HALEY ALDRICH

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REPORT ON

NPDES RGP APPLICATION FOR TEMPORARY CONSTRUCTION DEWATERING
BOSTON COLLEGE INSTITUTE FOR INTEGRATED SCIENCE AND SOCIETY
CHESTNUT HILL, MASSACHUSETTS

by Haley & Aldrich, Inc.
Boston, Massachusetts

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

File No. 128271-016
June 2019

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

10 June 2019
Revised 25 June 2019
File No. 128271-016

Environmental Protection Agency (EPA) Region 1
5 Post Office Square, Suite 100
Mail Code OEP06-1
Boston, Massachusetts 02109-3912

Attention: EPA/OEP RGP Applications Coordinator

Subject: Notice of Intent
NPDES RGP Application for Temporary Construction Dewatering
Boston College Institute for Integrated Science and Society
Chestnut Hill, Massachusetts

Ladies and Gentlemen:

On behalf of our client, Boston College, Haley & Aldrich, Inc. (Haley & Aldrich) is submitting this Notice of Intent (NOI) 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 Institute for Integrated Science and Society (IISS) Building, located on the Boston College Campus in Chestnut Hill, Massachusetts (herein referred to as the "Work Area"). A copy of the Notice of Intent form is included in Appendix A.

A. GENERAL SITE INFORMATION

The IISS site is located on the Boston College Campus and is currently occupied by Cushing Hall, which is surrounded by parking and landscaped areas. Cushing Hall is an academic building located within the Boston College middle campus that is planned to be demolished for construction of the new IISS building. The basement slab is stepped with varying basement slab elevations between El. 172.7and El. 175.2. The building is surrounded by parking and landscaped areas. The ground surface along the southern and eastern edges of Cushing Hall is relatively flat ranging from El. 182.5 to El. 181. North of Cushing Hall is a vegetated slope increasing from about El. 181 at Cushing Hall to about El. 188 at the Vivarium retaining wall. The top of the Vivarium retaining wall is approximately El. 198, and ground surface gradually slopes down to the west and south along the western edge of the existing building from approximately El. 195 to El. 182. Elevations are in feet and reference Boston City Base (BCB) datum.

The IISS project site is bordered to the west by an access road off Beacon Street and McGuinn and Fulton Halls, to the north by the basement retaining wall of the Vivarium portion of Higgins Hall, to the northeast by Higgins Hall, to the east by a parking area and the Service Building, and to the south by Campion Hall. Refer to Figure 1, Project Locus and Figure 2, Site and Subsurface Exploration Location Plan.

Current plans include the demolition of Cushing Hall and construction of a new approximately 27,000 sf 5-story building with one basement level (20,000 sf). The new building will occupy a slightly larger footprint than the existing Cushing Hall. The new basement will be larger in footprint than the existing basement of Cushing Hall and will be 10 to 13 ft lower than the existing Cushing Hall basement.

Numerous existing utilities are present within the project limits. Significant utilities include the Massachusetts Water Resources Authority (MWRA) Sudbury Aqueduct Tunnel. The tunnel easement is located approximately 25 ft south of the proposed building. The Sudbury River Aqueduct Tunnel was constructed by 1874 parallel to Beacon Street on the southern portion of the Boston College campus, providing water to the Chestnut Hill Reservoir system. The tunnel, presumably constructed in both bedrock and overburden soils, roughly parallels Beacon Street. Additional information on the tunnel will be required to evaluate potential impacts during construction.

Dewatering is anticipated to be required for construction of the building foundations, utilities, and drainage improvements. Groundwater levels measured at observation well locations ranged from El. 156.8 (HA-B7(OW)) to El. 162.2 (HA18-B8(OW)) in April 2018. Additional water may also be generated from surface runoff from precipitation, groundwater seepage, and construction-generated water (e.g., wheel washes, dust control, decontamination activities, water utility testing, etc.). Temporary construction dewatering is anticipated to begin in June 2019 and is estimated to occur intermittently over a period of approximately 12 months.

The concentration level of PCBs in soil (12.2 mg/kg) previously detected at the TP-4 area exceeded the MCP RCS-1 Reportable Concentration of 1 mg/kg. However, supplemental soil sampling and chemical testing program detected PCB concentration levels ranging from non-detect to less than 1 mg/kg and defined the vertical and lateral extent of PCB-impacted soil to be less than 10 cy. On 4 February 2019, approximately 12.83 tons of soil was excavated under the Limited Removal Action (LRA) provisions in accordance with the Massachusetts Contingency Plan (MCP), 310 CMR 40.0318 and disposed of off-site at the Turnkey receiving facility in Rochester, NH.

B. SOURCE WATER INFORMATION

To evaluate groundwater (source water) quality at the Work Area, one representative groundwater sample was obtained on 14 May 2019 from the monitoring well designated HA18-B8(OW), installed by Haley & Aldrich within the Work Area as part of a site characterization program. The well location is shown on Figure 2.

The groundwater sample was sent to a MassDEP-certified laboratory, Alpha Analytical, for analysis of constituents consistent with requirements of the 2017 NPDES Remediation General Permit, including volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polycyclic aromatic hydrocarbons (PAHs), total metals, total petroleum hydrocarbons (TPH), pesticides, polychlorinated biphenyls (PCBs), total suspended solids, chloride, total cyanide, total phenolics, and total residual chlorine.

A summary of the groundwater chemical analytical data is provided as Table I. Table I also includes previous groundwater results obtained during 2018 from monitoring well HA-B7(OW). Note that the 2018 groundwater data is superseded with the May 2019 data. The laboratory data reports are provided in Appendix F.

No VOCs and no SVOCs were detected in the groundwater sample above the laboratory detection limits. Two metals, total arsenic and total copper, were detected at concentrations below the site-specific effluent criteria.

C. RECEIVING WATER INFORMATION

Receiving water quality data was collected on 7 May 2019 in support of this NOI ; the results of which are summarized in Table II. Receiving water temperature was obtained in the field at 13 °C, and is noted on the effluent limitations input calculation page in Appendix B. The sample was collected from Leverett Pond approximately 200 ft from the proposed discharge area. The laboratory data report is provided in Appendix F.

The seven-day-ten-year flow (7Q10) of the receiving water was established using the U.S. Geological Survey (USGS) StreamStats program and confirmed by Massachusetts Department of Environmental Protection (MassDEP) on 30 May 2019. The StreamStats report, Dilution Factor calculations, and MassDEP confirmation of the 7Q10 and Dilution Factor are included in Appendix B.

The EPA suggested WQBEL Calculation spreadsheet was used to calculate the effluent criteria for the site. Groundwater and Receiving Water data were input, and the resulting criteria were tabulated in the attached Table I. Copies of the “EnterData” and “FreshwaterResults” 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.

D. DISCHARGE INFORMATION

During the excavation activities, it will be necessary to perform temporary construction dewatering to control surface water runoff from precipitation, groundwater seepage, and construction-generated water to enable excavations in-the-dry. Dewatering activities are anticipated to start in June 2019 and continue until May 2020. Construction dewatering will include piping and discharging water to a catch basin on-site. The catch basin drains to Leverett Pond via the Boston and Brookline sewer systems, which connect at Cleveland Circle. Refer to Figure 3 for the discharge route. We anticipate effluent

discharge rates to be about 50 gallons per minute (gpm) or less, with occasional peak flows of about 150 gpm during significant precipitation events. The temporary dewatering will take place in excavations and will be conducted with sumps located in excavations or from dewatering wells installed at the Site. 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 as requested by EPA.

E. DEWATERING TREATMENT SYSTEM INFORMATION

An effluent treatment system will be designed and implemented by the Contractor 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 is expected to include ion exchange resin as required to meet the discharge criteria (product information is included in Appendix C). 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. 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.

F. ADDITIONAL TREATMENT INFORMATION

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.).

G. 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 are considered to meet FWS Criterion A as no listed species or critical habitat have been established to be present within the project action area.

H. 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 Work Area; however, Leverett Pond is located within the Olmsted Park System, which is referenced in the National Register of Historic Places under Reference Number: 71000086. The discharges and discharge-related activities are not considered to have the potential to

negatively affect Olmsted Park, and the discharge is considered to meet Criterion B. Documentation is included in Appendix E.

I. SUPPLEMENTAL INFORMATION

Owner and operation information are provided below for reference:

Owner:
Boston College
140 Commonwealth Avenue
Chestnut Hill, Massachusetts 02467
Attn: Thomas Runyon

Operator:
Suffolk Construction Company, Inc.
65 Allerton Street
Boston, MA 02119
Attn: Frank Davis

Suffolk is seeking coverage under the RGP as permittee.

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.

Keila T. Munz
Scientist

Cole E. Worthy, III, LSP
Senior Associate

Enclosures:
- Table I – Summary of Source Water Quality Data
- Table II – Summary of Receiving Water Quality Data
- Figure 1 – Project Locus
- Figure 2 – Site and Subsurface Exploration Location Plan
- Figure 3 – Discharge Route – Boston Water and Sewer Commission and Brookline Sewer
- 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: Boston College Capital Projects Management; Attn: Thomas Runyon
Suffolk Construction Company, Inc.; Attn: Frank Davis

TABLES

TABLE I
SUMMARY OF GROUNDWATER QUALITY DATA
BOSTON COLLEGE - IISS
CHESTNUT HILL, MA
FILE NO. 128271-016

Location Name Sample Name Sample Date Sample Type Lab Sample ID	2017 NPDES RGP Site-Specific Criteria	HA18-B8 HA18-B8 (OW)_052019 05/14/2019 Primary L1920160-01	HA-B7(OW) HA-B7(OW)_041618 04/16/2018 Primary L1813184-01	HA-B7(OW) HA-B7(OW)_041918 04/19/2018 Primary L1813817-01	HA-B7(OW) HA18-B7 (OW)-100118 10/01/2018 Primary L1839470-01
Volatile Organic Compounds (ug/L)					
Total BTEX	100	-	-	-	-
SUM Volatile Organic Compounds	NA	ND	ND	ND	ND
Volatile Organic Compounds SIM (ug/L)					
1,4-Dioxane	200	ND (50)	-	-	-
Semi-Volatile Organic Compounds (ug/L)					
SUM Volatile Organic Compounds	NA	ND	ND	ND	ND
Semi-Volatile Organic Compounds (SIM) (ug/L)					
SUM of Group I PAHs	1	ND	ND	ND	ND
SUM of Group II PAHs	100	ND	ND	ND	ND
SUM of Semi-Volatile Organic Compounds (SIM)	NA	ND	ND	ND	ND
Total Petroleum Hydrocarbons (ug/L)					
Petroleum hydrocarbons	5000	ND (4000)	-	-	-
Inorganic Compounds (ug/L)					
Antimony, Dissolved	NA	-	-	ND (4)	-
Arsenic, Dissolved	NA	-	-	1.9	-
Cadmium, Dissolved	NA	-	-	0.3	-
Chromium, Dissolved	NA	-	-	1.3	-
Chromium VI (Hexavalent), Dissolved	323	ND (10)	ND (10)	-	-
Copper, Dissolved	NA	-	-	13.8	-
Iron, Dissolved	NA	-	-	82	-
Lead, Dissolved	NA	-	-	ND (1)	-
Mercury, Dissolved	NA	-	-	ND (0.2)	-
Nickel, Dissolved	NA	-	-	2.8	-
Selenium, Dissolved	NA	-	-	ND (5)	-
Silver, Dissolved	NA	-	-	11.8	ND (7)
Zinc, Dissolved	NA	-	-	11.8	-
Antimony, Total	206	ND (4)	ND (4)	-	-
Arsenic, Total	104	1.2	6.48	-	-
Cadmium, Total	10.2	ND (0.2)	0.22	-	-
Chromium, Total	NA	ND (1)	76.43	-	-
Copper, Total	242	4.77	761.4	-	-
Cyanide, Total	178	ND (5)	-	-	-
Hardness, Total	NA	269000	-	-	-
Iron, Total	5000	ND (50)	19900	-	-
Lead, Total	160	ND (1)	69.24	-	-
Mercury, Total	0.739	ND (0.2)	ND (0.2)	-	-
Nickel, Total	1450	ND (2)	60.69	-	-
Selenium, Total	235.8	ND (5)	ND (5)	-	-
Silver, Total	35.1	ND (0.4)	302.1	-	-
Zinc, Total	420	ND (10)	71.28	-	-
Other					
Ammonia, Total (ug/L)	Report	ND (75)	-	-	-
Chloride, Total (ug/L)	Report	344000	3580000	-	-
Chlorine, residual, Total (ug/L)	15	ND (20)	-	-	-
Chromium III (Trivalent), Total (ug/L)	323	ND (10)	76	-	-
Total phenols (ug/L)	1080	ND (30)	-	-	-
Total Suspended Solids (TSS) (ug/L)	30000	ND (5000)	-	260000	-
pH (lab), Total (pH units)	NA	7.6	7.8	-	-
Pesticides and PCBs (ug/L)					
SUM of PCBs	0.000064	ND	-	-	-

ABBREVIATIONS AND NOTES:
-: Not Analyzed
µg/L: micrograms per liter
NA: Not Applicable
ND (2.5): Not detected, number in parentheses is the laboratory detection limit

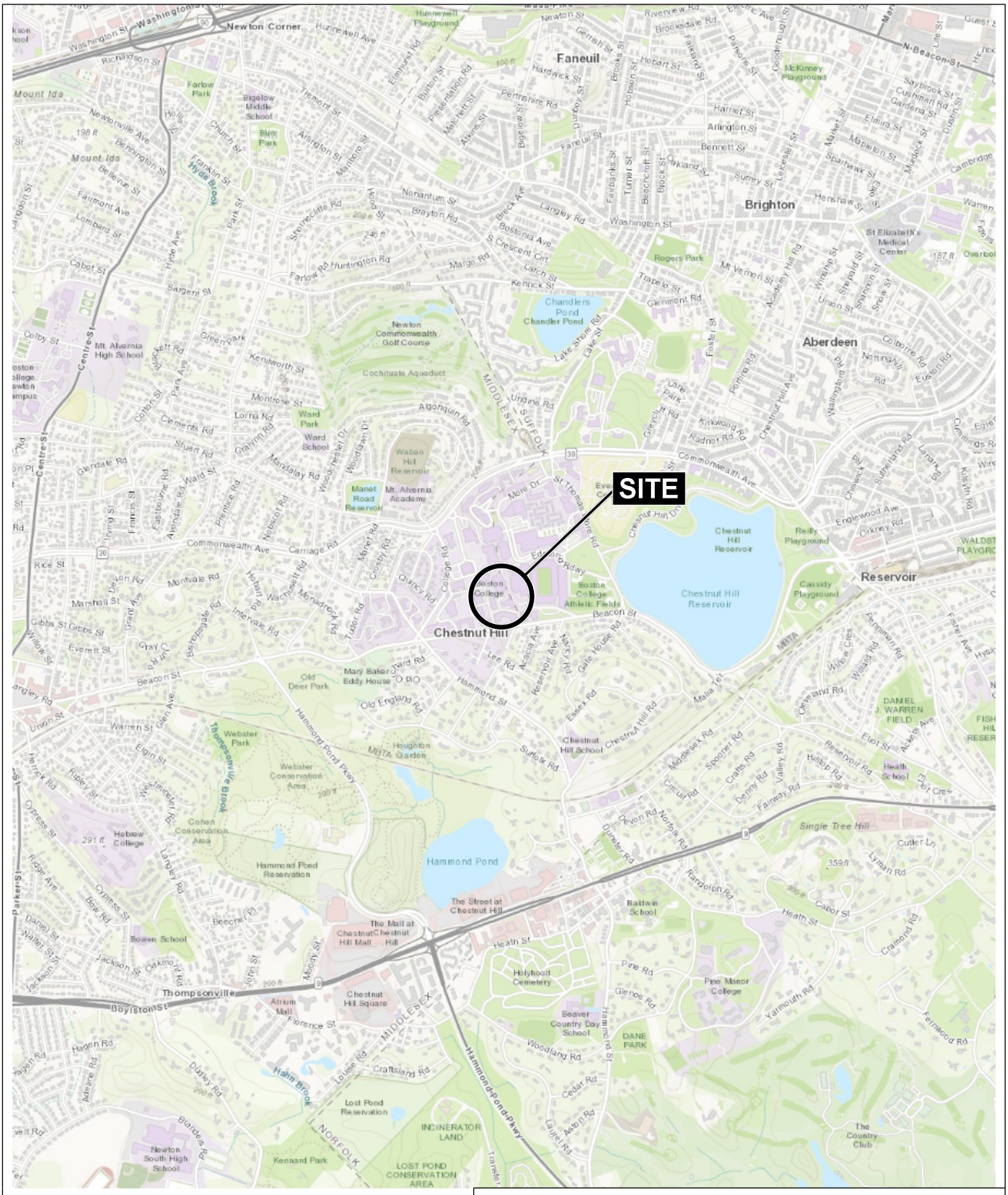
- Analytes detected in at least one sample are reported herein. For a complete list of analytes see the laboratory data sheets.

TABLE II
SUMMARY OF RECEIVING WATER QUALITY DATA
BOSTON COLLEGE CENTRAL HEATING PLANT
CHESTNUT HILL, MA
FILE NO. 128271-018

Precharacterization Grid	
Location Name	2019 RECEIVING
Sample Name	2019 RECEIVING-20190507
Sample Date	05/07/2019
Lab Sample ID	L1918984-01
Inorganic Compounds (ug/L)	
Chromium VI (Hexavalent), Dissolved	ND (10)
Antimony, Total	ND (4)
Arsenic, Total	ND (1)
Cadmium, Total	ND (0.2)
Chromium, Total	ND (1)
Copper, Total	2.98
Hardness, Total	128000
Iron, Total	965
Lead, Total	2.86
Mercury, Total	ND (0.2)
Nickel, Total	ND (2)
Selenium, Total	ND (5)
Silver, Total	ND (0.4)
Zinc, Total	ND (10)
Other	
pH (lab), Total (pH units)	6.9
Ammonia, Total (ug/L)	189
Chromium III (Trivalent), Total (ug/L)	ND (10)

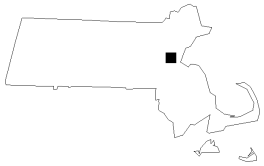
NOTES & ABBREVIATIONS:
ug/l: micrograms per liter
ND (1): not detected, number in parentheses is the reporting limit

FIGURES



MAP SOURCE: ESRI

SITE COORDINATES: 42°20'4"N, 71°10'7"W



HALEY ALDRICH

INSTITUTE FOR INTEGRATED SCIENCE AND SOCIETY
BOSTON COLLEGE
CHESTNUT HILL, MASSACHUSETTS

PROJECT LOCUS

APPROXIMATE SCALE: 1 IN = 2000 FT

JUNE 2019

FIGURE 1

128271-018_1_LOCUS.PDF

LIMITS OF FULTON HALL (EXISTING)

APPROXIMATE LIMITS OF PROPOSED BUILDING

LIMITS OF HIGGINS HALL (EXISTING)

SEE INSET

LIMITS OF CUSHING HALL (EXISTING)

APPROXIMATE LIMIT OF WORK

APPROXIMATE LIMITS OF PROPOSED BASEMENT

PROPOSED DEWATERING DISCHARGE POINT TO DRAIN LINE

LIMITS OF SERVICE BUILDING (EXISTING)

LIMITS OF MCGUIN HALL (EXISTING)

LIMITS OF CAMPION HALL (EXISTING)

HA18-B8(OW)

TP-1

TP-2

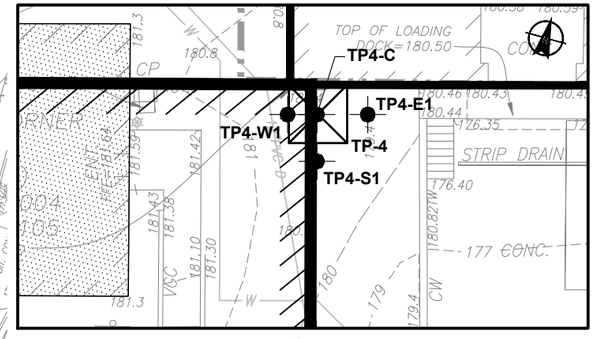
TP-3

TP-4

20' WIDE CITY OF NEWTON DRAIN EASEMENT

COMMONWEALTH OF MASSACHUSETTS EASEMENT (20' WIDE–SUDBURY AQUADUCT)

20' WIDE CITY OF NEWTON SEWER EASEMENT



INSET

0 10 20

SCALE IN FEET

LEGEND

HA18-B8(OW) DESIGNATION AND APPROXIMATE LOCATION OF BORING DRILLED BETWEEN 29 MARCH AND 10 APRIL 2018 BY NEW ENGLAND BORING CONTRACTORS AND MONITORED BY HALEY & ALDRICH, INC.

TP4-W1 DESIGNATION AND APPROXIMATE LOCATION OF GEOPROBE BORING DRILLED BY NORTHERN DRILL SERVICE ON 31 OCTOBER 2018.

TP-1 DESIGNATION AND APPROXIMATE LOCATION OF TEST PIT EXCAVATED BY W.L. FRENCH BETWEEEN 14 AND 17 SEPTEMBER 2018.

PROPOSED DISCHARGE POINT AND ROUTE

NOTE

1. BASE PLAN TAKEN FROM AN ELECTRONIC FILE TITLED "10572cut - 2018-03-12.dwg", PROVIDED BY NITSCH ENGINEERING ON 13 MARCH 2018. APPROXIMATE LIMITS OF PROPOSED BUILDINGS TAKEN FROM ELECTRONIC FILES TRANSMITTED BY PAYETTE ON 18 APRIL 2018.

0 40 80

SCALE IN FEET

HALEY ALDRICH

INTEGRATED INSTITUTE OF SCIENCE AND SOCIETY
BOSTON COLLEGE
CHESTNUT HILL, MASSACHUSETTS

SITE AND SUBSURFACE EXPLORATION LOCATION PLAN

SCALE: AS SHOWN
JUNE 2019

FIGURE 2

ERVIN, DAYNA Printed: 1/24/2019 11:34 AM Layout: B020
J:\GRAPHICS\128271\128271-016-B020.DWG

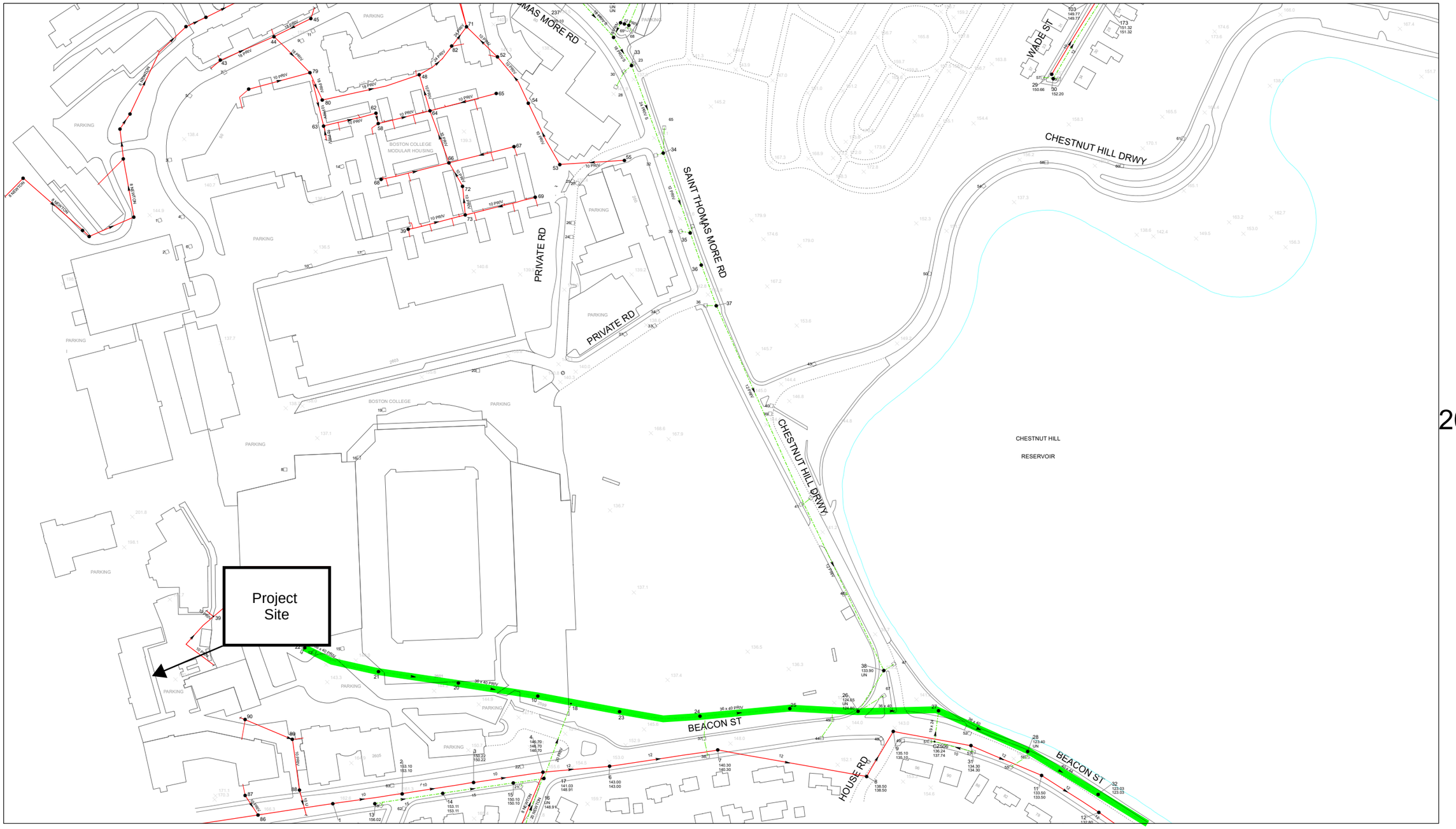
21C

21D

20D

19C

19D



NOTE: Spot Elevations shown are plotted in Boston City Base

DATE OF PHOTOGRAPHY - MARCH 30, APRIL 1 & 17, 1995
VERTICAL DATUM BASED ON THE BOSTON CITY BASE

THE LANDBASE ON THIS MAP WAS COMPILED TO MEET THE ASPRS STANDARD FOR CLASS 1 MAP ACCURACY

Date Produced:
4/25/2018

BOSTON WATER AND SEWER COMMISSION

SEWER SYSTEM

ALLSTON/BRIGHTON

SHEET NO.
20C

20C

20D

19D

NOTE: Spot Elevations shown are plotted in Boston City Base

DATE OF PHOTOGRAPHY - MARCH 30, APRIL 1 & 17, 1995
VERTICAL DATUM BASED ON THE BOSTON CITY BASE

THE LANDBASE ON THIS MAP WAS COMPILED TO MEET THE ASPRS STANDARD FOR CLASS 1 MAP ACCURACY

Date Produced:
4/25/2018

BOSTON WATER AND SEWER COMMISSION

SEWER SYSTEM

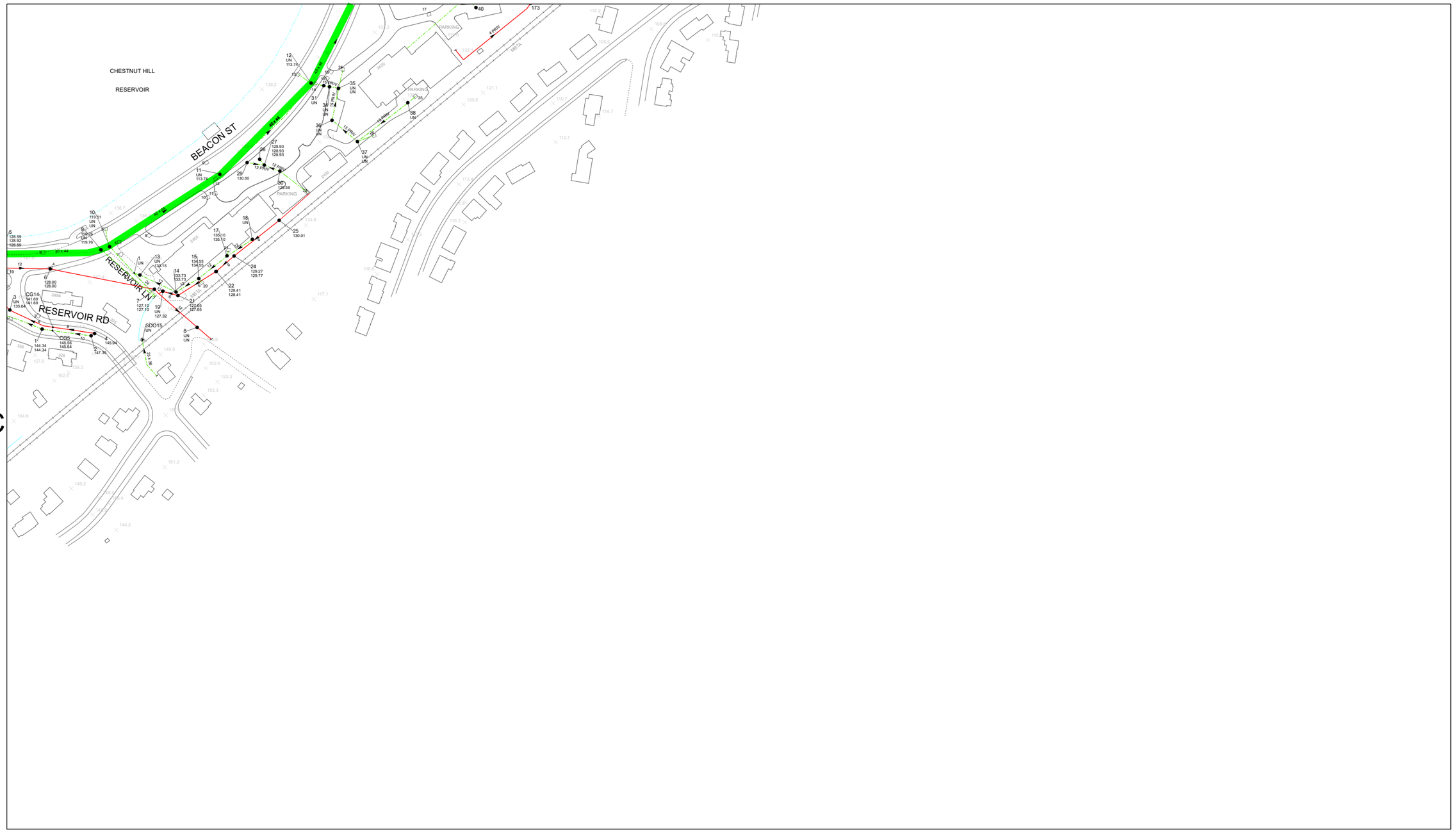
ALLSTON/BRIGHTON

SHEET NO.
19C

20C

20D

19C



SCALE IN FEET

NOTE: Spot Elevations shown are plotted in Boston City Base

DATE OF PHOTOGRAPHY - MARCH 30, APRIL 1 & 17, 1995
VERTICAL DATUM BASED ON THE BOSTON CITY BASE

THE LANDBASE ON THIS MAP WAS COMPILED TO MEET THE ASPRS STANDARD FOR CLASS 1 MAP ACCURACY

Date Produced:
4/25/2018

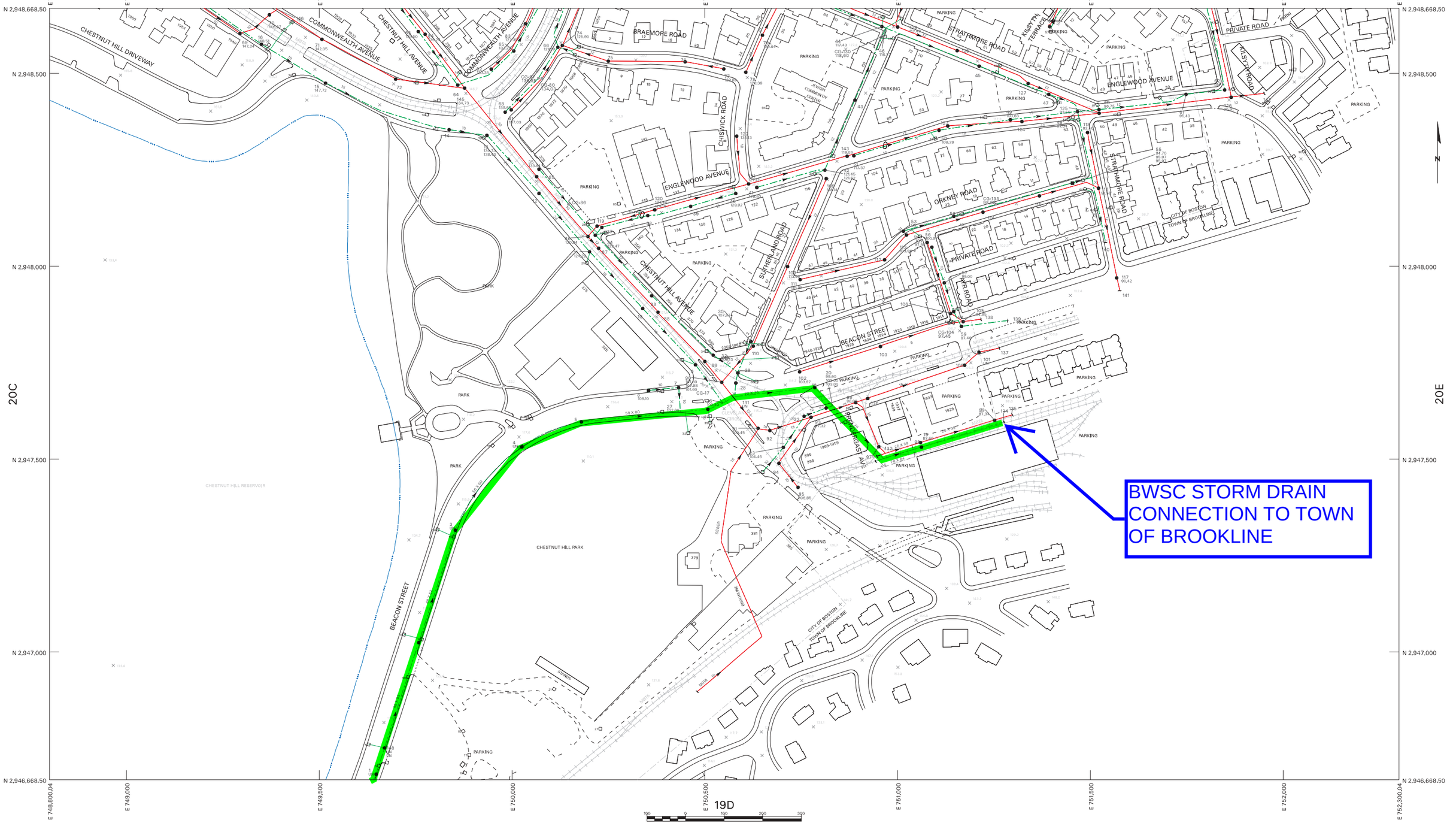
BOSTON WATER AND SEWER COMMISSION

SEWER SYSTEM

ALLSTON/BRIGHTON

SHEET NO.
19D

FIGURE 3: DISCHARGE ROUTE



NOTE: Spot Elevations shown are plotted in Boston City Base

500 FOOT GRID BASED ON MASSACHUSETTS STATE PLANE COORDINATE SYSTEM, NAD 83

DATE OF PHOTOGRAPHY - MARCH 30, APRIL 1 & 17, 1995
VERTICAL DATUM BASED ON THE BOSTON CITY BASE

THE LANDBASE ON THIS MAP WAS COMPILED TO MEET THE ASPRS STANDARD FOR CLASS 1 MAP ACCURACY

Date Produced
August 26, 2005

BOSTON WATER AND SEWER COMMISSION

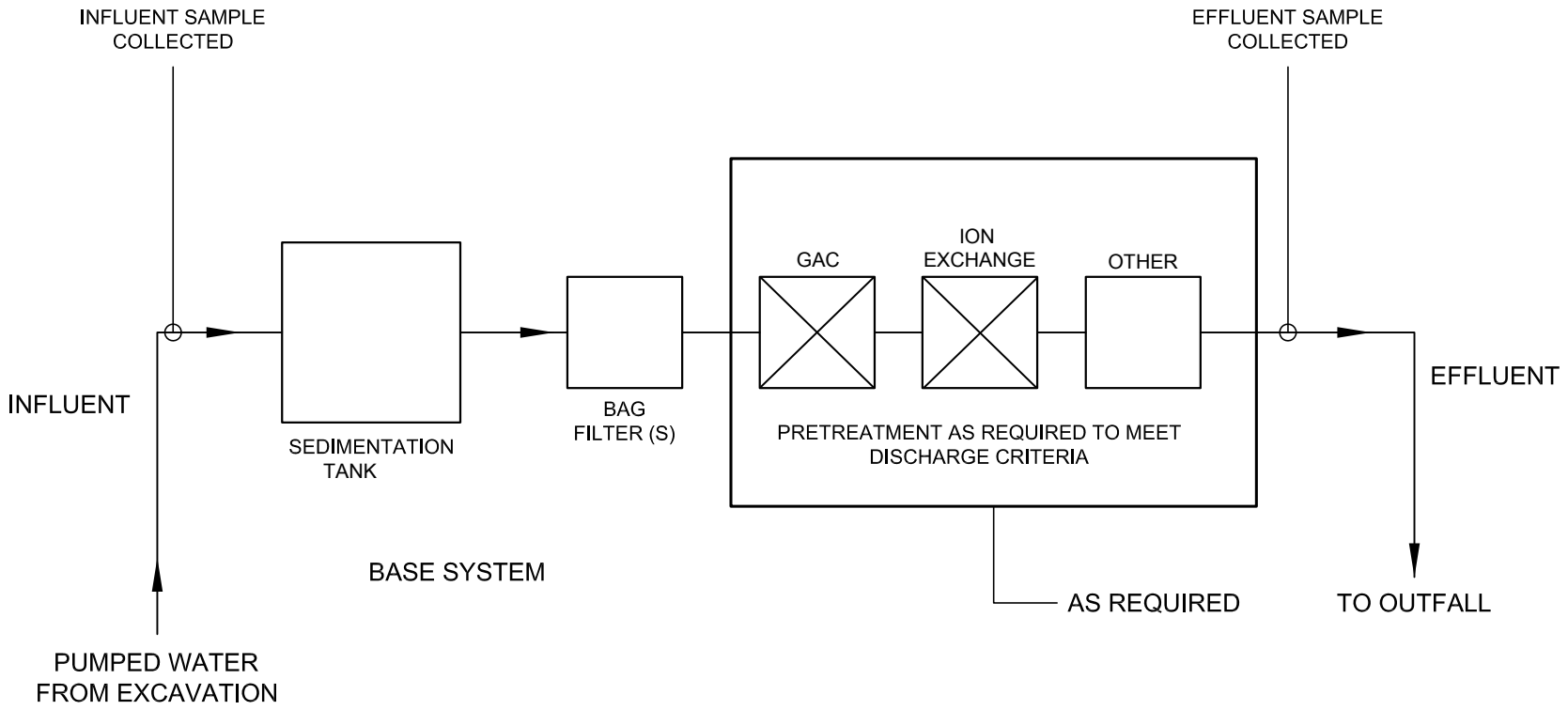
SEWER SYSTEM MAP

ALLSTON/BRIGHTON

SHEET NO.
20D

FIGURE 3: DISCHARGE ROUTE
PAGE 5 OF 5

BWSC Storm Drain (Cleveland Circle) to Village Brook to Leverett Pond



LEGEND:

→ DIRECTION OF FLOW

☒ INDICATES TECHNOLOGY EXPECTED TO BE USED ON THIS PROJECT

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

INSTITUTE FOR INTEGRATED SCIENCE AND SOCIETY
CHESTNUT HILL, MASSACHUSETTS

PROPOSED TREATMENT SYSTEM SCHEMATIC

SCALE: NONE
JUNE 2019

FIGURE 4

APPENDIX A

Notice of Intent

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:
Boston College Institute for Integrated Science and Society Building</td><td colspan="3">Site address: Institute for Integrated Science and Society
Boston College
Street: 140 Commonwealth Avenue</td></tr>
<tr><td>City: Chestnut Hill</td><td>State: MA</td><td>Zip: 02467</td></tr>
<tr><td rowspan="4">2. Site owner
Boston College

Owner is (check one): ☐ Federal ☐ State/Tribal ■ Private
■ Other; if so, specify: Institutional</td><td colspan="3">Contact Person: Thomas Runyon</td></tr>
<tr><td colspan="2">Telephone: 617-522-8992</td><td>Email: thomas.runyon@bc.edu</td></tr>
<tr><td colspan="3">Mailing address:
Street: 140 Commonwealth Avenue</td></tr>
<tr><td>City: Chestnut Hill</td><td>State: MA</td><td>Zip: 02467</td></tr>
<tr><td rowspan="4">3. Site operator, if different than owner
Suffolk Construction</td><td colspan="3">Contact Person: Frank Davis, Superintendent</td></tr>
<tr><td colspan="2">Telephone: 617-445-3500</td><td>Email: FDavis@suffolk.com</td></tr>
<tr><td colspan="3">Mailing address:
Street: 65 Allerton Street</td></tr>
<tr><td>City: Boston</td><td>State: MA</td><td>Zip: 02119</td></tr>
<tr><td>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="3">5. Other regulatory program(s) that apply to the site (check all that apply):
■ MA Chapter 21e; list RTN(s):

☐ 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):
Leverett Pond	MA72-11	Class B (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. Bottom Deposits, non-native aquatic plants, flow regime or substrate habitat alterations, DDT + PCB in fish tissue, E. coli (TMDL), Oil and Grease, DO, Phosphorus, Taste and Odor, Final TMDL not required or listed.

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.	0.0724 MGD
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.	1.34

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: 30 May 2019

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: Although "Contaminated Groundwater" is listed, see table for compounds actually detected.

2. Source water contaminants: None above RGP effluent criteria: Total Ar, Cu, and Cl; attributable to urban fill on-site.	
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): Leverett Pond, Brookline, MA	Outfall location(s): (Latitude, Longitude) 42.3303, -71.1138
Discharges enter the receiving water(s) via (check any that apply): ☐ Direct discharge to the receiving water ■ Indirect discharge, if so, specify: Pump to catch basin that flows to Leverett Pond ☐ 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: 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): June 2019 to May 2020 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="4">☐ 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	121,4500N	75	<75	<75	Report mg/L	---
Chloride		✔	1	44,300.0	12500	344000	344000	Report µg/l	---
Total Residual Chlorine	✔		1	121,4500C	20	<20	<20	0.2 mg/L	15
Total Suspended Solids		✔	1	121,2540D	5000	<5000	<5000	30 mg/L	---
Antimony	✔		1	3,200.8	4	<4	<4	206 µg/L	855
Arsenic		✔	1	3,200.8	1	1.2	1.2	104 µg/L	13
Cadmium	✔		1	3,200.8	0.2	<0.2	<0.2	10.2 µg/L	0.6775
Chromium III	✔		1	107,-	10	<10	<10	323 µg/L	230.5
Chromium VI	✔		1	1,7196A	10	<10	<10	323 µg/L	15.3
Copper		✔	1	3,200.8	1	4.77	4.77	242 µg/L	25.7
Iron	✔		1	19,200.7	50	<50	<50	5,000 µg/L	1335
Lead		✔	1	3,200.8	1	<1	<1	160 µg/L	12.51
Mercury		✔	1	3,245.1	0.2	0	0	0.739 µg/L	1.21
Nickel		✔	1	3,200.8	2	0	0	1,450 µg/L	142.8
Selenium	✔		1	3,200.8	5	<5	<5	235.8 µg/L	6.7
Silver	✔		1	3,200.8	0.4	<0.4	<0.4	35.1 µg/L	21.7
Zinc		✔	1	3,200.8	10	0	0	420 µg/L	328.3
Cyanide	✔		1	121,4500C	5	<5	<5	178 mg/L	6.9
B. Non-Halogenated VOCs									
Total BTEX	✔		1	NA	NA	NA	NA	100 µg/L	---
Benzene	✔		1	128,624.1	10	<10	<10	5.0 µg/L	---
1,4 Dioxane	✔		1	128,624.1-	50	<50	<50	200 µg/L	---
Acetone		✔	1	128,624.1	10	0	0	7.97 mg/L	---
Phenol	✔		1	4,420.1	30	<30	<30	1,080 µg/L	401

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	2.1
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	NA	NA	NA	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	4.4
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	NA	0	0	190 µg/L	---
Diethylhexyl phthalate		✔	1	129,625.1	2.2	0	0	101 µg/L	2.9
Total Group I PAHs		✔	1	129,625.1	NA	0	0	1.0 µg/L	---
Benzo(a)anthracene		✔	1	129,625.1-	0.1	0	0	As Total PAHs	0.0051
Benzo(a)pyrene		✔	1	129,625.1-	0.1	0	0		0.0051
Benzo(b)fluoranthene		✔	1	129,625.1-	0.1	0	0		0.0051
Benzo(k)fluoranthene		✔	1	129,625.1-	0.1	0	0		0.0051
Chrysene		✔	1	129,625.1-	0.1	0	0		0.0051
Dibenzo(a,h)anthracene		✔	1	129,625.1-	0.1	0	0		0.0051
Indeno(1,2,3-cd)pyrene		✔	1	129,625.1-	0.1	0	0		0.0051

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-	NA	0	0	100 µg/L	---
Naphthalene	✔		1	129,625.11	0.1	<0.1	<0.1	20 µg/L	---
E. Halogenated SVOCs									
Total PCBs		✔	1	E608.3	0.25	<0.25	<0.25	0.000064 µg/L	---
Pentachlorophenol	✔		1	1129,625.1	1	0	0	1.0 µg/L	---
F. Fuels Parameters									
Total Petroleum Hydrocarbons		✔	1	74,1664A	4000	0	0	5.0 mg/L	---
Ethanol	✔		1	NA	NA	NA	NA	Report mg/L	---
Methyl-tert-Butyl Ether	✔		1	128,624.1	10	NA	NA	70 µg/L	27
tert-Butyl Alcohol	✔		1	128,624.1	100	NA	NA	120 µg/L in MA 40 µg/L in NH	---
tert-Amyl Methyl Ether	✔		1	128,624.1	20	NA	NA	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:									
Hardness		✔	1	19200.7	660	269000	269000		
Acenaphthene		✔	1	SW8270D	NA	0	0		
Acenaphthylene		✔	1	SW8270D	NA	0	0		
Phenanthrene		✔	1	SW8270D	NA	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:

Ion exchange to address metals. Other treatments to be applied as necessary to meet effluent limits.

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 constituents. 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. 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 include one or more VOCs, SVOCs, 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: Flowmeter 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 gpm
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:

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.

Refer to attached Haley & Aldrich, Inc. letter

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.

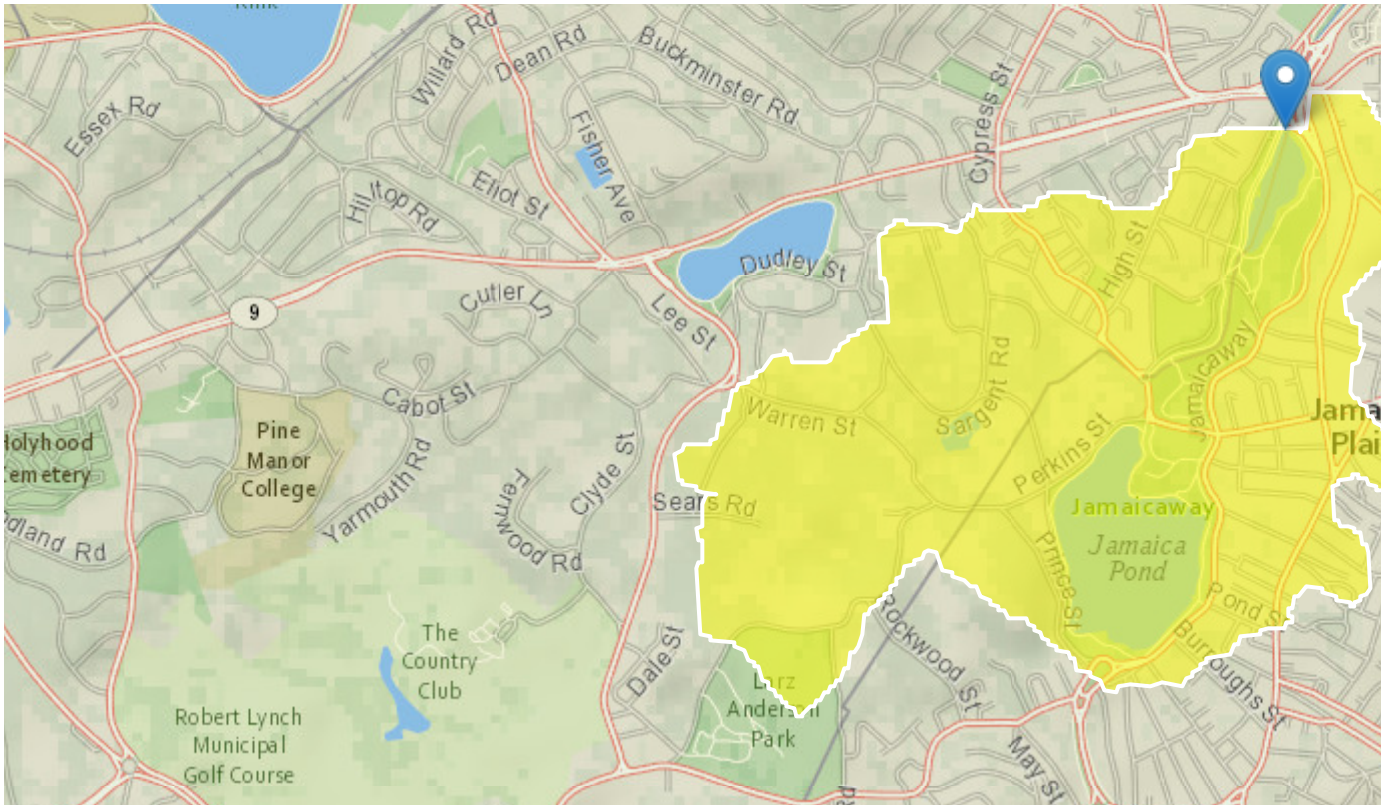
BMPP certification statement: A BMPP meeting the requirements of the his general permit will be implemented at the site upon initiation of discharge.	
Notification provided to the appropriate State, including a copy of this NOI, if required.	Check one: Yes ☐ No ☐ N/A
Notification provided to the municipality 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: Frank Davis	Date: 6/7/19
Print Name and Title: Frank Davis, Superintendent, Suffolk Construction	

APPENDIX B

Effluent Limitations Documentation

StreamStats Report

Region ID: MA
Workspace ID: MA20190515125937161000
Clicked Point (Latitude, Longitude): 42.33058, -71.11373
Time: 2019-05-15 08:59:52 -0400



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
MAREGION	Region of Massachusetts 0 for Eastern 1 for Western	0	dimensionless
DRFTPERSTR	Area of stratified drift per unit of stream length	0.48	square mile per mile
DRNAREA	Area that drains to a point on a stream	1.36	square miles
BSLDEM250	Mean basin slope computed from 1:250K DEM	3.309	percent
ELEV	Mean Basin Elevation	99.7	feet
LC06STOR	Percentage of water bodies and wetlands determined from the NLCD 2006	9.84	percent

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

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.36	square miles	1.61	149
BSLDEM250	Mean Basin Slope from 250K DEM	3.309	percent	0.32	24.6
DRFTPERSTR	Stratified Drift per Stream Length	0.48	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 errorsOne 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	0.212	ft^3/s
7 Day 10 Year Low Flow	0.112	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. (http://pubs.usgs.gov/wri/wri004135/)

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Application Version: 4.3.0

HALEY & ALDRICH, INC.		**CALCULATIONS**	**FILE NO.**	**128271-016**
			SHEET	**1 of 1**
CLIENT	**BOSTON COLLEGE**		**DATE**	**22-May-19**
PROJECT	**INTITUTE FOR INTEGRATED SCIENCE AND SOCIETY**		**COMPUTED BY**	**KTM**
SUBJECT	**DILUTION FACTOR CALCULATIONS**		**CHECKED BY**	

PURPOSE: Calculate Dilution Factor (DF) for project based on 7 Day 10 Year (7Q10) Low Flow values.

APPROACH: Calculate DF based on EPA formula $(Q_S + Q_D)/Q_D$, where Q_S is 7Q10 in million gallons per day (MGD) and Q_D is discharge flow in MGD.

ASSUMPTIONS:
1. 7Q10 is 0.112 cfs (from StreamStats 4.0)
2. A conversion of 7.48 is used to convert cubic feet to gallons
3. A discharge flowrate of 150 gpm is assumed

CALCULATIONS:

7Q10 Low Flow Value (Q_S)

$$Q_S = \frac{0.112\ ft^3}{sec} \times \frac{7.48\ gallons}{ft^3} \times \frac{86{,}400\ sec}{day} \times \frac{1\ MG}{1{,}000{,}000\ gallons}$$

Q_S = 0.0724 MGD

Discharge Flowrate (Q_D)

$$Q_D = \frac{150\ gallons}{min} \times \frac{1{,}440\ min}{day} \times \frac{1\ MG}{1{,}000{,}000\ gallons}$$

Q_D = 0.216 MGD

Dilution Factor (DF)

$$DF = \frac{Q_S + Q_D}{QD} = \frac{0.0724\ MGD + 0.216\ MGD}{0.216\ MGD} = 1.34$$

CONCLUSION The dilution factor for this project is calculated to be 1.34 based on the provided 7Q10 low flow value and discharge flowrate.

Dilution Factor	1.3			
	TBEL applies if bolded		WQBEL applies if bolded	
A. Inorganics				
Ammonia	**Report**	mg/L	---	
Chloride	**Report**	µg/L	---	
Total Residual Chlorine	0.2	mg/L	**15**	µg/L
Total Suspended Solids	**30**	mg/L	---	
Antimony	**206**	µg/L	855	µg/L
Arsenic	**104**	µg/L	13	µg/L
Cadmium	**10.2**	µg/L	0.6775	µg/L
Chromium III	**323**	µg/L	230.5	µg/L
Chromium VI	**323**	µg/L	15.3	µg/L
Copper	**242**	µg/L	25.7	µg/L
Iron	**5000**	µg/L	1335	µg/L
Lead	**160**	µg/L	12.51	µg/L
Mercury	**0.739**	µg/L	1.21	µg/L
Nickel	**1450**	µg/L	142.8	µg/L
Selenium	**235.8**	µg/L	6.7	µg/L
Silver	**35.1**	µg/L	21.7	µg/L
Zinc	**420**	µg/L	328.3	µg/L
Cyanide	**178**	mg/L	6.9	µg/L
B. Non-Halogenated VOCs				
Total BTEX	**100**	µg/L	---	
Benzene	**5.0**	µg/L	---	
1,4 Dioxane	**200**	µg/L	---	
Acetone	**7970**	µg/L	---	
Phenol	**1,080**	µg/L	401	µg/L
C. Halogenated VOCs				
Carbon Tetrachloride	**4.4**	µg/L	2.1	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	4.4	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	2.9	µg/L
Total Group I Polycyclic Aromatic Hydrocarbons	**1.0**	µg/L	---	
Benzo(a)anthracene	**1.0**	µg/L	0.0051	µg/L
Benzo(a)pyrene	**1.0**	µg/L	0.0051	µg/L
Benzo(b)fluoranthene	**1.0**	µg/L	0.0051	µg/L
Benzo(k)fluoranthene	**1.0**	µg/L	0.0051	µg/L
Chrysene	**1.0**	µg/L	0.0051	µg/L
Dibenzo(a,h)anthracene	**1.0**	µg/L	0.0051	µg/L
Indeno(1,2,3-cd)pyrene	**1.0**	µg/L	0.0051	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	---	
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	27	µg/L
tert-Butyl Alcohol	**120**	µg/L	---	
tert-Amyl Methyl Ether	**90**	µg/L	---	

Compliance Level applies if shown		
50	µg/L	
---	µg/L	

---	µg/L
---	µg/L
---	µg/L
---	µg/L
---	µg/L
---	µg/L
---	µg/L

0.5	µg/L

APPENDIX C

Additional Treatment Information

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

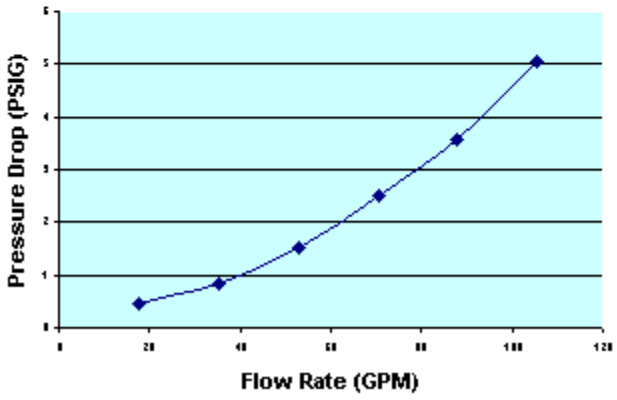
HPAF SERIES FILTERS
MODEL HPAF-2000

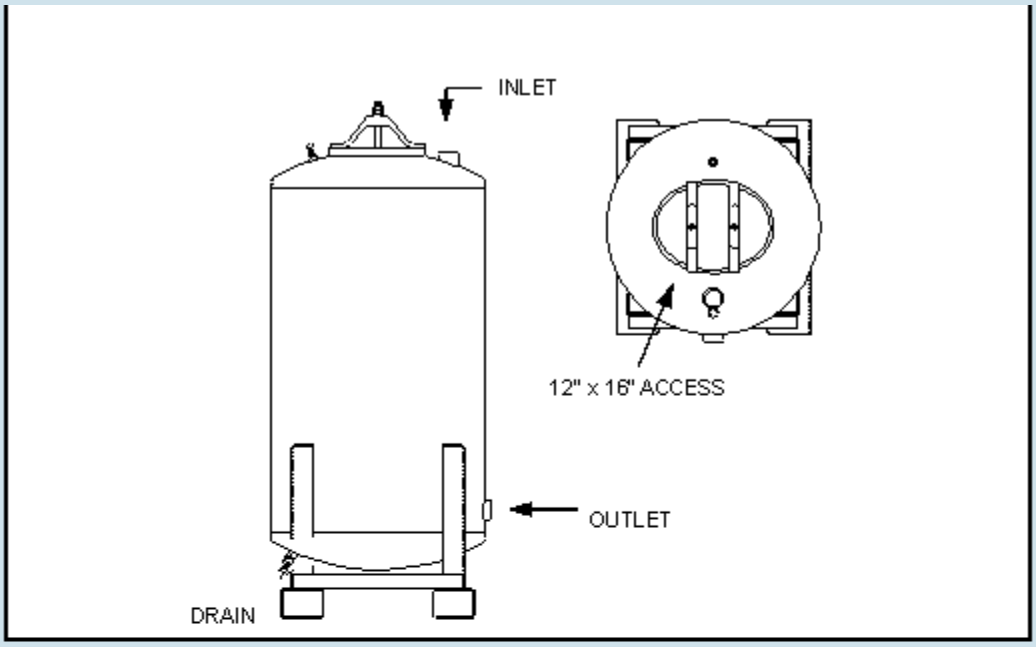
The HPAF-2000 filter is a media filter vessel designed to treat liquid streams. While the typical design application is a activated carbon adsorbtion unit, the filter can easily accommodate many medias. Some applications include:

- 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

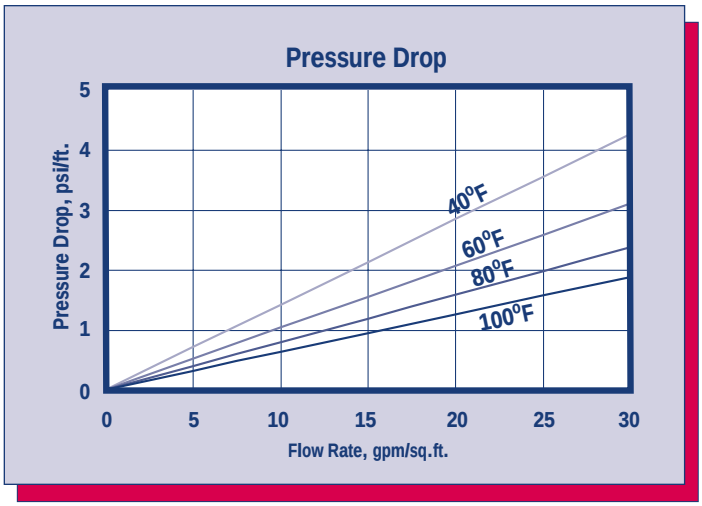
RESINTECH CGS is a high purity, light colored, high capacity, gel type sulfonated polystyrene cation resin supplied in the sodium form as moist, tough uniform spherical beads. *ResinTech CGS* specifically is intended for use in all water softening applications,including beverages, potable water and water 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.)

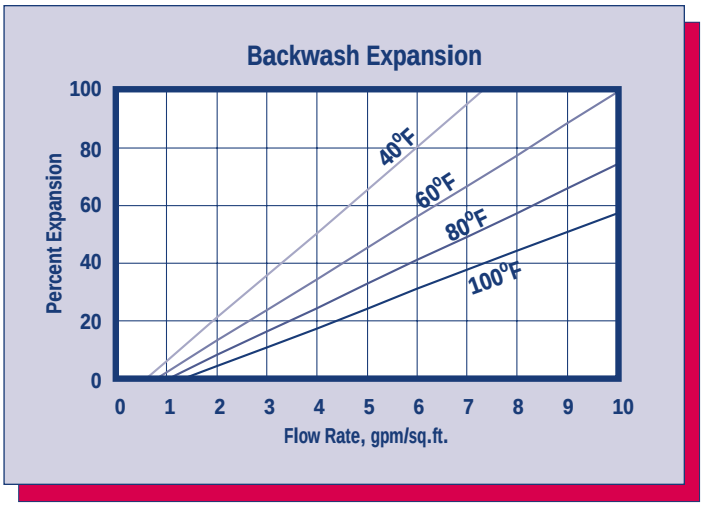
FEATURES & BENEFITS

- **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.

CGSver010603

SBG1

ANION EXCHANGE RESIN TYPE ONE GEL Cl OR OH FORM

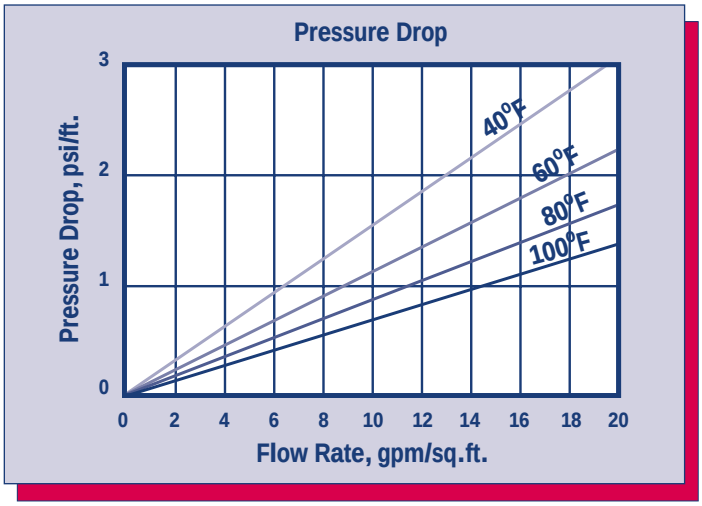
RESINTECH SBG1 is a high capacity, shock resistant, gelular, Type 1, strongly basic anion exchange resin supplied in the chloride or hydroxide form as moist, tough, uniform, spherical beads. *RESINTECH SBG1* is intended for use in all types of deionization systems and chemical processing applications. 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.

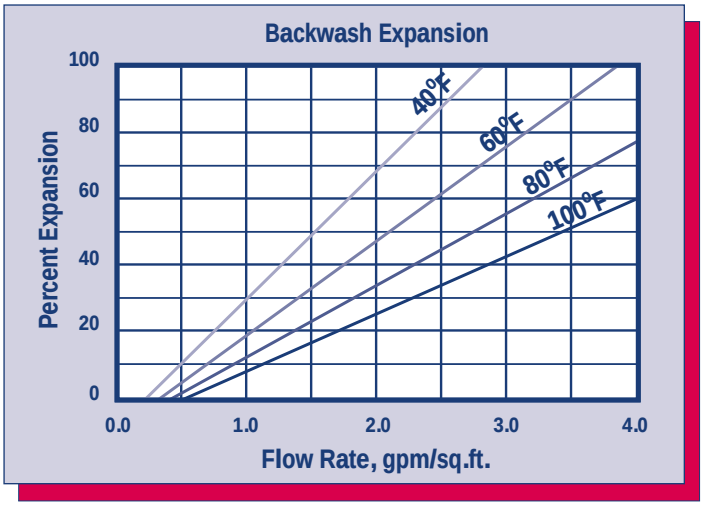
FEATURES & BENEFITS

- **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.

***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.

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

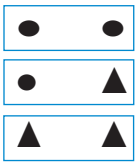
Choose from Hach's Broad Range of Digital and Analog Sensors

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	▲

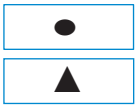
● = Digital ▲ = Analog

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



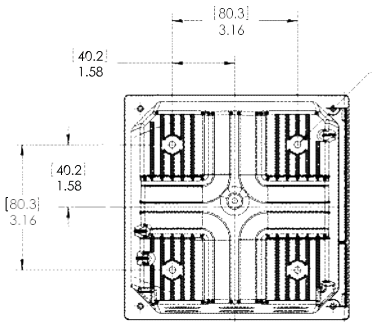
Specifications*

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.*

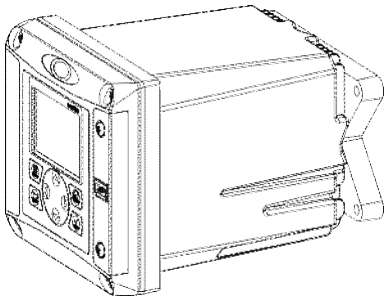
Dimensions

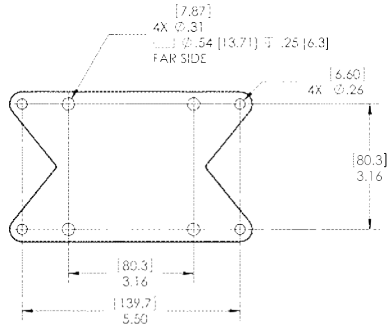
Surface Mounting Dimensions



Mounting Dimensions
(Rear View)

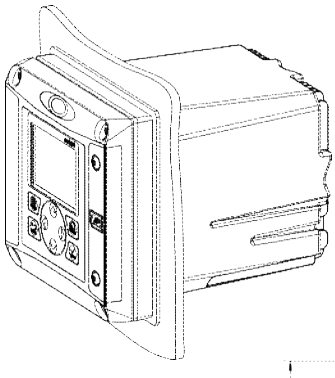
OR

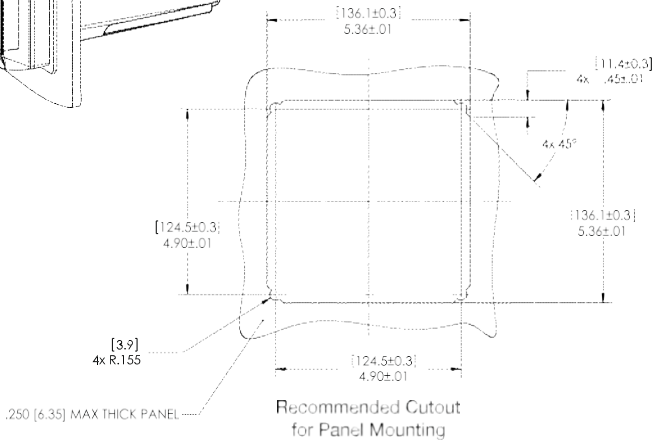




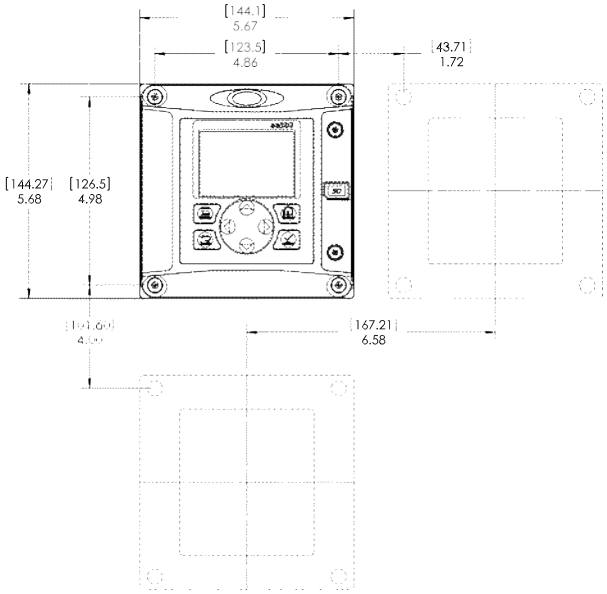
Bracket (supplied) for Surface Mounting
(Not compatible with Weather and Sun Shield
p/n 9220600 when surface mounting.)

Panel Mounting Dimensions



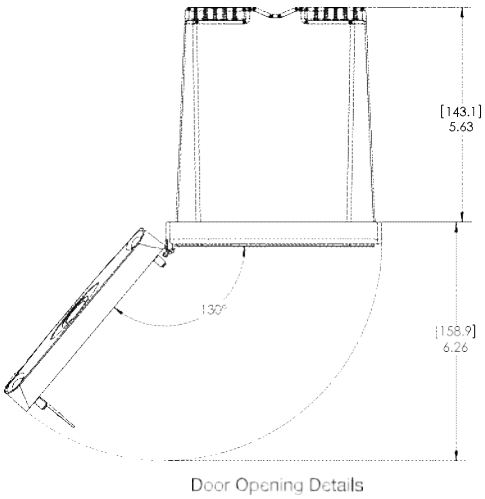


Recommended Cutout
for Panel Mounting

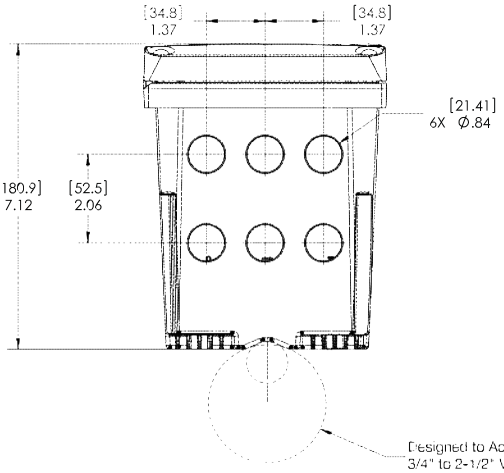


Minimum Spacing Dimensions
for Group Mounting

Top and Bottom Views

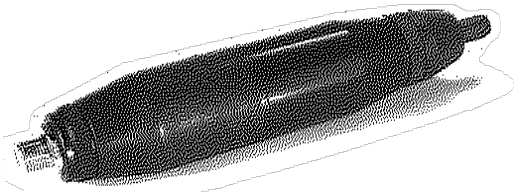


Door Opening Details

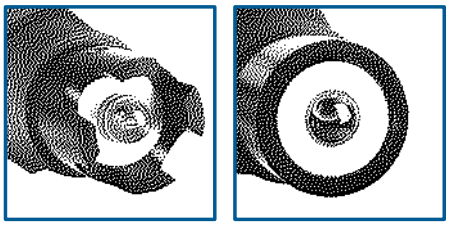


Designed to Accommodate
3/4" to 2-1/2" Vertical or Horizontal Pipe

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.

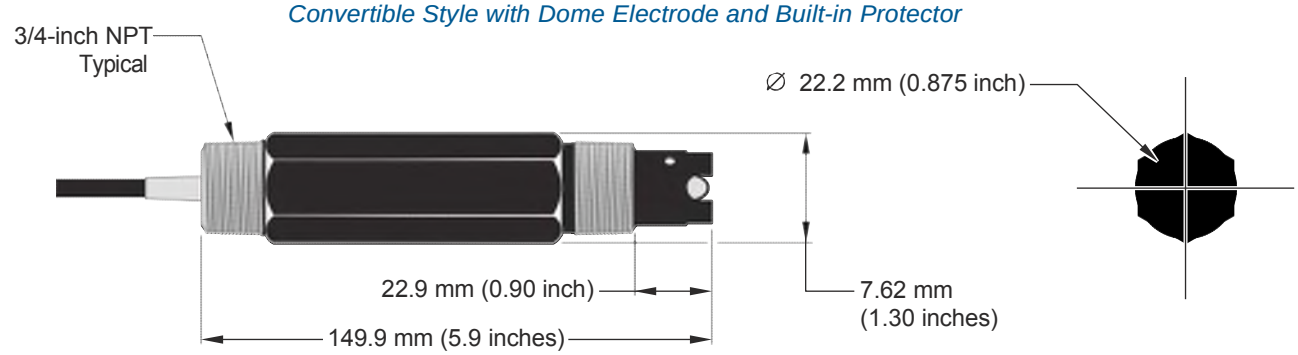
Insertion Style Sensor

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.

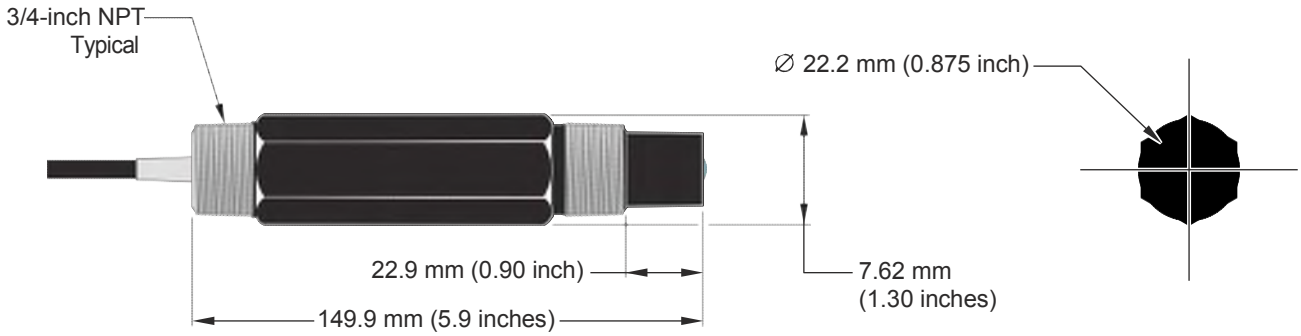
Sanitary Style Sensor

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 hput Power:	130 Watts
Average Input Power @ Max SPM:	50 Watts

Custom Engineered Designs - Pre-Engineered Systems

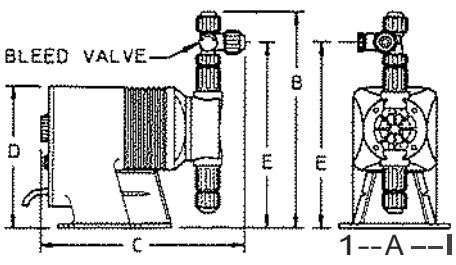
Pre-Engineered Systems

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

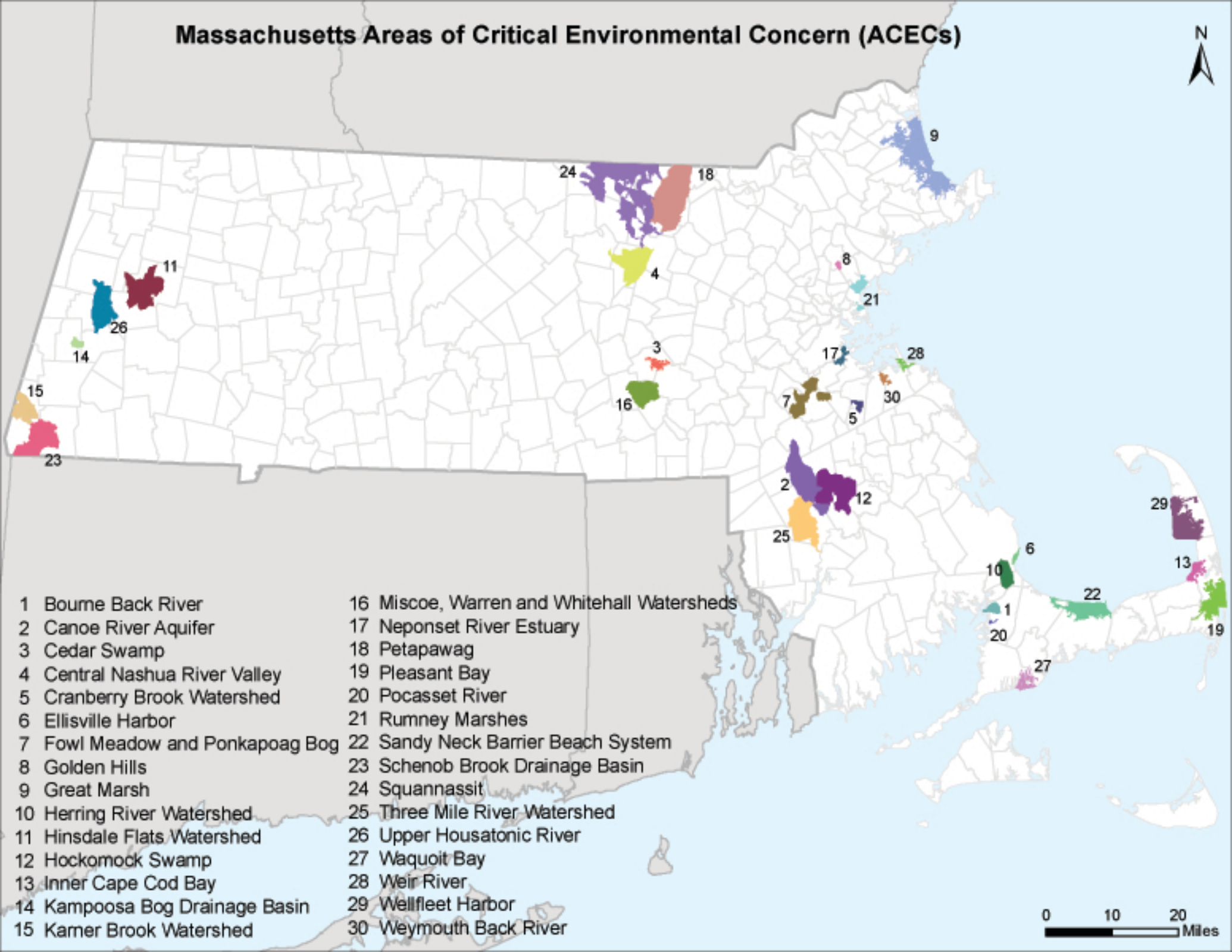
NOTE: Inches X 2.54 cm



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

MassDEP - Bureau of Waste Site Cleanup

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

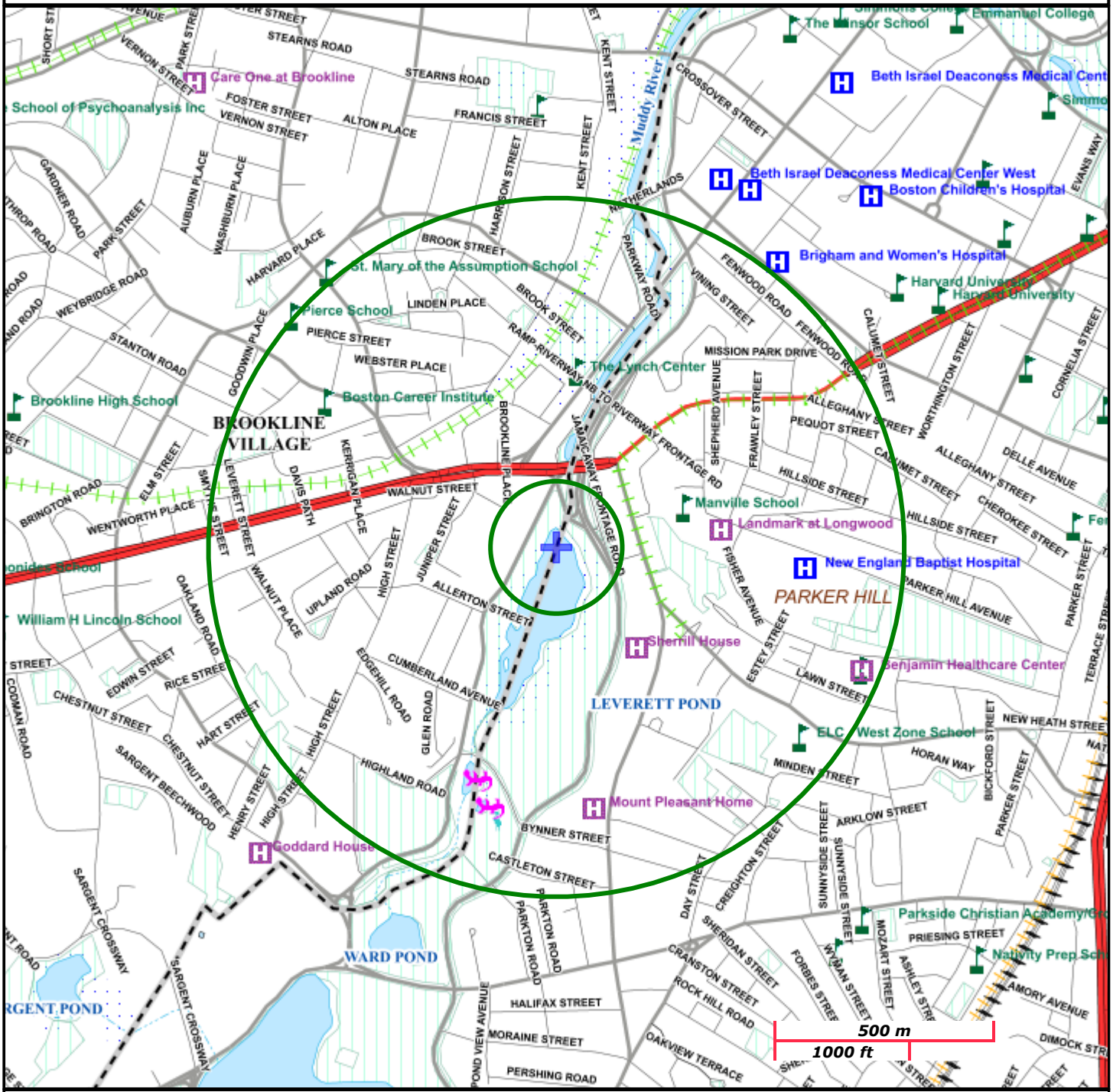
Site Information:

BROOKLINE, MA

NAD83 UTM Meters:
4688601mN , 325851mE (Zone: 19)
May 15, 2019

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: http://www.mass.gov/mgis/.

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.

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

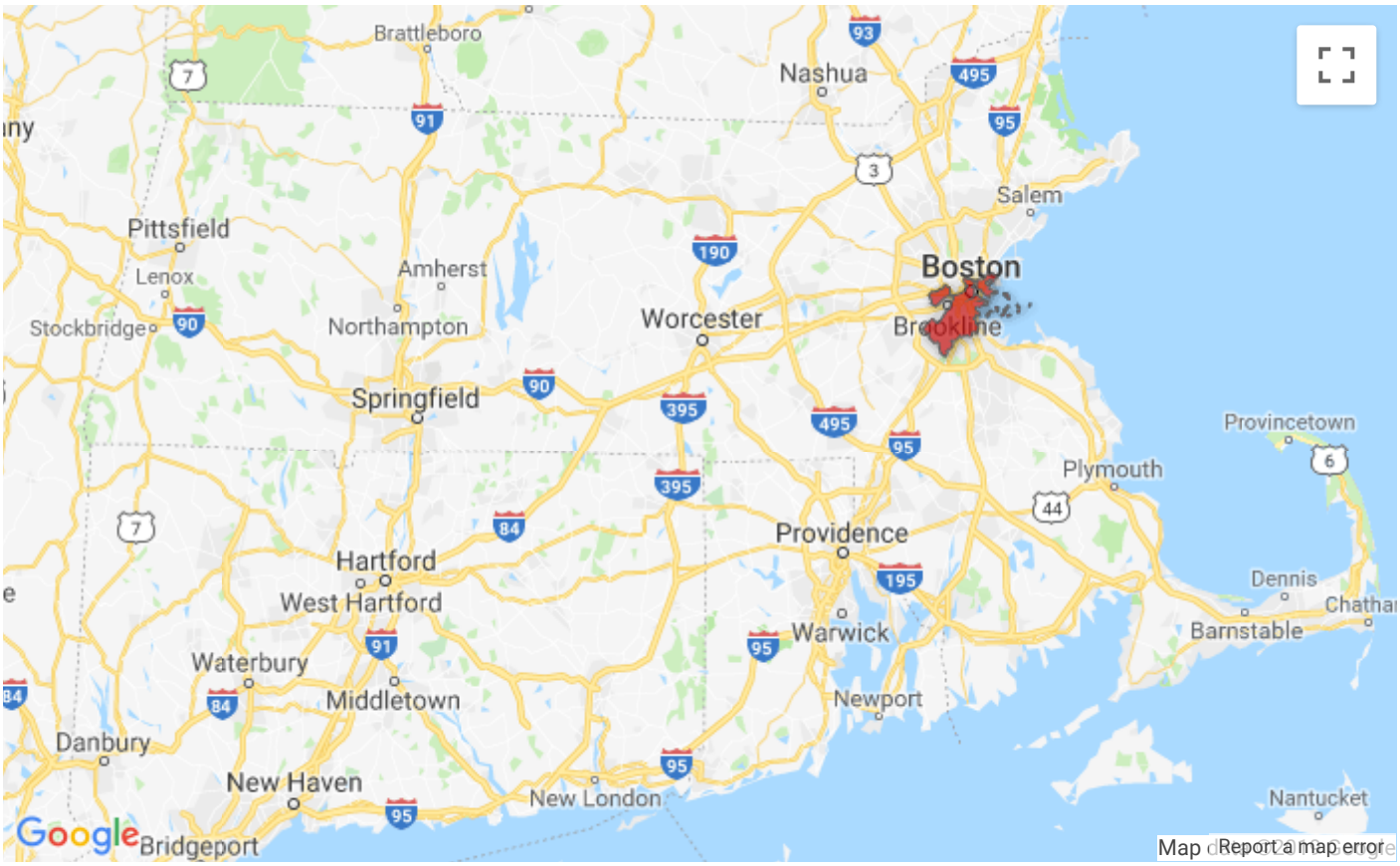
COUNTY	SPECIES	FEDERAL STATUS	GENERAL LOCATION/HABITAT	TOWNS
Plymouth	Piping Plover	Threatened	Coastal Beaches	Scituate, Marshfield, Duxbury, Plymouth, Wareham and Mattapoisett
	Northern Red-bellied Cooter	Endangered	Inland Ponds and Rivers	Kingston, Middleborough, Carver, Plymouth, Bourne, Wareham, 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

Town: BOSTON or Species (Common Name): or Species (Scientific Name):



Showing 1 to 10 of 46 entries

Search:

First Previous 1 2 3 4 5 Next Last

Town	Taxonomic Group	Scientific Name	Common Name	MESA Status	Most Recent Obs
BOSTON	Butterfly/Moth	Abagrotis nefascia	Coastal Heathland Cutworm	SC	2001
BOSTON	Vascular Plant	Ageratina aromatica	Lesser Snakeroot	E	1896
BOSTON	Amphibian	Ambystoma laterale	Blue-spotted Salamander	SC	2015
BOSTON	Bird	Ammodramus savannarum	Grasshopper Sparrow	T	1993
BOSTON	Butterfly/Moth	Apodrepanulatrix liberaria	New Jersey Tea Inchworm	E	Historic
BOSTON	Vascular Plant	Aristida purpurascens	Purple Needlegrass	T	Historic
BOSTON	Vascular Plant	Aristida tuberculosa	Seabeach Needlegrass	T	1877
BOSTON	Vascular Plant	Asclepias verticillata	Linear-leaved Milkweed	T	1878
BOSTON	Bird	Bartramia longicauda	Upland Sandpiper	E	2015
BOSTON	Vascular Plant	Boechera missouriensis	Green Rock-cress	T	1930

Show 10 entries

Town: BROOKLINE or Species (Common Name): or Species (Scientific Name):

Show 100 entries Search:

Town	Taxonomic Group	Scientific Name	Com
BROOKLINE	Beetle	Cicindela purpurea	Cow Path Tiger Beetle
BROOKLINE	Beetle	Cicindela rufiventris hentzii	Eastern Red-bellied Tiger Beetle
BROOKLINE	Vascular Plant	Houstonia longifolia	Long-leaved Bluet
BROOKLINE	Vascular Plant	Linum medium var. texanum	Rigid Flax
BROOKLINE	Vascular Plant	Lipocarpha micrantha	Dwarf Bulrush
BROOKLINE	Vascular Plant	Platanthera flava var. herbiola	Pale Green Orchis
BROOKLINE	Bird	Vermivora chrysoptera	Golden-winged Warbler
BROOKLINE	Vascular Plant	Viola brittoniana	Britton's Violet

Showing 1 to 8 of 8 entries First Previous 1 Next Last

IPaC **U.S. Fish & Wildlife Service**

IPaC resource list

IPaC is experiencing intermittent system issues that could prevent PDF document requests from succeeding. We are working on the issue and hope to have it resolved soon.

This rep habitat (collecti) jurisdict 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

Norfolk 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.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS

Northern Long-eared Bat Myotis septentrionalis **Threatened**

No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/9045

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS 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.)
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-billed Cuckoo Coccyzus erythropthalmus **This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.** https://ecos.fws.gov/ecp/species/9399	**Breeds May 15 to Oct 10**
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**
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**
Cerulean Warbler Dendroica cerulea **This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.** https://ecos.fws.gov/ecp/species/2974	**Breeds Apr 29 to Jul 20**
Evening Grosbeak Coccothraustes vespertinus **This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.**	**Breeds elsewhere**

Kentucky Warbler Oporornis formosus — **Breeds Apr 20 to Aug 20**
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

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

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.

Prothonotary Warbler Protonotaria citrea — **Breeds Apr 1 to Jul 31**
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Red-headed Woodpecker Melanerpes erythrocephalus — **Breeds May 10 to Sep 10**
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.

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

Whimbrel Numenius phaeopus — **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/9483

Willet Tringa semipalmata — **Breeds Apr 20 to Aug 5**
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Wood Thrush Hylocichla mustelina — **Breeds May 10 to Aug 31**
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

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 (■)

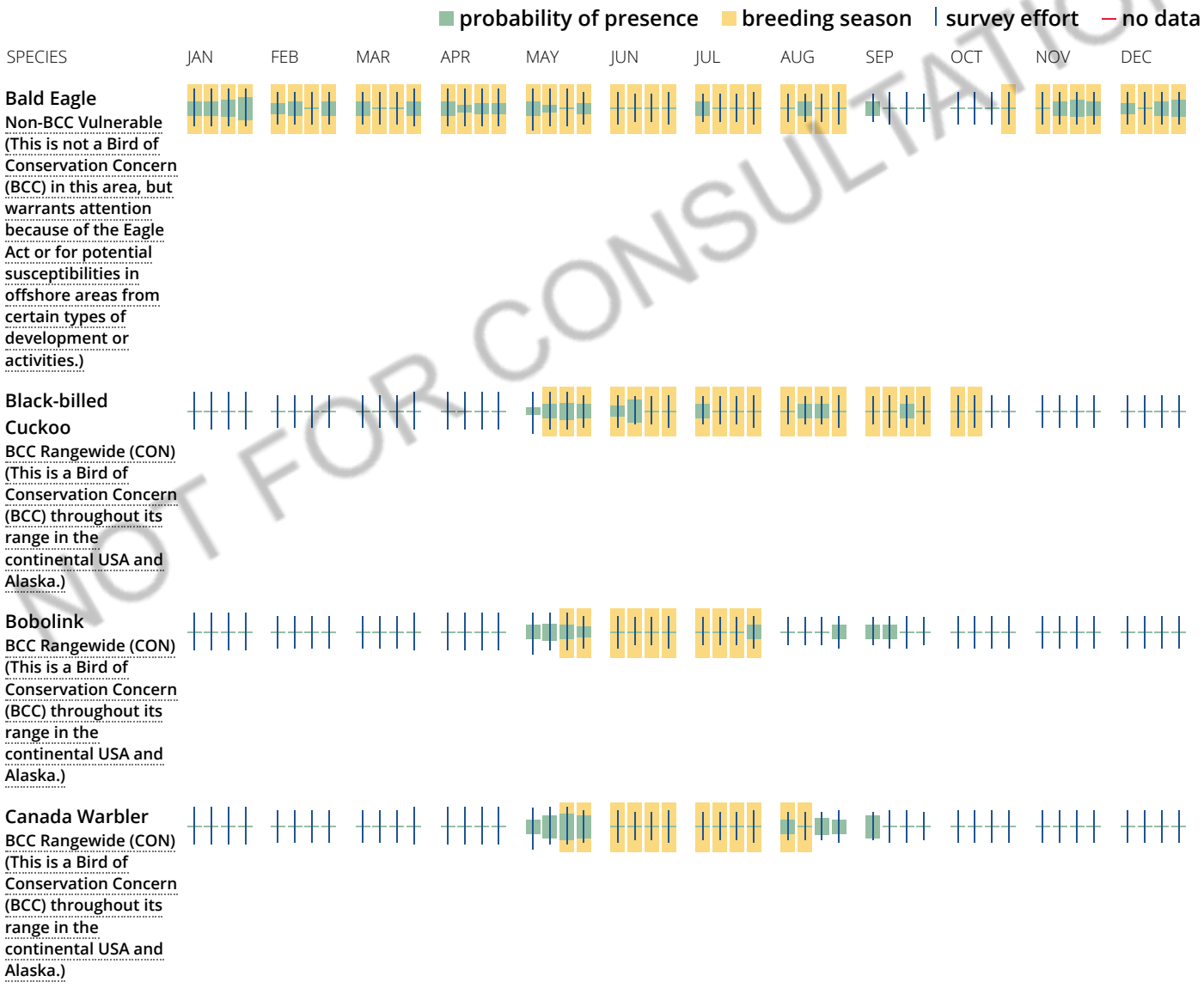
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

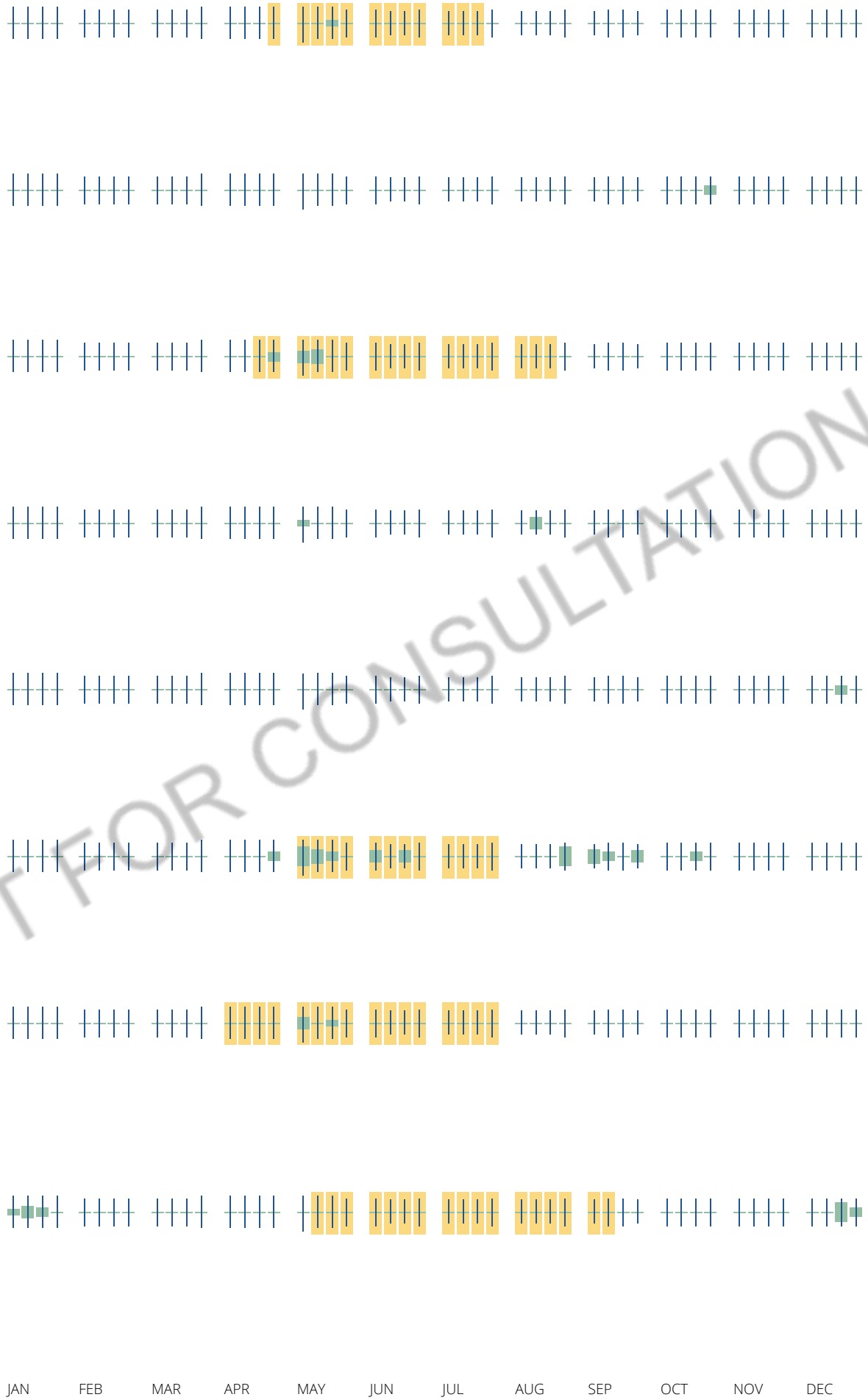
Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

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.





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.)

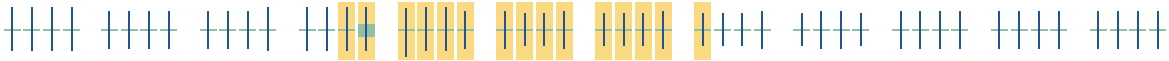
Semipalmated Sandpiper
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

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

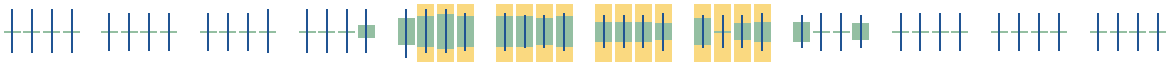
Snowy Owl
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

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:

FRESHWATER POND

PUBHh

RIVERINE

R4SBC

R5UBH

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.

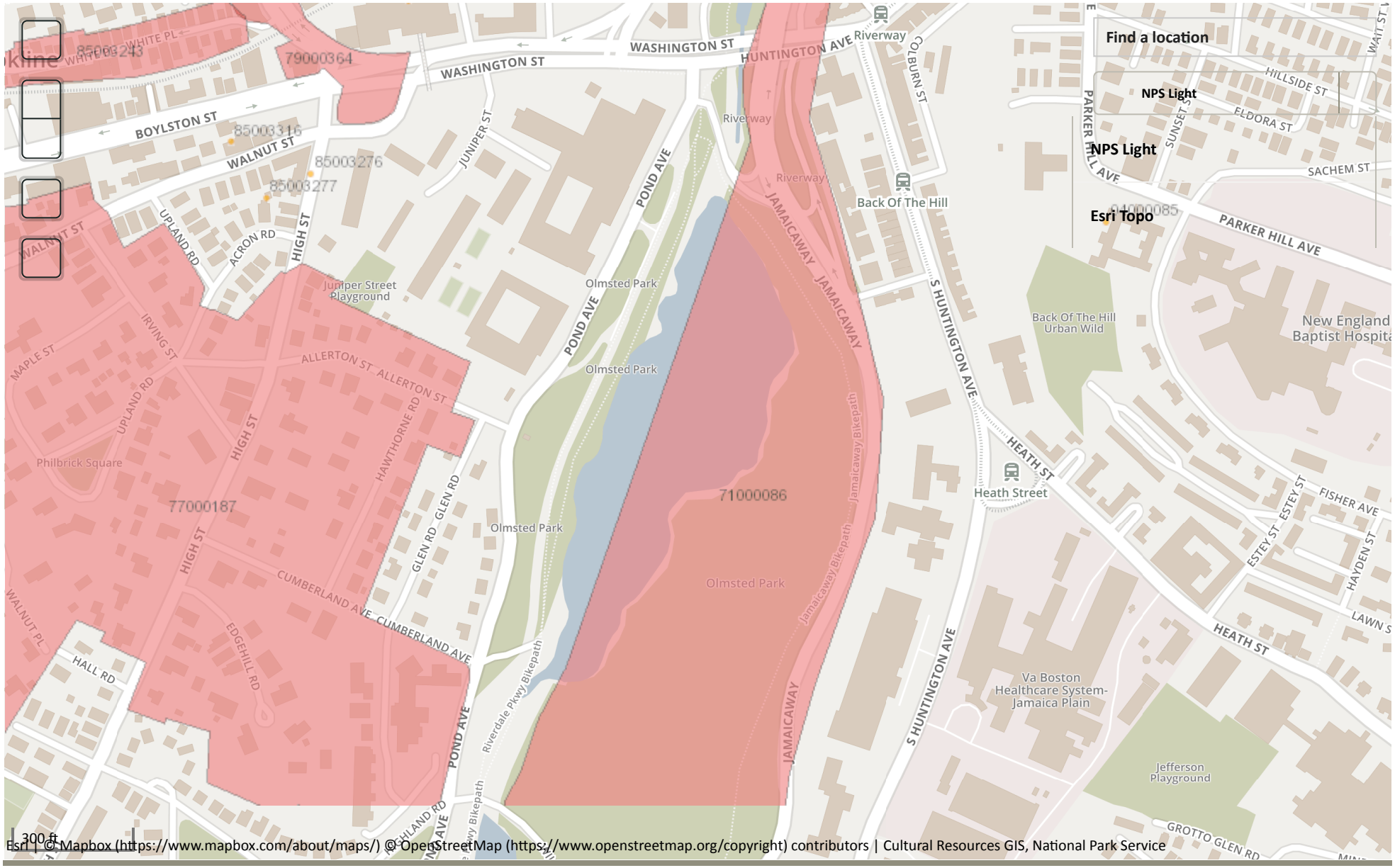
APPENDIX E

National Historic Preservation Act Review

National Register of Historic Places

National Park Service
U.S. Department of the Interior

Public, non-restricted data depicting National Register spatial data processed by the Cultural Resources GIS facility. …



Contact Us (https://www.nps.gov/contacts.htm)

Massachusetts Cultural Resource Information System
MACRIS

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Results

Get Results in Report Format
(•) PDF ( ) Spreadsheet

Below are the results of your search, using the following search criteria:
Town(s): Brookline
Street Name: pond ave
Resource Type(s): Area, Structure, Burial Ground, Object, Building

For more information about this page and how to use it, click here

Inv. No.	Property Name	Street	Town	Year	SR			
BKL.901	Leverett Pond	Huntington Ave	Brookline	1881	SR		INV	
BKL.2244		203 Pond Ave	Brookline	1924				
BKL.2245		209 Pond Ave	Brookline	1925	SR			
BKL.2246		215 Pond Ave	Brookline	1926	SR			
BKL.2247		219 Pond Ave	Brookline	1925	SR			
BKL.2248		225 Pond Ave	Brookline	1940	SR			
BKL.2249		231 Pond Ave	Brookline	1928	SR			

7 Properties Found

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Massachusetts Cultural Resource Information System

Scanned Record Cover Page

Inventory No:	BKL.901
Historic Name:	Leverett Pond
Common Name:	
Address:	Huntington Ave Pond Ave
City/Town:	Brookline
Village/Neighborhood:	
Local No:	O.P. 3
Year Constructed:	1881
Architect(s):	Olmsted, Frederick Law
Architectural Style(s):	
Use(s):	Park
Significance:	Landscape Architecture; Recreation
Area(s):	BKL.X: Olmsted Park System
Designation(s):	Nat'l Register District (12/08/1971)
Building Materials(s):	

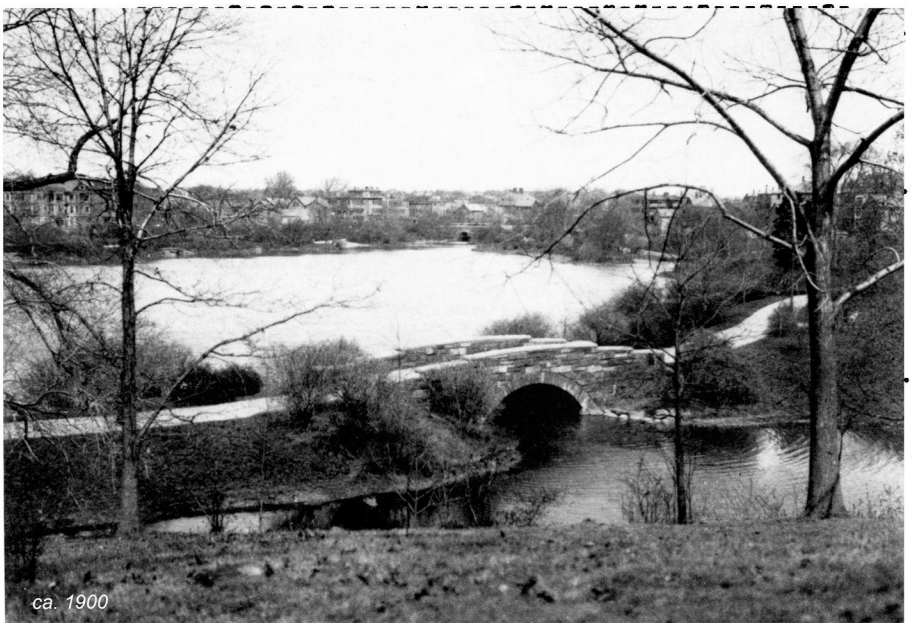
Commonwealth of Massachusetts
Massachusetts Historical Commission
220 Morrissey Boulevard, Boston, Massachusetts 02125
www.sec.state.ma.us/mhc

NRDIS 12/08/1971 [BOS.IO / BKL.X]

FORM H - PARKS AND LANDSCAPE FEATURES

Area	Form No.
O.P.	3

MASSACHUSETTS HISTORICAL COMMISSION
294 Washington Street, Boston, Ma. 02108



Town Brookline & Boston

Address Pond & Huntington Ave.s,

Name Leverett Pond (Olmsted Park)& (Muddy River Improvement)

Ownership:

X Public

___ Private

Present owner Brookline, Boston & MDC
Brookline Town Office
333 Washington St.
Brookline, MA

Type:

X Park

___ Green

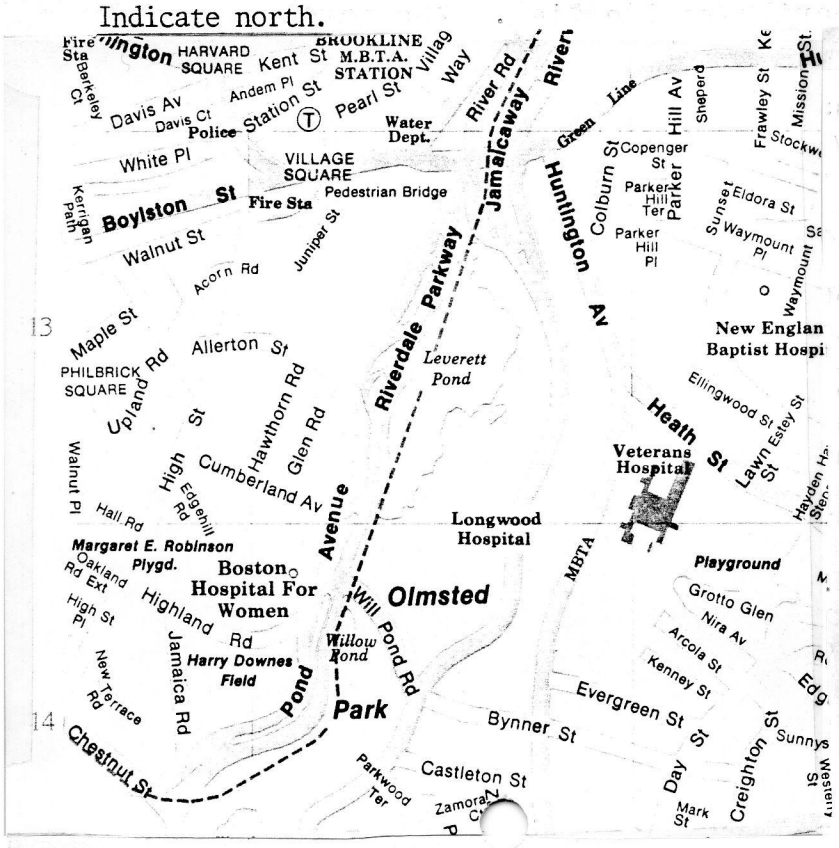
___ Training Field

___ Boulevard or Parkway

___ Other

SKETCH MAP

Draw map showing property's location in relationship to nearest cross streets and other buildings or geographical features. Indicate north.



4. Description:

Date 1881

Size (approx. acreage) 12.8 acres

Architect (if known) F.L. Olmsted

Location of Plans (if known) Job # 964, 927 & 930/FLONHS -99Warren St., Brookline

Setting primarily residential/urban

Current Condition improving/$100,000 in revitalization funds/fair-good

Recorded by Becca Palder

Organization MAOP

Date Aug. 1983

VISUAL ASSESSMENT Describe topography and layout. Note components such as structures (bandstands, gazebos, sheds) monuments & fountains; landscaping features (formal plantings, bodies of water).

NATURAL FEATURES: Compare current appearance with original, if possible.

The pond is 1500ft. x 500ft. & has a half-mile shoreline. The major inlet to Leverett Pond originates from Jamaica Pond, a kettle pond fed by a natural spring. From Jamaica Pond the brook is culverted from Ward Pond to Willow Pond & emerges into Leverett Pond. The water flows into Muddy River at the (N) end of the pond, into the Back Bay Fens, & finally into the Charles River basin. Leverett Pond is therefore an important link in the continuing function of the river-floodplain & wetland ystem of the Boston-Brookline area.

ARCH. ELEMENTS:

The Cumberland Avenue Bridge (1893) & the Leverett Pond footbridge (1894) designed by Shepley, Rutan & Coolidge, from designs furnished by the Olmsted office. To the (SE) on the Boston side, are two baseball diamonds & an MDC skating rink.

HISTORICAL SIGNIFICANCE Discuss types of use, major period of use, evaluate importance within town.

Leverett Pond is a major component of Frederick Law Olmsted's plan for the Boston Park System. It is thus a vital link in the chain of open spaces & waterways planned by Olmsted as a cohesive work of art. It is characteristic of Olmsted's naturalistic approach to park design.

The pond occupies a significant link in the Muddy River wetland system & the Charles River watershed.

Leverett Pond serves as a significant focal point for Brookline meetings & gatherings. The pond & surrounding parklands now called Leverett Park are situated in a densely populated district called Brookline Village. Olmsted Park (renamed in 1900) includes Jamaica Pond, Leverette Pond, Ward's Pond, & Willow Pond.

Landuse adjacent to the park is primarily residential. The northwest border of Leverette Pond is residential. At the (N) end of Pond Avenue is Brook House, an apartment complex. Until recently, the Parkway Division of the Lying-In Hospital, to the (W), provided an institutional land use. The grounds of this bldg. were designed by Frederick Law Olmsted in 1892. It has been proposed for condominium development.

Leverett Pond is primarily used for picnicking, sunbathing, & wildlife observation.

Olmsted's original design for Leverette Pond is still essentially intact, although the condition of the park has deteriorated. Many trees & shrubs planted by Olmsted on the Brookline side have inevitably been lost, although a few majestic maples, beeches & oaks survive. The oak forest on the Boston side contains much of the original planting. Invasive plants such as bittersweet & brambles have taken over, preventing fruiting & choking out other plants.

The pond is polluted & needs to be dredged. Since the pond is at the foot of the drumlin, the runoff from the streets is significant. The pond banks are eroded & the turf is torn up by parked cars. An intrinsic part of Olmsted's design was to divert attention away from the park's boundries. Today's traffic on the parkway has the opposite effect. A recent restoration study has been made by Radcliffe Seminars Landscape Design Program.

Massachusetts Cultural Resource Information System
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Results

Get Results in Report Format
PDF Spreadsheet

Below are the results of your search, using the following search criteria:
Town(s): Boston
Street Name: Jamaicaway
Resource Type(s): Area, Building, Burial Ground, Object, Structure

For more information about this page and how to use it, click here

Inv. No.	Property Name	Street	Town	Year	SR			
BOS.9300	Jamaicaway Bridge over Huntington Avenue	Jamaicaway	Boston	1936	SR		INV	
BOS.9310	Olmsted Park - Retaining Walls along Jamaicaway	Jamaicaway	Boston	1894	SR			
BOS.9338	Jamaica Pond	Jamaicaway	Boston	r 1780	SR			
BOS.9339	Jamaica Pond Pavilon	Jamaicaway	Boston	c 1910	SR		INV	
BOS.10020	Perkins, Edward Newton House	Jamaicaway	Boston	1870	SR		INV	
BOS.10021	Jamaica Pond Boathouse	Jamaicaway	Boston	1913	SR		INV	
BOS.10022	Curley, James Michael House	350 Jamaicaway	Boston	1915	SR		INV	
BOS.9308	Ward's Pond Stone Steps	Ward's Pond	Boston	1894	SR			

8 Properties Found

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For more information about this page and how to use it, click here.

Inventory No:	BOS.IO NR
Historic Name:	Olmsted Park System
Common Name:	Emerald Necklace around Boston
Address:	
City/Town:	Boston
Village/Neighborhood:	Back Bay West; Dorchester; Fenway - Kenmore; Jamaica Plain; Parker Hill - Mission Hill; Roxbury
Local No:	
Year Constructed:	
Architect(s):	Olmsted, Frederick Law
Architectural Style(s):	
Use(s):	Other Recreational; Park
Significance:	Community Planning; Landscape Architecture; Recreation
Area(s):	
Designation(s):	Nat'l Register District (12/08/1971)
Building Material(s):	

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Massachusetts Cultural Resource Information System
MACRIS

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For more information about this page and how to use it, click here.

Inventory No:	BOS.9310
Historic Name:	Olmsted Park - Retaining Walls along Jamaicaway
Common Name:	
Address:	Jamaicaway
City/Town:	Boston
Village/Neighborhood:	Parker Hill - Mission Hill; Top and Back of the Hill; Centre - Heath Streets
Local No:	IO;JE
Year Constructed:	1894
Architect(s):	Olmsted
Architectural Style(s):	
Use(s):	Other Engineering; Other Road Related
Significance:	Engineering; Landscape Architecture; Transportation
Area(s):	NR BOS.IO: Olmsted Park System BOS.JE: Emerald Necklace Parks
Designation(s):	Nat'l Register District (12/08/1971); Local Landmark (12/18/1989)
Building Material(s):	

Digital Photo Not Yet Available

New Search Previous

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Massachusetts Cultural Resource Information System
MACRIS

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For more information about this page and how to use it, click here.

Inventory No:	BOS.JE
Historic Name:	Emerald Necklace Parks
Common Name:	
Address:	
City/Town:	Boston
Village/Neighborhood:	Fenway - Longwood; Jamaica Plain; Parker Hill - Mission Hill; Fenway
Local No:	
Year Constructed:	
Architect(s):	Olmsted, Frederick Law
Architectural Style(s):	
Use(s):	Other Recreational; Other Transportation; Park
Significance:	Architecture; Community Planning; Conservation; Engineering; Landscape Architecture; Recreation; Social History; Transportation
Area(s):	
Designation(s):	Nat'l Register District (12/08/1971); Local Landmark (12/18/1989)
Building Material(s):	

Digital Photo Not Yet Available

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APPENDIX F

Laboratory Data Reports

ANALYTICAL REPORT

Lab Number:	L1920160
Client:	Haley & Aldrich, Inc. 465 Medford Street, Suite 2200 Charlestown, MA 02129-1400
ATTN:	Cole Worthy
Phone:	(617) 886-7341
Project Name:	BOSTON COLLEGE-IISS
Project Number:	128271-016
Report Date:	05/30/19

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: BOSTON COLLEGE-IISS
Project Number: 128271-016

Lab Number: L1920160
Report Date: 05/30/19

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L1920160-01	HA18-B8 (OW)_052019	WATER	CHESTNUT HILL, MA	05/14/19 11:25	05/14/19
L1920160-02	TB	WATER	CHESTNUT HILL, MA	05/14/19 00:00	05/14/19

Project Name:	BOSTON COLLEGE-IISS	**Lab Number:**	L1920160
Project Number:	128271-016	**Report Date:**	05/30/19

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:	BOSTON COLLEGE-IISS	**Lab Number:**	L1920160
Project Number:	128271-016	**Report Date:**	05/30/19

Case Narrative (continued)

Report Submission

May 30, 2019: This final report includes the results of all requested analyses.

May 22, 2019: 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.

Sample Receipt

L1920160-01 (HA18-B8 (OW)_052019): The Client ID was specified by the client.

L1920160-02 (TB): A sample identified as "TB" was received but not listed on the Chain of Custody. This sample was not analyzed.

Total Metals

The WG1238678-3 MS recovery, performed on L1920160-01 (HA18-B8 (OW)_052019), is outside the acceptance criteria for iron (127%). A post digestion spike was performed and yielded an unacceptable recovery for iron (148%). The serial dilution recovery was not applicable; therefore, this element fails the matrix test and the result reported in the native sample should be considered estimated.

Phenolics, Total

The WG1237235-4 MS recovery (49%), performed on L1920160-01 (HA18-B8 (OW)_052019), is outside the acceptance criteria; however, the associated LCS recovery is within criteria. No further action was taken.

Chlorine, Total Residual

The WG1237299-4 MS recovery (72%), performed on L1920160-01 (HA18-B8 (OW)_052019), is outside the acceptance criteria; 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:  Melissa Cripps

Title: Technical Director/Representative Date: 05/30/19

ORGANICS

VOLATILES

Project Name: BOSTON COLLEGE-IISS
Project Number: 128271-016
Lab Number: L1920160
Report Date: 05/30/19

SAMPLE RESULTS

Lab ID: L1920160-01
Client ID: HA18-B8 (OW)_052019
Sample Location: CHESTNUT HILL, MA

Date Collected: 05/14/19 11:25
Date Received: 05/14/19
Field Prep: Refer to COC

Sample Depth:
Matrix: Water
Analytical Method: 128,624.1
Analytical Date: 05/16/19 11:51
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: BOSTON COLLEGE-IISS **Lab Number:** L1920160

Project Number: 128271-016 **Report Date:** 05/30/19

SAMPLE RESULTS

Lab ID: L1920160-01 Date Collected: 05/14/19 11:25

Client ID: HA18-B8 (OW)_052019 Date Received: 05/14/19

Sample Location: CHESTNUT HILL, 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	101		60-140
Fluorobenzene	90		60-140
4-Bromofluorobenzene	101		60-140

Project Name: BOSTON COLLEGE-IISS
Project Number: 128271-016
Lab Number: L1920160
Report Date: 05/30/19

SAMPLE RESULTS

Lab ID: L1920160-01
Client ID: HA18-B8 (OW)_052019
Sample Location: CHESTNUT HILL, MA
Date Collected: 05/14/19 11:25
Date Received: 05/14/19
Field Prep: Refer to COC

Sample Depth:
Matrix: Water
Analytical Method: 128,624.1-SIM
Analytical Date: 05/16/19 11:51
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	94		60-140
4-Bromofluorobenzene	110		60-140

Project Name: BOSTON COLLEGE-IISS
Project Number: 128271-016
Lab Number: L1920160
Report Date: 05/30/19

SAMPLE RESULTS

Lab ID: L1920160-01
Client ID: HA18-B8 (OW)_052019
Sample Location: CHESTNUT HILL, MA

Date Collected: 05/14/19 11:25
Date Received: 05/14/19
Field Prep: Refer to COC

Sample Depth:
Matrix: Water
Analytical Method: 14,504.1
Analytical Date: 05/17/19 19:21
Analyst: AWS

Extraction Method: EPA 504.1
Extraction Date: 05/17/19 16:55

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

Project Name: BOSTON COLLEGE-IISS **Lab Number:** L1920160

Project Number: 128271-016 **Report Date:** 05/30/19

Method Blank Analysis
Batch Quality Control

Analytical Method: 128,624.1
Analytical Date: 05/16/19 08:10
Analyst: GT

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01 Batch: WG1237856-4					
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: BOSTON COLLEGE-IISS **Lab Number:** L1920160

Project Number: 128271-016 **Report Date:** 05/30/19

Method Blank Analysis
Batch Quality Control

Analytical Method: 128,624.1
Analytical Date: 05/16/19 08:10
Analyst: GT

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01 Batch: WG1237856-4					

Surrogate	%Recovery	Qualifier	Acceptance Criteria
Pentafluorobenzene	92		60-140
Fluorobenzene	93		60-140
4-Bromofluorobenzene	102		60-140

Project Name: BOSTON COLLEGE-IISS **Lab Number:** L1920160

Project Number: 128271-016 **Report Date:** 05/30/19

Method Blank Analysis
Batch Quality Control

Analytical Method: 128,624.1-SIM
Analytical Date: 05/16/19 08:10
Analyst: GT

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS-SIM - Westborough Lab for sample(s): 01 Batch: WG1237965-4					
1,4-Dioxane	ND		ug/l	50	--

Surrogate	%Recovery	Qualifier	Acceptance Criteria
Fluorobenzene	95		60-140
4-Bromofluorobenzene	110		60-140

Project Name: BOSTON COLLEGE-IISS
Project Number: 128271-016
Lab Number: L1920160
Report Date: 05/30/19

Method Blank Analysis
Batch Quality Control

Analytical Method: 14,504.1
Analytical Date: 05/17/19 17:40
Analyst: AWS

Extraction Method: EPA 504.1
Extraction Date: 05/17/19 16:55

Parameter	Result	Qualifier	Units	RL	MDL	
Microextractables by GC - Westborough Lab for sample(s): 01 Batch: WG1238451-1						
1,2-Dibromoethane	ND		ug/l	0.010	--	A
1,2-Dibromo-3-chloropropane	ND		ug/l	0.010	--	A

Lab Control Sample Analysis

Batch Quality Control

Project Name: BOSTON COLLEGE-IISS

Project Number: 128271-016

Lab Number: L1920160

Report Date: 05/30/19

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: WG1237856-3								
Methylene chloride	85		-		60-140	-		28
1,1-Dichloroethane	75		-		50-150	-		49
Carbon tetrachloride	90		-		70-130	-		41
1,1,2-Trichloroethane	100		-		70-130	-		45
Tetrachloroethene	105		-		70-130	-		39
1,2-Dichloroethane	90		-		70-130	-		49
1,1,1-Trichloroethane	95		-		70-130	-		36
Benzene	95		-		65-135	-		61
Toluene	105		-		70-130	-		41
Ethylbenzene	110		-		60-140	-		63
Vinyl chloride	80		-		5-195	-		66
1,1-Dichloroethene	95		-		50-150	-		32
cis-1,2-Dichloroethene	100		-		60-140	-		30
Trichloroethene	95		-		65-135	-		48
1,2-Dichlorobenzene	110		-		65-135	-		57
1,3-Dichlorobenzene	105		-		70-130	-		43
1,4-Dichlorobenzene	110		-		65-135	-		57
p/m-Xylene	108		-		60-140	-		30
o-xylene	105		-		60-140	-		30
Acetone	78		-		40-160	-		30
Methyl tert butyl ether	80		-		60-140	-		30
Tert-Butyl Alcohol	82		-		60-140	-		30
Tertiary-Amyl Methyl Ether	85		-		60-140	-		30

Lab Control Sample Analysis

Batch Quality Control

Project Name: BOSTON COLLEGE-IISS

Project Number: 128271-016

Lab Number: L1920160

Report Date: 05/30/19

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: WG1237856-3								

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Pentafluorobenzene	102				60-140
Fluorobenzene	90				60-140
4-Bromofluorobenzene	99				60-140

Lab Control Sample Analysis

Batch Quality Control

Project Name: BOSTON COLLEGE-IISS

Project Number: 128271-016

Lab Number: L1920160

Report Date: 05/30/19

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: WG1237965-3								
1,4-Dioxane	110		-		60-140	-		20

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Fluorobenzene	94				60-140
4-Bromofluorobenzene	108				60-140

Lab Control Sample Analysis

Batch Quality Control

Project Name: BOSTON COLLEGE-IISS

Project Number: 128271-016

Lab Number: L1920160

Report Date: 05/30/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits	Column
Microextractables by GC - Westborough Lab Associated sample(s): 01 Batch: WG1238451-2									
1,2-Dibromoethane	95		-		80-120	-			A
1,2-Dibromo-3-chloropropane	103		-		80-120	-			A

Matrix Spike Analysis

Batch Quality Control

Project Name: BOSTON COLLEGE-IISS

Project Number: 128271-016

Lab Number: L1920160

Report Date: 05/30/19

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: WG1238451-3 QC Sample: L1919666-01 Client ID: MS Sample													
1,2-Dibromoethane	ND	0.247	0.213	86		-	-		80-120	-		20	A
1,2-Dibromo-3-chloropropane	ND	0.247	0.229	93		-	-		80-120	-		20	A

SEMIVOLATILES

Project Name: BOSTON COLLEGE-IISS
Project Number: 128271-016
Lab Number: L1920160
Report Date: 05/30/19

SAMPLE RESULTS

Lab ID: L1920160-01
Client ID: HA18-B8 (OW)_052019
Sample Location: CHESTNUT HILL, MA

Date Collected: 05/14/19 11:25
Date Received: 05/14/19
Field Prep: Refer to COC

Sample Depth:
Matrix: Water
Analytical Method: 129,625.1
Analytical Date: 05/16/19 18:54
Analyst: CB

Extraction Method: EPA 625.1
Extraction Date: 05/16/19 00:51

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Semivolatile Organics by GC/MS - Westborough Lab						
Bis(2-ethylhexyl)phthalate	ND		ug/l	2.2	--	1
Butyl benzyl phthalate	ND		ug/l	5.0	--	1
Di-n-butylphthalate	ND		ug/l	5.0	--	1
Di-n-octylphthalate	ND		ug/l	5.0	--	1
Diethyl phthalate	ND		ug/l	5.0	--	1
Dimethyl phthalate	ND		ug/l	5.0	--	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
Nitrobenzene-d5	87		42-122
2-Fluorobiphenyl	85		46-121
4-Terphenyl-d14	111		47-138

Project Name: BOSTON COLLEGE-IISS
Project Number: 128271-016
Lab Number: L1920160
Report Date: 05/30/19

SAMPLE RESULTS

Lab ID: L1920160-01
Client ID: HA18-B8 (OW)_052019
Sample Location: CHESTNUT HILL, MA

Date Collected: 05/14/19 11:25
Date Received: 05/14/19
Field Prep: Refer to COC

Sample Depth:
Matrix: Water
Analytical Method: 129,625.1-SIM
Analytical Date: 05/17/19 12:30
Analyst: CB

Extraction Method: EPA 625.1
Extraction Date: 05/16/19 01:01

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Semivolatile Organics by GC/MS-SIM - Westborough Lab						
Acenaphthene	ND		ug/l	0.10	--	1
Fluoranthene	ND		ug/l	0.10	--	1
Naphthalene	ND		ug/l	0.10	--	1
Benzo(a)anthracene	ND		ug/l	0.10	--	1
Benzo(a)pyrene	ND		ug/l	0.10	--	1
Benzo(b)fluoranthene	ND		ug/l	0.10	--	1
Benzo(k)fluoranthene	ND		ug/l	0.10	--	1
Chrysene	ND		ug/l	0.10	--	1
Acenaphthylene	ND		ug/l	0.10	--	1
Anthracene	ND		ug/l	0.10	--	1
Benzo(ghi)perylene	ND		ug/l	0.10	--	1
Fluorene	ND		ug/l	0.10	--	1
Phenanthrene	ND		ug/l	0.10	--	1
Dibenzo(a,h)anthracene	ND		ug/l	0.10	--	1
Indeno(1,2,3-cd)pyrene	ND		ug/l	0.10	--	1
Pyrene	ND		ug/l	0.10	--	1
Pentachlorophenol	ND		ug/l	1.0	--	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
2-Fluorophenol	50		25-87
Phenol-d6	32		16-65
Nitrobenzene-d5	86		42-122
2-Fluorobiphenyl	84		46-121
2,4,6-Tribromophenol	86		45-128
4-Terphenyl-d14	82		47-138

Project Name: BOSTON COLLEGE-IISS
Project Number: 128271-016
Lab Number: L1920160
Report Date: 05/30/19

Method Blank Analysis
Batch Quality Control

Analytical Method: 129,625.1
Analytical Date: 05/16/19 13:48
Analyst: ALS

Extraction Method: EPA 625.1
Extraction Date: 05/16/19 00:51

Parameter	Result	Qualifier	Units	RL	MDL
Semivolatile Organics by GC/MS - Westborough Lab for sample(s): 01 Batch: WG1237671-1					
Bis(2-ethylhexyl)phthalate	ND		ug/l	2.2	--
Butyl benzyl phthalate	ND		ug/l	5.0	--
Di-n-butylphthalate	ND		ug/l	5.0	--
Di-n-octylphthalate	ND		ug/l	5.0	--
Diethyl phthalate	ND		ug/l	5.0	--
Dimethyl phthalate	ND		ug/l	5.0	--

Surrogate	%Recovery	Qualifier	Acceptance Criteria
Nitrobenzene-d5	74		42-122
2-Fluorobiphenyl	77		46-121
4-Terphenyl-d14	87		47-138

Project Name: BOSTON COLLEGE-IISS **Lab Number:** L1920160

Project Number: 128271-016 **Report Date:** 05/30/19

Method Blank Analysis
Batch Quality Control

Analytical Method: 129,625.1-SIM
Analytical Date: 05/17/19 11:11
Analyst: CB

Extraction Method: EPA 625.1
Extraction Date: 05/16/19 01:01

Parameter	Result	Qualifier	Units	RL	MDL
Semivolatile Organics by GC/MS-SIM - Westborough Lab for sample(s): 01 Batch: WG1237673-1					
Acenaphthene	ND		ug/l	0.10	--
Fluoranthene	ND		ug/l	0.10	--
Naphthalene	ND		ug/l	0.10	--
Benzo(a)anthracene	ND		ug/l	0.10	--
Benzo(a)pyrene	ND		ug/l	0.10	--
Benzo(b)fluoranthene	ND		ug/l	0.10	--
Benzo(k)fluoranthene	ND		ug/l	0.10	--
Chrysene	ND		ug/l	0.10	--
Acenaphthylene	ND		ug/l	0.10	--
Anthracene	ND		ug/l	0.10	--
Benzo(ghi)perylene	ND		ug/l	0.10	--
Fluorene	ND		ug/l	0.10	--
Phenanthrene	ND		ug/l	0.10	--
Dibenzo(a,h)anthracene	ND		ug/l	0.10	--
Indeno(1,2,3-cd)pyrene	ND		ug/l	0.10	--
Pyrene	ND		ug/l	0.10	--
Pentachlorophenol	ND		ug/l	1.0	--

Surrogate	%Recovery	Qualifier	Acceptance Criteria
2-Fluorophenol	49		25-87
Phenol-d6	31		16-65
Nitrobenzene-d5	81		42-122
2-Fluorobiphenyl	77		46-121
2,4,6-Tribromophenol	68		45-128
4-Terphenyl-d14	77		47-138

Lab Control Sample Analysis

Batch Quality Control

Project Name: BOSTON COLLEGE-IISS

Project Number: 128271-016

Lab Number: L1920160

Report Date: 05/30/19

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: WG1237671-3								
Bis(2-ethylhexyl)phthalate	97		-		29-137	-		82
Butyl benzyl phthalate	110		-		1-140	-		60
Di-n-butylphthalate	103		-		8-120	-		47
Di-n-octylphthalate	106		-		19-132	-		69
Diethyl phthalate	87		-		1-120	-		100
Dimethyl phthalate	94		-		1-120	-		183

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Nitrobenzene-d5	92				42-122
2-Fluorobiphenyl	89				46-121
4-Terphenyl-d14	94				47-138

Lab Control Sample Analysis

Batch Quality Control

Project Name: BOSTON COLLEGE-IISS

Project Number: 128271-016

Lab Number: L1920160

Report Date: 05/30/19

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: WG1237673-2								
Acenaphthene	91		-		60-132	-		30
Fluoranthene	98		-		43-121	-		30
Naphthalene	83		-		36-120	-		30
Benzo(a)anthracene	100		-		42-133	-		30
Benzo(a)pyrene	90		-		32-148	-		30
Benzo(b)fluoranthene	98		-		42-140	-		30
Benzo(k)fluoranthene	97		-		25-146	-		30
Chrysene	96		-		44-140	-		30
Acenaphthylene	91		-		54-126	-		30
Anthracene	96		-		43-120	-		30
Benzo(ghi)perylene	98		-		1-195	-		30
Fluorene	95		-		70-120	-		30
Phenanthrene	95		-		65-120	-		30
Dibenzo(a,h)anthracene	97		-		1-200	-		30
Indeno(1,2,3-cd)pyrene	99		-		1-151	-		30
Pyrene	98		-		70-120	-		30
Pentachlorophenol	80		-		38-152	-		30

Lab Control Sample Analysis

Batch Quality Control

Project Name: BOSTON COLLEGE-IISS

Project Number: 128271-016

Lab Number: L1920160

Report Date: 05/30/19

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: WG1237673-2								

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
2-Fluorophenol	50				25-87
Phenol-d6	33				16-65
Nitrobenzene-d5	85				42-122
2-Fluorobiphenyl	87				46-121
2,4,6-Tribromophenol	76				45-128
4-Terphenyl-d14	86				47-138

PCBS

Project Name: BOSTON COLLEGE-IISS
Project Number: 128271-016
Lab Number: L1920160
Report Date: 05/30/19

SAMPLE RESULTS

Lab ID: L1920160-01
Client ID: HA18-B8 (OW)_052019
Sample Location: CHESTNUT HILL, MA

Date Collected: 05/14/19 11:25
Date Received: 05/14/19
Field Prep: Refer to COC

Sample Depth:
Matrix: Water
Analytical Method: 127,608.3
Analytical Date: 05/16/19 12:06
Analyst: WR

Extraction Method: EPA 608.3
Extraction Date: 05/15/19 13:07
Cleanup Method: EPA 3665A
Cleanup Date: 05/16/19
Cleanup Method: EPA 3660B
Cleanup Date: 05/16/19

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	67		37-123	B
Decachlorobiphenyl	75		38-114	B
2,4,5,6-Tetrachloro-m-xylene	70		37-123	A
Decachlorobiphenyl	73		38-114	A

Project Name: BOSTON COLLEGE-IISS
Project Number: 128271-016
Lab Number: L1920160
Report Date: 05/30/19

Method Blank Analysis
Batch Quality Control

Analytical Method: 127,608.3
Analytical Date: 05/16/19 11:01
Analyst: WR

Extraction Method: EPA 608.3
Extraction Date: 05/15/19 13:07
Cleanup Method: EPA 3665A
Cleanup Date: 05/16/19
Cleanup Method: EPA 3660B
Cleanup Date: 05/16/19

Parameter	Result	Qualifier	Units	RL	MDL	Column
Polychlorinated Biphenyls by GC - Westborough Lab for sample(s): 01 Batch: WG1237449-1						
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	63		37-123	B
Decachlorobiphenyl	72		38-114	B
2,4,5,6-Tetrachloro-m-xylene	70		37-123	A
Decachlorobiphenyl	70		38-114	A

Lab Control Sample Analysis

Batch Quality Control

Project Name: BOSTON COLLEGE-IISS

Project Number: 128271-016

Lab Number: L1920160

Report Date: 05/30/19

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: WG1237449-2									
Aroclor 1016	78		-		50-140	-		36	A
Aroclor 1260	71		-		8-140	-		38	A

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria	Column
2,4,5,6-Tetrachloro-m-xylene	71				37-123	B
Decachlorobiphenyl	74				38-114	B
2,4,5,6-Tetrachloro-m-xylene	73				37-123	A
Decachlorobiphenyl	71				38-114	A

METALS

Project Name: BOSTON COLLEGE-IISS
Lab Number: L1920160
Project Number: 128271-016
Report Date: 05/30/19

SAMPLE RESULTS

Lab ID: L1920160-01
Client ID: HA18-B8 (OW)_052019
Sample Location: CHESTNUT HILL, MA
Date Collected: 05/14/19 11:25
Date Received: 05/14/19
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	0.00400	--	1	05/18/19 13:27	05/18/19 18:34	EPA 3005A	3,200.8	MG
Arsenic, Total	0.00120		mg/l	0.00100	--	1	05/18/19 13:27	05/18/19 18:34	EPA 3005A	3,200.8	MG
Cadmium, Total	ND		mg/l	0.00020	--	1	05/18/19 13:27	05/18/19 18:34	EPA 3005A	3,200.8	MG
Chromium, Total	ND		mg/l	0.00100	--	1	05/18/19 13:27	05/18/19 18:34	EPA 3005A	3,200.8	MG
Copper, Total	0.00477		mg/l	0.00100	--	1	05/18/19 13:27	05/18/19 18:34	EPA 3005A	3,200.8	MG
Iron, Total	ND		mg/l	0.050	--	1	05/18/19 13:27	05/20/19 10:15	EPA 3005A	19,200.7	LC
Lead, Total	ND		mg/l	0.00100	--	1	05/18/19 13:27	05/18/19 18:34	EPA 3005A	3,200.8	MG
Mercury, Total	ND		mg/l	0.00020	--	1	05/15/19 12:20	05/15/19 19:32	EPA 245.1	3,245.1	EA
Nickel, Total	ND		mg/l	0.00200	--	1	05/18/19 13:27	05/18/19 18:34	EPA 3005A	3,200.8	MG
Selenium, Total	ND		mg/l	0.00500	--	1	05/18/19 13:27	05/18/19 18:34	EPA 3005A	3,200.8	MG
Silver, Total	ND		mg/l	0.00040	--	1	05/18/19 13:27	05/18/19 18:34	EPA 3005A	3,200.8	MG
Zinc, Total	ND		mg/l	0.01000	--	1	05/18/19 13:27	05/18/19 18:34	EPA 3005A	3,200.8	MG
Total Hardness by SM 2340B - Mansfield Lab											
Hardness	269		mg/l	0.660	NA	1	05/18/19 13:27	05/20/19 10:15	EPA 3005A	19,200.7	LC
General Chemistry - Mansfield Lab											
Chromium, Trivalent	ND		mg/l	0.010	--	1		05/18/19 18:34	NA	107,-	

Project Name: BOSTON COLLEGE-IISS **Lab Number:** L1920160

Project Number: 128271-016 **Report Date:** 05/30/19

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 Batch: WG1237414-1										
Mercury, Total	ND		mg/l	0.0002	--	1	05/15/19 12:20	05/15/19 19:11	3,245.1	EA

Prep Information

Digestion Method: EPA 245.1

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 01 Batch: WG1238678-1										
Iron, Total	ND		mg/l	0.050	--	1	05/18/19 13:27	05/20/19 10:07	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 Batch: WG1238678-1										
Hardness	ND		mg/l	0.660	NA	1	05/18/19 13:27	05/20/19 10:07	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 Batch: WG1238680-1										
Antimony, Total	ND		mg/l	0.00400	--	1	05/18/19 13:27	05/18/19 18:14	3,200.8	MG
Arsenic, Total	ND		mg/l	0.00100	--	1	05/18/19 13:27	05/18/19 18:14	3,200.8	MG
Cadmium, Total	ND		mg/l	0.00020	--	1	05/18/19 13:27	05/18/19 18:14	3,200.8	MG
Chromium, Total	ND		mg/l	0.00100	--	1	05/18/19 13:27	05/18/19 18:14	3,200.8	MG
Copper, Total	ND		mg/l	0.00100	--	1	05/18/19 13:27	05/18/19 18:14	3,200.8	MG

Project Name: BOSTON COLLEGE-IISS **Lab Number:** L1920160

Project Number: 128271-016 **Report Date:** 05/30/19

Method Blank Analysis
Batch Quality Control

Lead, Total	ND	mg/l	0.00100	--	1	05/18/19 13:27	05/18/19 18:14	3,200.8	MG
Nickel, Total	ND	mg/l	0.00200	--	1	05/18/19 13:27	05/18/19 18:14	3,200.8	MG
Selenium, Total	ND	mg/l	0.00500	--	1	05/18/19 13:27	05/18/19 18:14	3,200.8	MG
Silver, Total	ND	mg/l	0.00040	--	1	05/18/19 13:27	05/18/19 18:14	3,200.8	MG
Zinc, Total	ND	mg/l	0.01000	--	1	05/18/19 13:27	05/18/19 18:14	3,200.8	MG

Prep Information

Digestion Method: EPA 3005A

Lab Control Sample Analysis

Batch Quality Control

Project Name: BOSTON COLLEGE-IISS

Project Number: 128271-016

Lab Number: L1920160

Report Date: 05/30/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01 Batch: WG1237414-2								
Mercury, Total	109		-		85-115	-		
Total Metals - Mansfield Lab Associated sample(s): 01 Batch: WG1238678-2								
Iron, Total	115		-		85-115	-		
Total Hardness by SM 2340B - Mansfield Lab Associated sample(s): 01 Batch: WG1238678-2								
Hardness	113		-		85-115	-		
Total Metals - Mansfield Lab Associated sample(s): 01 Batch: WG1238680-2								
Antimony, Total	99		-		85-115	-		
Arsenic, Total	106		-		85-115	-		
Cadmium, Total	112		-		85-115	-		
Chromium, Total	102		-		85-115	-		
Copper, Total	102		-		85-115	-		
Lead, Total	113		-		85-115	-		
Nickel, Total	103		-		85-115	-		
Selenium, Total	112		-		85-115	-		
Silver, Total	108		-		85-115	-		
Zinc, Total	115		-		85-115	-		

Matrix Spike Analysis
Batch Quality Control

Project Name: BOSTON COLLEGE-IISS
Project Number: 128271-016

Lab Number: L1920160
Report Date: 05/30/19

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 QC Batch ID: WG1237414-3 QC Sample: L1919705-01 Client ID: MS Sample												
Mercury, Total	ND	0.005	0.0052	103		-	-		70-130	-		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1238678-3 QC Sample: L1920160-01 Client ID: HA18-B8 (OW)_052019												
Iron, Total	ND	1	1.27	**127**	Q	-	-		75-125	-		20
Total Hardness by SM 2340B - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1238678-3 QC Sample: L1920160-01 Client ID: HA18-B8 (OW)_052019												
Hardness	269	66.2	332	95		-	-		75-125	-		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1238678-7 QC Sample: L1919010-01 Client ID: MS Sample												
Iron, Total	20.4	1	21.0	**60**	Q	-	-		75-125	-		20
Total Hardness by SM 2340B - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1238678-7 QC Sample: L1919010-01 Client ID: MS Sample												
Hardness	361	66.2	439	118		-	-		75-125	-		20

Matrix Spike Analysis
Batch Quality Control

Project Name: BOSTON COLLEGE-IISS
Project Number: 128271-016

Lab Number: L1920160
Report Date: 05/30/19

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 QC Batch ID: WG1238680-3 QC Sample: L1920160-01 Client ID: HA18-B8 (OW)_052019									
Antimony, Total	ND	0.5	0.6450	129	-	-	70-130	-	20
Arsenic, Total	0.00120	0.12	0.1356	112	-	-	70-130	-	20
Cadmium, Total	ND	0.051	0.06162	121	-	-	70-130	-	20
Chromium, Total	ND	0.2	0.2251	112	-	-	70-130	-	20
Copper, Total	0.00477	0.25	0.2789	110	-	-	70-130	-	20
Lead, Total	ND	0.51	0.5886	115	-	-	70-130	-	20
Nickel, Total	ND	0.5	0.5628	112	-	-	70-130	-	20
Selenium, Total	ND	0.12	0.1450	121	-	-	70-130	-	20
Silver, Total	ND	0.05	0.05799	116	-	-	70-130	-	20
Zinc, Total	ND	0.5	0.6031	121	-	-	70-130	-	20

Lab Duplicate Analysis
Batch Quality Control

Project Name: BOSTON COLLEGE-IISS
Project Number: 128271-016

Lab Number: L1920160
Report Date: 05/30/19

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1237414-4 QC Sample: L1919705-01 Client ID: DUP Sample						
Mercury, Total	ND	ND	mg/l	NC		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1238678-4 QC Sample: L1920160-01 Client ID: HA18-B8 (OW)_052019						
Iron, Total	ND	ND	mg/l	NC		20
Total Hardness by SM 2340B - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1238678-4 QC Sample: L1920160-01 Client ID: HA18-B8 (OW)_052019						
Hardness	269	265	mg/l	1		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1238680-4 QC Sample: L1920160-01 Client ID: HA18-B8 (OW)_052019						
Antimony, Total	ND	ND	mg/l	NC		20
Arsenic, Total	0.00120	ND	mg/l	NC		20
Cadmium, Total	ND	ND	mg/l	NC		20
Chromium, Total	ND	ND	mg/l	NC		20
Copper, Total	0.00477	0.00473	mg/l	1		20
Lead, Total	ND	ND	mg/l	NC		20
Nickel, Total	ND	ND	mg/l	NC		20
Selenium, Total	ND	ND	mg/l	NC		20
Silver, Total	ND	ND	mg/l	NC		20
Zinc, Total	ND	ND	mg/l	NC		20

INORGANICS
&
MISCELLANEOUS

Project Name: BOSTON COLLEGE-IISS
Project Number: 128271-016
Lab Number: L1920160
Report Date: 05/30/19

SAMPLE RESULTS

Lab ID: L1920160-01
Client ID: HA18-B8 (OW)_052019
Sample Location: CHESTNUT HILL, MA
Sample Depth:
Matrix: Water

Date Collected: 05/14/19 11:25
Date Received: 05/14/19
Field Prep: Refer to COC

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total Suspended	ND		mg/l	5.0	NA	1	-	05/15/19 10:20	121,2540D	DR
Cyanide, Total	ND		mg/l	0.005	--	1	05/15/19 06:04	05/15/19 11:07	121,4500CN-CE	LH
Chlorine, Total Residual	ND		mg/l	0.02	--	1	-	05/15/19 04:50	121,4500CL-D	MA
pH (H)	7.6		SU	-	NA	1	-	05/21/19 17:33	121,4500H+-B	AS
Nitrogen, Ammonia	ND		mg/l	0.075	--	1	05/15/19 02:00	05/15/19 22:44	121,4500NH3-BH	AT
TPH, SGT-HEM	ND		mg/l	4.00	--	1	05/16/19 16:45	05/16/19 22:20	74,1664A	MM
Phenolics, Total	ND		mg/l	0.030	--	1	05/15/19 04:47	05/16/19 04:56	4,420.1	GD
Chromium, Hexavalent	ND		mg/l	0.010	--	1	05/14/19 23:00	05/15/19 00:14	1,7196A	JW
Anions by Ion Chromatography - Westborough Lab										
Chloride	344.		mg/l	12.5	--	25	-	05/15/19 22:14	44,300.0	AU

Project Name: BOSTON COLLEGE-IISS **Lab Number:** L1920160

Project Number: 128271-016 **Report Date:** 05/30/19

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: WG1237172-1										
Chromium, Hexavalent	ND		mg/l	0.010	--	1	05/14/19 23:00	05/14/19 23:55	1,7196A	JW
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG1237191-1										
Nitrogen, Ammonia	ND		mg/l	0.075	--	1	05/15/19 02:00	05/15/19 22:31	121,4500NH3-BH	AT
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG1237235-1										
Phenolics, Total	ND		mg/l	0.030	--	1	05/15/19 04:47	05/16/19 04:53	4,420.1	GD
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG1237246-1										
Cyanide, Total	ND		mg/l	0.005	--	1	05/15/19 06:04	05/15/19 10:48	121,4500CN-CE	LH
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG1237299-1										
Chlorine, Total Residual	ND		mg/l	0.02	--	1	-	05/15/19 04:50	121,4500CL-D	MA
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG1237320-1										
Solids, Total Suspended	ND		mg/l	5.0	NA	1	-	05/15/19 10:20	121,2540D	DR
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG1238018-1										
TPH, SGT-HEM	ND		mg/l	4.00	--	1	05/16/19 16:45	05/16/19 22:20	74,1664A	MM
Anions by Ion Chromatography - Westborough Lab for sample(s): 01 Batch: WG1238057-1										
Chloride	ND		mg/l	0.500	--	1	-	05/15/19 20:26	44,300.0	AU

Lab Control Sample Analysis

Batch Quality Control

Project Name: BOSTON COLLEGE-IISS

Project Number: 128271-016

Lab Number: L1920160

Report Date: 05/30/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1237172-2								
Chromium, Hexavalent	92		-		85-115	-		20
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1237191-2								
Nitrogen, Ammonia	96		-		80-120	-		20
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1237235-2								
Phenolics, Total	80		-		70-130	-		
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1237246-2								
Cyanide, Total	94		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1237299-2								
Chlorine, Total Residual	100		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1238018-2								
TPH	68		-		64-132	-		34
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 01 Batch: WG1238057-2								
Chloride	104		-		90-110	-		

Lab Control Sample Analysis

Batch Quality Control

Project Name: BOSTON COLLEGE-IISS

Project Number: 128271-016

Lab Number: L1920160

Report Date: 05/30/19

Parameter	LCS %Recovery	LCSD %Recovery	%Recovery Limits	RPD	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1239614-1					
pH	100	-	99-101	-	5

Matrix Spike Analysis
Batch Quality Control

Project Name: BOSTON COLLEGE-IISS
Project Number: 128271-016

Lab Number: L1920160
Report Date: 05/30/19

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 (OW)_052019	QC Batch ID: WG1237172-4		QC Sample: L1920160-01		Client ID: HA18-B8							
Chromium, Hexavalent	ND	0.1	0.105	105		-	-		85-115	-		20
General Chemistry - Westborough Lab Associated sample(s): 01 (OW)_052019	QC Batch ID: WG1237191-4		QC Sample: L1920160-01		Client ID: HA18-B8							
Nitrogen, Ammonia	ND	4	3.93	98		-	-		80-120	-		20
General Chemistry - Westborough Lab Associated sample(s): 01 (OW)_052019	QC Batch ID: WG1237235-4		QC Sample: L1920160-01		Client ID: HA18-B8							
Phenolics, Total	ND	0.4	0.20	**49**	Q	-	-		70-130	-		20
General Chemistry - Westborough Lab Associated sample(s): 01	QC Batch ID: WG1237246-4		QC Sample: L1920008-02		Client ID: MS Sample							
Cyanide, Total	ND	0.2	0.201	100		-	-		90-110	-		30
General Chemistry - Westborough Lab Associated sample(s): 01 (OW)_052019	QC Batch ID: WG1237299-4		QC Sample: L1920160-01		Client ID: HA18-B8							
Chlorine, Total Residual	ND	0.25	0.18	**72**	Q	-	-		80-120	-		20
General Chemistry - Westborough Lab Associated sample(s): 01	QC Batch ID: WG1238018-4		QC Sample: L1920025-01		Client ID: MS Sample							
TPH	9.80	25	34.5	99		-	-		64-132	-		34
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 01	QC Batch ID: WG1238057-3		QC Sample: L1920146-02		Client ID: MS Sample							
Chloride	2280	200	2480	101		-	-		90-110	-		18

Lab Duplicate Analysis

Batch Quality Control

Project Name: BOSTON COLLEGE-IISS

Project Number: 128271-016

Lab Number: L1920160

Report Date: 05/30/19

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1237172-3 QC Sample: L1920160-01 Client ID: HA18-B8 (OW)_052019						
Chromium, Hexavalent	ND	ND	mg/l	NC		20
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1237191-3 QC Sample: L1920160-01 Client ID: HA18-B8 (OW)_052019						
Nitrogen, Ammonia	ND	ND	mg/l	NC		20
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1237235-3 QC Sample: L1920160-01 Client ID: HA18-B8 (OW)_052019						
Phenolics, Total	ND	ND	mg/l	NC		20
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1237246-3 QC Sample: L1920008-01 Client ID: DUP Sample						
Cyanide, Total	ND	ND	mg/l	NC		30
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1237299-3 QC Sample: L1920160-01 Client ID: HA18-B8 (OW)_052019						
Chlorine, Total Residual	ND	ND	mg/l	NC		20
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1237320-2 QC Sample: L1920051-04 Client ID: DUP Sample						
Solids, Total Suspended	64	60	mg/l	6		29
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1238018-3 QC Sample: L1920025-01 Client ID: DUP Sample						
TPH	9.80	ND	mg/l	NC		34
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1238057-4 QC Sample: L1920146-02 Client ID: DUP Sample						
Chloride	2280	2270	mg/l	0		18

Lab Duplicate Analysis

Batch Quality Control

Project Name: BOSTON COLLEGE-IISS

Project Number: 128271-016

Lab Number: L1920160

Report Date: 05/30/19

Parameter	Native Sample	Duplicate Sample	Units	RPD	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1239614-2 QC Sample: L1920069-07 Client ID: DUP Sample					
pH	5.5	5.6	SU	2	5

Project Name: BOSTON COLLEGE-IISS
Project Number: 128271-016

Lab Number: L1920160
Report Date: 05/30/19

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(*)
L1920160-01A	Vial HCl preserved	A	NA		3.9	Y	Absent		SUB-ETHANOL(14)
L1920160-01B	Vial HCl preserved	A	NA		3.9	Y	Absent		SUB-ETHANOL(14)
L1920160-01C	Vial HCl preserved	A	NA		3.9	Y	Absent		SUB-ETHANOL(14)
L1920160-01D	Vial Na2S2O3 preserved	A	NA		3.9	Y	Absent		504(14)
L1920160-01E	Vial Na2S2O3 preserved	A	NA		3.9	Y	Absent		504(14)
L1920160-01F	Vial Na2S2O3 preserved	A	NA		3.9	Y	Absent		504(14)
L1920160-01G	Vial Na2S2O3 preserved	A	NA		3.9	Y	Absent		624.1-RGP(7),624.1-SIM-RGP(7)
L1920160-01H	Vial Na2S2O3 preserved	A	NA		3.9	Y	Absent		624.1-RGP(7),624.1-SIM-RGP(7)
L1920160-01I	Vial Na2S2O3 preserved	A	NA		3.9	Y	Absent		624.1-RGP(7),624.1-SIM-RGP(7)
L1920160-01J	Vial Na2S2O3 preserved	A	NA		3.9	Y	Absent		624.1-RGP(7),624.1-SIM-RGP(7)
L1920160-01K	Vial Na2S2O3 preserved	A	NA		3.9	Y	Absent		624.1-RGP(7),624.1-SIM-RGP(7)
L1920160-01L	Plastic 250ml HNO3 preserved	A	<2	<2	3.9	Y	Absent		HOLD-METAL-DISSOLVED(180)
L1920160-01M	Plastic 250ml HNO3 preserved	A	<2	<2	3.9	Y	Absent		CD-2008T(180),NI-2008T(180),ZN-2008T(180),CU-2008T(180),FE-UI(180),HARDU(180),AG-2008T(180),AS-2008T(180),HG-U(28),SE-2008T(180),CR-2008T(180),PB-2008T(180),SB-2008T(180)
L1920160-01N	Plastic 950ml unpreserved	A	8	8	3.9	Y	Absent		CL-300(28),HEXCR-7196(1),TRC-4500(1),PH-4500(.01)
L1920160-01O	Plastic 250ml NaOH preserved	A	>12	>12	3.9	Y	Absent		TCN-4500(14)
L1920160-01P	Plastic 500ml H2SO4 preserved	A	<2	<2	3.9	Y	Absent		NH3-4500(28)
L1920160-01Q	Plastic 950ml unpreserved	A	8	8	3.9	Y	Absent		TSS-2540(7)
L1920160-01R	Amber 950ml H2SO4 preserved	A	<2	<2	3.9	Y	Absent		TPHENOL-420(28)
L1920160-01S	Amber 1000ml HCl preserved	A	NA		3.9	Y	Absent		TPH-1664(28)
L1920160-01T	Amber 1000ml HCl preserved	A	NA		3.9	Y	Absent		TPH-1664(28)
L1920160-01U	Amber 1000ml Na2S2O3	A	8	8	3.9	Y	Absent		PCB-608.3(7)

*Values in parentheses indicate holding time in days

Project Name: BOSTON COLLEGE-IISS
Project Number: 128271-016

Lab Number: L1920160
Report Date: 05/30/19

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1920160-01V	Amber 1000ml Na2S2O3	A	8	8	3.9	Y	Absent		PCB-608.3(7)
L1920160-01W	Amber 1000ml Na2S2O3	A	8	8	3.9	Y	Absent		PCB-608.3(7)
L1920160-01X	Amber 1000ml Na2S2O3	A	8	8	3.9	Y	Absent		625.1-RGP(7),625.1-SIM-RGP(7)
L1920160-01Y	Amber 1000ml Na2S2O3	A	8	8	3.9	Y	Absent		625.1-RGP(7),625.1-SIM-RGP(7)
L1920160-01Z	Amber 1000ml Na2S2O3	A	8	8	3.9	Y	Absent		625.1-RGP(7),625.1-SIM-RGP(7)
L1920160-02A	Vial Na2S2O3 preserved	A	NA		3.9	Y	Absent		ARCHIVE()
L1920160-02B	Vial Na2S2O3 preserved	A	NA		3.9	Y	Absent		ARCHIVE()
L1920160-02C	Vial Na2S2O3 preserved	A	NA		3.9	Y	Absent		ARCHIVE()
L1920160-02D	Vial Na2S2O3 preserved	A	NA		3.9	Y	Absent		ARCHIVE()
L1920160-02E	Vial Na2S2O3 preserved	A	NA		3.9	Y	Absent		ARCHIVE()
L1920160-02F	Vial Na2S2O3 preserved	A	NA		3.9	Y	Absent		ARCHIVE()

*Values in parentheses indicate holding time in days

Project Name:	BOSTON COLLEGE-IISS	**Lab Number:**	L1920160
Project Number:	128271-016	**Report Date:**	05/30/19

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:	BOSTON COLLEGE-IISS	**Lab Number:**	L1920160
Project Number:	128271-016	**Report Date:**	05/30/19

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.

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.

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.

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 Condensation Product".

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 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:	BOSTON COLLEGE-IISS	**Lab Number:**	L1920160
Project Number:	128271-016	**Report Date:**	05/30/19

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
EPA 8260C: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), Methyl methacrylate, 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.

EPA 6860: SCM: Perchlorate

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.
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**
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: 5/14/19

ALPHA Job #: L1920160

H&A Information

H&A Client: Boston College

H&A Address: 465 Medford St, Boston, MA 0212-1400

H&A Phone: 617-886-7400

H&A Fax:

H&A Email: kscalise

Project Information

Project Name: Boston College - IISS

Project Location: Chestnut Hill, MA

Project #: 128271-016

(Use Project name as Project #)

Project Manager: H. Scranton, C. Worthy

ALPHAQuote #:

Turn-Around Time

Standard ☑ Due Date:

(only if pre approved) ☐ # of Days: 5

Deliverables

☑ Email ☐ Fax

☐ EQuIS (1 File) ☑ EQuIS (4 File)

☐ Other:

Billing Information

☑ Same as Client Info

PO #

Regulatory Requirements (Program/Criteria)

EPA NPDES RGP 2017

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:

11. Total NPDES Metals - Ag, As, Cd, Cr, Cu, Ni, Pb, Sb, Se, Zn, Fe, Hg
*Please place Dissolved Metals ON HOLD (Field Filtered)
Please sample per EPA Approved 2017 RGP Permit methods

Please specify Metals or TAL.

ANALYSIS

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	1. TSS - 2540	2. TRC-4500	3. TCN-4500	4. Ethylene Dribromide - 504.1	5. 8260, & 8260 SIM for Dioxane, or applicable method	6. HEXCR-3500 & Trivalent Chromium	7. TPHENOL-420	8. 8270 TCL (including Diethylhexylphthalate)	9. 8270TCL-SIM, or applicable method	10. CL-300	11. Total Metals (NPDES RGP)	12. Ammonia Nitrogen - SM4500	13. Total Hardness + pH	14. A2-ALCOHOL (Ethanol)	15. TPH-1664	16. PCB-608
20160-01	HA-B7(OW)_05 2019	5/14	1125	AQ	TH	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Sample Filtration

☐ Done ☐ Lab to do

Preservation ☐ Lab to do

(Please Specify below)

Sample Specific Comments

*Hold for Dissolved Metals analysis

Temperature (Field Measured):

Total Bottles

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
	5/14 1630		5/14/19 1630
	5/14 1815		5/14/19 1815

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 (1/28/2016)

ALPHA ANALYTICAL
World Class Chemistry

Subcontract Chain of Custody

Test America (Nashville)
2960 Foster Creighton Drive
Nashville, TN 37204

Alpha Job Number
L1920160

Client Information

Client: Alpha Analytical Labs
Address: Eight Walkup Drive
Westborough, MA 01581-1019

Phone: 603.319.5010
Email: mgulli@alphalab.com

Project Information

Project Location: MA
Project Manager: Melissa Gulli

Turnaround & Deliverables Information

Due Date:
Deliverables:

Regulatory Requirements/Report Limits

State/Federal Program:
Regulatory Criteria: RCS-1-14;S1/G1-14

Project Specific Requirements and/or Report Requirements

Reference following Alpha Job Number on final report/deliverables: L1920160

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
	HA-B7 (OW)_052019	05-14-19 11:25	WATER	Ethanol by EPA 1671 Revision A	

Relinquished By:	Date/Time:	Received By:	Date/Time:
Chris Telesca	5/15/19		

Form No: AL_subcoc

eurofins | Environment Testing TestAmerica

ANALYTICAL REPORT

Eurofins TestAmerica, Nashville
2960 Foster Creighton Drive
Nashville, TN 37204
Tel: (615)726-0177

Laboratory Job ID: 490-174167-1
Client Project/Site: L1920160

For:
Alpha Analytical Inc
145 Flanders Road
Westborough, Massachusetts 01581-1019

Attn: Melissa Gulli

Authorized for release by:
5/24/2019 1:58:40 PM

Ken Hayes, Project Manager II
(615)301-5035
ken.hayes@testamericainc.com

Table of Contents

Sample Summary

Client: Alpha Analytical Inc
Project/Site: L1920160

Job ID: 490-174167-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
490-174167-1	HA18-B8 (OW)_052019	Water	05/14/19 11:25	05/16/19 09:15	

Case Narrative

Client: Alpha Analytical Inc
Project/Site: L1920160

Job ID: 490-174167-1

Job ID: 490-174167-1

Laboratory: Eurofins TestAmerica, Nashville

Narrative

Job Narrative
490-174167-1

Comments
No additional comments.

Receipt
The sample was received on 5/16/2019 9:15 AM; the sample arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 3.1º C.

GC Semi VOA
Method 1671A: The laboratory control sample (LCS) laboratory control sample duplicate (LCSD), matrix spike (MS) and matrix spike duplicate (MSD) for analytical batch 490-596565 recovered outside control limits for the following analyte: Ethanol. This analyte was biased high in the QC samples and was not detected in the following associated sample(s); therefore, the data have been reported: HA18-B8 (OW)_052019 (490-174167-1).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Definitions/Glossary

Client: Alpha Analytical Inc
Project/Site: L1920160

Job ID: 490-174167-1

Qualifiers

GC VOA

Qualifier	Qualifier Description
*	LCS or LCSD is outside acceptance limits.
F1	MS and/or MSD Recovery is outside acceptance limits.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: Alpha Analytical Inc
Project/Site: L1920160

Job ID: 490-174167-1

Client Sample ID: HA18-B8 (OW)_052019

Lab Sample ID: 490-174167-1

Date Collected: 05/14/19 11:25

Matrix: Water

Date Received: 05/16/19 09:15

Method: 1671A - Ethanol (GC/FID)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethanol	ND	* F1	2000	500	ug/L			05/21/19 12:51	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Isopropyl acetate (Surr)	*93*		*70 - 130*		*05/21/19 12:51*	*1*

QC Sample Results

Client: Alpha Analytical Inc
Project/Site: L1920160

Job ID: 490-174167-1

Method: 1671A - Ethanol (GC/FID)

Lab Sample ID: MB 490-596565/4
Matrix: Water
Analysis Batch: 596565

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethanol	ND		2000	500	ug/L			05/21/19 12:27	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Isopropyl acetate (Surr)	*86*		*70 - 130*		*05/21/19 12:27*	*1*

Lab Sample ID: LCS 490-596565/5
Matrix: Water
Analysis Batch: 596565

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Ethanol			30100	45350	*	ug/L		150	70 - 130		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
Isopropyl acetate (Surr)	*86*		*70 - 130*

Lab Sample ID: LCSD 490-596565/6
Matrix: Water
Analysis Batch: 596565

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Ethanol			30100	45250	*	ug/L		150	70 - 130	0	20

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
Isopropyl acetate (Surr)	*87*		*70 - 130*

Lab Sample ID: 490-174167-1 MS
Matrix: Water
Analysis Batch: 596565

Client Sample ID: HA18-B8 (OW)_052019
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
Ethanol	ND	* F1	30100	43680	F1	ug/L		145	70 - 130		

Surrogate	*MS %Recovery*	*MS Qualifier*	*Limits*
Isopropyl acetate (Surr)	*98*		*70 - 130*

Lab Sample ID: 490-174167-1 MSD
Matrix: Water
Analysis Batch: 596565

Client Sample ID: HA18-B8 (OW)_052019
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Ethanol	ND	* F1	30100	47650	F1	ug/L		158	70 - 130	9	20

Surrogate	*MSD %Recovery*	*MSD Qualifier*	*Limits*
Isopropyl acetate (Surr)	*100*		*70 - 130*

QC Association Summary

Client: Alpha Analytical Inc
Project/Site: L1920160

Job ID: 490-174167-1

GC VOA

Analysis Batch: 596565

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
490-174167-1	HA18-B8 (OW)_052019	Total/NA	Water	1671A	
MB 490-596565/4	Method Blank	Total/NA	Water	1671A	
LCS 490-596565/5	Lab Control Sample	Total/NA	Water	1671A	
LCSD 490-596565/6	Lab Control Sample Dup	Total/NA	Water	1671A	
490-174167-1 MS	HA18-B8 (OW)_052019	Total/NA	Water	1671A	
490-174167-1 MSD	HA18-B8 (OW)_052019	Total/NA	Water	1671A	

Lab Chronicle

Client: Alpha Analytical Inc
Project/Site: L1920160

Job ID: 490-174167-1

Client Sample ID: HA18-B8 (OW)_052019

Date Collected: 05/14/19 11:25
Date Received: 05/16/19 09:15

Lab Sample ID: 490-174167-1

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	1671A		1			596565	05/21/19 12:51	AAB	TAL NSH

Laboratory References:

TAL NSH = Eurofins TestAmerica, Nashville, 2960 Foster Creighton Drive, Nashville, TN 37204, TEL (615)726-0177

Method Summary

Client: Alpha Analytical Inc
Project/Site: L1920160

Job ID: 490-174167-1

Method	Method Description	Protocol	Laboratory
1671A	Ethanol (GC/FID)	EPA	TAL NSH

Protocol References:

EPA = US Environmental Protection Agency

Laboratory References:

TAL NSH = Eurofins TestAmerica, Nashville, 2960 Foster Creighton Drive, Nashville, TN 37204, TEL (615)726-0177

Accreditation/Certification Summary

Client: Alpha Analytical Inc
Project/Site: L1920160

Job ID: 490-174167-1

Laboratory: Eurofins TestAmerica, Nashville

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	EPA Region	Identification Number	Expiration Date
California	State Program	9	2938	06-30-19

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
1671A		Water	Ethanol

Maine	State Program	1	TN00032	11-03-19

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
1671A		Water	Ethanol

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
Nashville, TN

COOLER RECEIPT FORM

490-174167 Chain of Custody

Cooler Received/Opened On 05-16-2019 @ 09:15

Time Samples Removed From Cooler _____ Time Samples Placed In Storage _____ (2 Hour Window)

1. Tracking # 1ZE3065401991762 54 (last 4 digits, FedEx) Courier: UPS NDA

IR Gun ID 31470368 pH Strip Lot N/A Chlorine Strip Lot N/A

2. Temperature of rep. sample or temp blank when opened: 3.1 *Degrees Celsius*

3. If Item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO...NA

4. Were custody seals on outside of cooler? YES...NO...NA

If yes, how many and where: _____

5. Were the seals intact, signed, and dated correctly? YES...NO...NA

6. Were custody papers inside cooler? YES...NO...NA

I certify that I opened the cooler and answered questions 1-6 (intial) KA

7. Were custody seals on containers: YES NO and Intact YES...NO...NA

Were these signed and dated correctly? YES...NO...NA

8. Packing mat'l used? Bubblewrap Plastic bag Peanuts Vermiculite Foam Insert Paper Other None

9. Cooling process: ~~Ice~~ Ice-pack Ice (direct contact) Dry ice Other None

10. Did all containers arrive in good condition (unbroken)? YES...NO...NA

11. Were all container labels complete (#, date, signed, pres., etc)? YES...NO...NA

12. Did all container labels and tags agree with custody papers? YES...NO...NA

13a. Were VOA vials received? YES...NO...NA

b. Was there any observable headspace present in any VOA vial? YES...NO...NA

● ⬅ Larger than this.

14. Was there a Trip Blank in this cooler? YES...NO...NA If multiple coolers, sequence # _____

I certify that I unloaded the cooler and answered questions 7-14 (intial) ADH

15a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES...NO...NA

b. Did the bottle labels indicate that the correct preservatives were used YES...NO...NA

16. Was residual chlorine present? YES...NO...NA

I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (intial) ADH

17. Were custody papers properly filled out (ink, signed, etc)? YES...NO...NA

18. Did you sign the custody papers in the appropriate place? YES...NO...NA

19. Were correct containers used for the analysis requested? YES...NO...NA

20. Was sufficient amount of sample sent in each container? YES...NO...NA

I certify that I entered this project into LIMS and answered questions 17-20 (intial) ADH

I certify that I attached a label with the unique LIMS number to each container (intial) ADH

21. Were there Non-Conformance issues at login? YES...NO Was a NCM generated? YES...NO...#_____

BIS = Broken in shipment
Cooler Receipt Form.doc

LF-1
End of Form

Revised 8/23/17

ALPHA ANALYTICAL
World Class Chemistry

Subcontract Chain of Custody

Test America (Nashville)
2960 Foster Creighton Drive
Nashville, TN 37204

Alpha Job Number
L1920160

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: RCS-1-14;S1/G1-14

Project Specific Requirements and/or Report Requirements

Reference following Alpha Job Number on final report/deliverables: L1920160

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
	HA-B7 (OW)_052019	05-14-19 11:25	WATER	Ethanol by EPA 1671 Revision A	

Loc: 490
174167

Relinquished By:	Date/Time:	Received By:	Date/Time:
Chris Telesca	5/15/19		5/16/19 915

Form No: AL_subcoc

3.1°C

ANALYTICAL REPORT

Lab Number:	L1813184
Client:	Haley & Aldrich, Inc. 465 Medford Street, Suite 2200 Charlestown, MA 02129-1400
ATTN:	Cole Worthy
Phone:	(617) 886-7341
Project Name:	BOSTON COLLEGE IISS
Project Number:	128271-016
Report Date:	04/23/18

Certifications & Approvals: MA (M-MA086), NH NELAP (2064), NJ NELAP (MA935), CT (PH-0574), IL (200077), ME (MA00086), MD (348), NY (11148), NC (25700/666), PA (68-03671), RI (LAO00065), TX (T104704476), VT (VT-0935), VA (460195), USDA (Permit #P330-14-00197).

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

Project Name: BOSTON COLLEGE IISS
Project Number: 128271-016

Lab Number: L1813184
Report Date: 04/23/18

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L1813184-01	HA-B7(OW)_041618	WATER	CHESTNUT HILL, MA	04/16/18 11:00	04/16/18

Project Name: BOSTON COLLEGE IISS
Project Number: 128271-016

Lab Number: L1813184
Report Date: 04/23/18

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. All specific QC information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated 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.

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 table. The information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications.

Please see the associated ADEx data file for a comparison of laboratory reporting limits that were achieved with the regulatory Numerical Standards requested on the Chain of Custody.

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 Client Service Representative 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 Client Services at 800-624-9220 with any questions.

Project Name: BOSTON COLLEGE IISS
Project Number: 128271-016
Lab Number: L1813184
Report Date: 04/23/18

Case Narrative (continued)

Report Revision

April 23, 2018: The Client ID has been changed on L1813184-01.

Sample Receipt

L1813184-01 (HA-B7(OW)_041618): The collection time was obtained from the container label.

Total Metals

The WG1107137-3 MS recovery for antimony (58%), performed on L1813184-01 (HA-B7(OW)_041618), recovered outside the 70-130% acceptance criteria. The result for this analyte is considered suspect due to either the heterogeneous nature of the sample or matrix interference.

The WG1107137-4 Laboratory Duplicate RPD for cadmium (22%), performed on L1813184-01 (HA-B7(OW)_041618), is above the acceptance criteria; however, the sample and duplicate results are less than five times the reporting limit. Therefore, the RPD is valid.

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: Kelly Stenstrom

Title: Technical Director/Representative Date: 04/23/18

METALS

Project Name: BOSTON COLLEGE IISS
Lab Number: L1813184
Project Number: 128271-016
Report Date: 04/23/18

SAMPLE RESULTS

Lab ID: L1813184-01
Client ID: HA-B7(OW)_041618
Sample Location: CHESTNUT HILL, MA
Date Collected: 04/16/18 11:00
Date Received: 04/16/18
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	0.00400	--	1	04/17/18 11:40	04/18/18 09:31	EPA 3005A	3,200.8	AM
Arsenic, Total	0.00648		mg/l	0.00100	--	1	04/17/18 11:40	04/18/18 09:31	EPA 3005A	3,200.8	AM
Cadmium, Total	0.00022		mg/l	0.00020	--	1	04/17/18 11:40	04/18/18 09:31	EPA 3005A	3,200.8	AM
Chromium, Total	0.07643		mg/l	0.00100	--	1	04/17/18 11:40	04/18/18 09:31	EPA 3005A	3,200.8	AM
Copper, Total	0.7614		mg/l	0.00100	--	1	04/17/18 11:40	04/18/18 09:31	EPA 3005A	3,200.8	AM
Iron, Total	19.9		mg/l	0.050	--	1	04/17/18 11:40	04/19/18 11:43	EPA 3005A	19,200.7	LC
Lead, Total	0.06924		mg/l	0.00050	--	1	04/17/18 11:40	04/18/18 09:31	EPA 3005A	3,200.8	AM
Mercury, Total	ND		mg/l	0.00020	--	1	04/17/18 11:05	04/17/18 15:22	EPA 245.1	3,245.1	MG
Nickel, Total	0.06069		mg/l	0.00200	--	1	04/17/18 11:40	04/18/18 09:31	EPA 3005A	3,200.8	AM
Selenium, Total	ND		mg/l	0.00500	--	1	04/17/18 11:40	04/18/18 09:31	EPA 3005A	3,200.8	AM
Silver, Total	0.3021		mg/l	0.04000	--	1	04/18/18 10:45	04/19/18 11:18	EPA 3005A	3,200.8	AM
Zinc, Total	0.07128		mg/l	0.01000	--	1	04/17/18 11:40	04/18/18 09:31	EPA 3005A	3,200.8	AM
General Chemistry - Mansfield Lab											
Chromium, Trivalent	0.076		mg/l	0.010	--	1		04/18/18 09:31	NA	107,-	

Project Name: BOSTON COLLEGE IISS
Project Number: 128271-016
Lab Number: L1813184
Report Date: 04/23/18

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 Batch: WG1107137-1										
Antimony, Total	ND		mg/l	0.00400	--	1	04/17/18 11:40	04/18/18 09:15	3,200.8	AM
Arsenic, Total	ND		mg/l	0.00100	--	1	04/17/18 11:40	04/18/18 09:15	3,200.8	AM
Cadmium, Total	ND		mg/l	0.00020	--	1	04/17/18 11:40	04/18/18 09:15	3,200.8	AM
Chromium, Total	ND		mg/l	0.00100	--	1	04/17/18 11:40	04/18/18 09:15	3,200.8	AM
Copper, Total	ND		mg/l	0.00100	--	1	04/17/18 11:40	04/18/18 09:15	3,200.8	AM
Lead, Total	ND		mg/l	0.00050	--	1	04/17/18 11:40	04/18/18 09:15	3,200.8	AM
Nickel, Total	ND		mg/l	0.00200	--	1	04/17/18 11:40	04/18/18 09:15	3,200.8	AM
Selenium, Total	ND		mg/l	0.00500	--	1	04/17/18 11:40	04/18/18 09:15	3,200.8	AM
Silver, Total	ND		mg/l	0.00040	--	1	04/17/18 11:40	04/18/18 09:15	3,200.8	AM
Zinc, Total	ND		mg/l	0.01000	--	1	04/17/18 11:40	04/18/18 09:15	3,200.8	AM

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 Batch: WG1107139-1										
Mercury, Total	ND		mg/l	0.0002	--	1	04/17/18 11:05	04/17/18 15:13	3,245.1	MG

Prep Information

Digestion Method: EPA 245.1

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 01 Batch: WG1107140-1										
Iron, Total	ND		mg/l	0.050	--	1	04/17/18 11:40	04/19/18 10:36	19,200.7	LC

Prep Information

Digestion Method: EPA 3005A

Project Name: BOSTON COLLEGE IISS
Project Number: 128271-016
Lab Number: L1813184
Report Date: 04/23/18

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 Batch: WG1107506-1										
Cadmium, Total	ND		mg/l	0.00020	--	1	04/18/18 10:45	04/19/18 10:58	3,200.8	AM
Silver, Total	ND		mg/l	0.00040	--	1	04/18/18 10:45	04/19/18 10:58	3,200.8	AM

Prep Information

Digestion Method: EPA 3005A

Lab Control Sample Analysis

Batch Quality Control

Project Name: BOSTON COLLEGE IISS

Project Number: 128271-016

Lab Number: L1813184

Report Date: 04/23/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01 Batch: WG1107137-2								
Antimony, Total	106		-		85-115	-		
Arsenic, Total	104		-		85-115	-		
Cadmium, Total	108		-		85-115	-		
Chromium, Total	100		-		85-115	-		
Copper, Total	100		-		85-115	-		
Lead, Total	105		-		85-115	-		
Nickel, Total	103		-		85-115	-		
Selenium, Total	110		-		85-115	-		
Silver, Total	94		-		85-115	-		
Zinc, Total	106		-		85-115	-		
Total Metals - Mansfield Lab Associated sample(s): 01 Batch: WG1107139-2								
Mercury, Total	90		-		85-115	-		
Total Metals - Mansfield Lab Associated sample(s): 01 Batch: WG1107140-2								
Iron, Total	103		-		85-115	-		
Total Metals - Mansfield Lab Associated sample(s): 01 Batch: WG1107506-2								
Cadmium, Total	111		-		85-115	-		
Silver, Total	99		-		85-115	-		

Matrix Spike Analysis
Batch Quality Control

Project Name: BOSTON COLLEGE IISS
Project Number: 128271-016

Lab Number: L1813184
Report Date: 04/23/18

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 QC Batch ID: WG1107137-3 QC Sample: L1813184-01 Client ID: HA-B7(OW)_041618												
Antimony, Total	ND	0.5	0.2903	**58**	Q	-	-		70-130	-		20
Arsenic, Total	0.00648	0.12	0.1275	101		-	-		70-130	-		20
Cadmium, Total	0.00022	0.051	0.05432	106		-	-		70-130	-		20
Chromium, Total	0.07643	0.2	0.2622	93		-	-		70-130	-		20
Copper, Total	0.7614	0.25	1.012	100		-	-		70-130	-		20
Lead, Total	0.06924	0.51	0.6210	108		-	-		70-130	-		20
Nickel, Total	0.06069	0.5	0.5530	98		-	-		70-130	-		20
Selenium, Total	ND	0.12	0.1165	97		-	-		70-130	-		20
Silver, Total	0.1195	0.05	0.1681	97		-	-		70-130	-		20
Zinc, Total	0.07128	0.5	0.5606	98		-	-		70-130	-		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1107139-3 QC Sample: L1813049-01 Client ID: MS Sample												
Mercury, Total	ND	0.005	0.0048	96		-	-		70-130	-		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1107139-5 QC Sample: L1813184-01 Client ID: HA-B7(OW)_041618												
Mercury, Total	ND	0.005	0.0048	97		-	-		70-130	-		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1107140-3 QC Sample: L1813161-01 Client ID: MS Sample												
Iron, Total	ND	1	1.02	102		-	-		75-125	-		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1107506-3 QC Sample: L1813210-10 Client ID: MS Sample												
Cadmium, Total	0.00028	0.102	0.09992	98		-	-		70-130	-		20
Silver, Total	ND	0.1	0.08828	88		-	-		70-130	-		20

Lab Duplicate Analysis
Batch Quality Control

Project Name: BOSTON COLLEGE IISS
Project Number: 128271-016

Lab Number: L1813184
Report Date: 04/23/18

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1107137-4 QC Sample: L1813184-01 Client ID: HA-B7(OW)_041618						
Antimony, Total	ND	ND	mg/l	NC		20
Arsenic, Total	0.00648	0.00613	mg/l	6		20
Cadmium, Total	0.00022	0.00028	mg/l	**22**	Q	20
Chromium, Total	0.07643	0.07711	mg/l	1		20
Copper, Total	0.7614	0.7503	mg/l	1		20
Lead, Total	0.06924	0.06914	mg/l	0		20
Nickel, Total	0.06069	0.05742	mg/l	6		20
Selenium, Total	ND	ND	mg/l	NC		20
Zinc, Total	0.07128	0.07008	mg/l	2		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1107139-4 QC Sample: L1813049-01 Client ID: DUP Sample						
Mercury, Total	ND	ND	mg/l	NC		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1107139-6 QC Sample: L1813184-01 Client ID: HA-B7(OW)_041618						
Mercury, Total	ND	ND	mg/l	NC		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1107140-4 QC Sample: L1813161-01 Client ID: DUP Sample						
Iron, Total	ND	ND	mg/l	NC		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1107506-4 QC Sample: L1813210-10 Client ID: DUP Sample						
Cadmium, Total	0.00028	0.00030	mg/l	8		20

INORGANICS
&
MISCELLANEOUS

Project Name: BOSTON COLLEGE IISS
Project Number: 128271-016
Lab Number: L1813184
Report Date: 04/23/18

SAMPLE RESULTS

Lab ID: L1813184-01
Client ID: HA-B7(OW)_041618
Sample Location: CHESTNUT HILL, MA
Sample Depth:
Matrix: Water

Date Collected: 04/16/18 11:00
Date Received: 04/16/18
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
pH (H)	7.8		SU	-	NA	1	-	04/16/18 22:22	121,4500H+-B	AS
Chromium, Hexavalent	ND		mg/l	0.010	--	1	04/17/18 01:55	04/17/18 02:11	1,7196A	UN
Anions by Ion Chromatography - Westborough Lab										
Chloride	3580		mg/l	50.0	--	100	-	04/18/18 21:18	44,300.0	AU

Project Name: BOSTON COLLEGE IISS
Project Number: 128271-016
Lab Number: L1813184
Report Date: 04/23/18

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: WG1107013-1										
Chromium, Hexavalent	ND		mg/l	0.010	--	1	04/17/18 01:55	04/17/18 02:07	1,7196A	UN
Anions by Ion Chromatography - Westborough Lab for sample(s): 01 Batch: WG1108092-1										
Chloride	ND		mg/l	0.500	--	1	-	04/18/18 17:41	44,300.0	AU

Lab Control Sample Analysis

Batch Quality Control

Project Name: BOSTON COLLEGE IISS

Project Number: 128271-016

Lab Number: L1813184

Report Date: 04/23/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1106990-1								
pH	101		-		99-101	-		5
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1107013-2								
Chromium, Hexavalent	97		-		85-115	-		20
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 01 Batch: WG1108092-2								
Chloride	98		-		90-110	-		

Matrix Spike Analysis
Batch Quality Control

Project Name: BOSTON COLLEGE IISS
Project Number: 128271-016

Lab Number: L1813184
Report Date: 04/23/18

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: WG1107013-4 QC Sample: L1813184-01 Client ID: HA-B7(OW)_041618												
Chromium, Hexavalent	ND	0.1	0.102	102		-	-		85-115	-		20
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1108092-3 QC Sample: L1813394-01 Client ID: MS Sample												
Chloride	34.1	4	36.8	**68**	Q	-	-		90-110	-		18

Lab Duplicate Analysis
Batch Quality Control

Project Name: BOSTON COLLEGE IISS
Project Number: 128271-016

Lab Number: L1813184
Report Date: 04/23/18

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1106990-2 QC Sample: L1813146-01 Client ID: DUP Sample						
pH	12.5	12.4	SU	0		5
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1107013-3 QC Sample: L1813184-01 Client ID: HA-B7(OW)_041618						
Chromium, Hexavalent	ND	ND	mg/l	NC		20
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1108092-4 QC Sample: L1813394-01 Client ID: DUP Sample						
Chloride	34.1	34.2	mg/l	0		18

Project Name: BOSTON COLLEGE IISS
Project Number: 128271-016

Lab Number: L1813184
Report Date: 04/23/18

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(*)
L1813184-01A	Plastic 250ml HNO3 preserved	A	<2	<2	5.2	Y	Absent		CD-2008T(180),NI-2008T(180),ZN-2008T(180),CU-2008T(180),FE-UI(180),AG-2008T(180),AS-2008T(180),HG-U(28),SE-2008T(180),CR-2008T(180),PB-2008T(180),SB-2008T(180)
L1813184-01B	Plastic 950ml unpreserved	A	7	7	5.2	Y	Absent		CL-300(28),HEXCR-7196(1),PH-4500(.01)

*Values in parentheses indicate holding time in days

Project Name:	BOSTON COLLEGE IISS	**Lab Number:**	L1813184
Project Number:	128271-016	**Report Date:**	04/23/18

GLOSSARY

Acronyms

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).
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.
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.
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.
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

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.

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.

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 Condensation Product".
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

Report Format: Data Usability Report

Project Name:	BOSTON COLLEGE IISS	**Lab Number:**	L1813184
Project Number:	128271-016	**Report Date:**	04/23/18

Data Qualifiers

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.

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

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 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.

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

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

Report Format: Data Usability Report

Project Name:	BOSTON COLLEGE IISS	**Lab Number:**	L1813184
Project Number:	128271-016	**Report Date:**	04/23/18

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.

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.

107 Alpha Analytical - In-house calculation method.

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: m/p-xylene, o-xylene
EPA 8260C: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), Methyl methacrylate, 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
EPA 300: DW: Bromide
EPA 6860: SCM: Perchlorate
EPA 9010: NPW and SCM: Amenable Cyanide Distillation
SM4500: NPW: Amenable Cyanide, Dissolved Oxygen; 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.
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, SM4500CI-D, SM2320B, SM2540C, SM4500H-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**, EPA 351.1, 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 624: Volatile Halocarbons & Aromatics,
EPA 608: 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: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, SM9222D.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Be, Cd, Cr, Cu, 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, Pb, Mn, Ni, Se, Ag, 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: 4-16-18

ALPHA Job #: L1813154

Project Information
- Project Name: Boston College IISS
- Project Location: Chestnut Hill, MA
- Project #: 128271-016
- (Use Project name as Project #) ☐
- Project Manager: C. Worthy
- ALPHAQuote #:

Turn-Around Time
- Standard ☑ — Due Date:
- Rush (if pre approved) ☐ — # of Days: 5 Day

H&A Information
- H&A Client: Boston College
- H&A Address: 465 Medford St, Boston, MA 02129-1400
- H&A Phone: 617-886-7400
- H&A Fax:
- H&A Email: Cworthy, Siberg

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

Billing Information
- ☐ Same as Client Info
- PO #

Regulatory Requirements (Program/Criteria)
MA NPDES DGP

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:

1. Total Ag, An, As, Cd, TotalCr, HexCr, Cu, Ni, Pb, Sb, Zn, Hg, Fe. 4. **Field Filtered
Analyze using the EPA 2017 NPDES Approved Testing Methods

ANALYSIS

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	1. Total Metals (See note, includes HexCr)	2. Chloride	3. TSS	4. Dissolved Metals** (HOLD)	pH	Total Bottles
13154-	[illegible]	4/16/18		WW		X	X			X	2
01	HA16-B7(ow)_041618	4/16/18		Ag	MJD	X	X			X	2
											2 TOTAL
Container Type						P	P	P	P	P	
Preservative						C	A			A	

Sample Filtration
- ☐ Done
- ☐ Lab to do

Preservation
- ☐ Lab to do

(Please Specify below)

Sample Specific Comments

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]	4/16/18	[signature]	4/16/18 1613
[signature]	4/16/18 1613	[signature]	4/16/18 1630
[signature]	4/16/18 1740	[signature]	4/16/18 17:40

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 (1/28/2016)

ANALYTICAL REPORT

Lab Number:	L1813817
Client:	Haley & Aldrich, Inc. 465 Medford Street, Suite 2200 Charlestown, MA 02129-1400
ATTN:	Cole Worthy
Phone:	(617) 886-7341
Project Name:	BOSTON COLLEGE IISS
Project Number:	128271-016
Report Date:	04/25/18

Certifications & Approvals: MA (M-MA086), NH NELAP (2064), NJ NELAP (MA935), CT (PH-0574), IL (200077), ME (MA00086), MD (348), NY (11148), NC (25700/666), PA (68-03671), RI (LAO00065), TX (T104704476), VT (VT-0935), VA (460195), USDA (Permit #P330-14-00197).

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

Project Name: BOSTON COLLEGE IISS
Project Number: 128271-016

Lab Number: L1813817
Report Date: 04/25/18

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L1813817-01	HA-B7 (OW)	WATER	CHESTNUT HILL, MA	04/19/18 11:05	04/19/18

Project Name: BOSTON COLLEGE IISS **Lab Number:** L1813817
Project Number: 128271-016 **Report Date:** 04/25/18

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. All specific QC information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated 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.

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 table. The information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications.

Please see the associated ADEx data file for a comparison of laboratory reporting limits that were achieved with the regulatory Numerical Standards requested on the Chain of Custody.

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 Client Service Representative 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 Client Services at 800-624-9220 with any questions.

Project Name:	BOSTON COLLEGE IISS	**Lab Number:**	L1813817
Project Number:	128271-016	**Report Date:**	04/25/18

Case Narrative (continued)

Sample Receipt

The Project Number and element list for metals analysis were specified by the client.

Dissolved Metals

The WG1108807-2 LCS recovery, associated with L1813817-01 (HA-B7 (OW)), is above the acceptance criteria for selenium (124%); however, the associated sample is non-detect to the RL for this target analyte. The results of the original analysis are reported.

The WG1108807-3 MS recovery for zinc (133%), performed on L1813817-01 (HA-B7 (OW)), recovered outside the 70-130% acceptance criteria. The result for this analyte is considered suspect due to either the heterogeneous nature of the sample or matrix interference.

The WG1108807-4 Laboratory Duplicate RPD for nickel (21%), performed on L1813817-01 (HA-B7 (OW)), is above the acceptance criteria; however, the sample and duplicate results are less than five times the reporting limit. Therefore, the RPD is valid.

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: 04/25/18

METALS

Project Name: BOSTON COLLEGE IISS
Lab Number: L1813817
Project Number: 128271-016
Report Date: 04/25/18

SAMPLE RESULTS

Lab ID: L1813817-01
Client ID: HA-B7 (OW)
Sample Location: CHESTNUT HILL, MA
Sample Depth:
Matrix: Water

Date Collected: 04/19/18 11:05
Date Received: 04/19/18
Field Prep: Field Filtered (Dissolved Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Dissolved Metals - Mansfield Lab											
Antimony, Dissolved	ND		mg/l	0.0040	--	1	04/23/18 08:15	04/23/18 16:13	EPA 3005A	3,200.8	AM
Arsenic, Dissolved	0.0019		mg/l	0.0010	--	1	04/23/18 08:15	04/23/18 16:13	EPA 3005A	3,200.8	AM
Cadmium, Dissolved	0.0003		mg/l	0.0002	--	1	04/23/18 08:15	04/23/18 16:13	EPA 3005A	3,200.8	AM
Chromium, Dissolved	0.0013		mg/l	0.0010	--	1	04/23/18 08:15	04/23/18 16:13	EPA 3005A	3,200.8	AM
Copper, Dissolved	0.0138		mg/l	0.0010	--	1	04/23/18 08:15	04/23/18 16:13	EPA 3005A	3,200.8	AM
Iron, Dissolved	0.082		mg/l	0.050	--	1	04/23/18 08:15	04/23/18 16:02	EPA 3005A	19,200.7	LC
Lead, Dissolved	ND		mg/l	0.0010	--	1	04/23/18 08:15	04/23/18 16:13	EPA 3005A	3,200.8	AM
Mercury, Dissolved	ND		mg/l	0.00020	--	1	04/23/18 15:22	04/24/18 18:57	EPA 245.1	3,245.1	EA
Nickel, Dissolved	0.0028		mg/l	0.0020	--	1	04/23/18 08:15	04/23/18 16:13	EPA 3005A	3,200.8	AM
Selenium, Dissolved	ND		mg/l	0.0050	--	1	04/23/18 08:15	04/23/18 16:13	EPA 3005A	3,200.8	AM
Silver, Dissolved	0.0118		mg/l	0.0004	--	1	04/23/18 08:15	04/23/18 16:13	EPA 3005A	3,200.8	AM
Zinc, Dissolved	0.0118		mg/l	0.0100	--	1	04/23/18 08:15	04/23/18 16:13	EPA 3005A	3,200.8	AM

Project Name: BOSTON COLLEGE IISS
Project Number: 128271-016
Lab Number: L1813817
Report Date: 04/25/18

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: WG1108807-1										
Antimony, Dissolved	ND		mg/l	0.0040	--	1	04/23/18 08:15	04/23/18 15:53	3,200.8	AM
Arsenic, Dissolved	ND		mg/l	0.0010	--	1	04/23/18 08:15	04/23/18 15:53	3,200.8	AM
Cadmium, Dissolved	ND		mg/l	0.0002	--	1	04/23/18 08:15	04/23/18 15:53	3,200.8	AM
Chromium, Dissolved	ND		mg/l	0.0010	--	1	04/23/18 08:15	04/23/18 15:53	3,200.8	AM
Copper, Dissolved	ND		mg/l	0.0010	--	1	04/23/18 08:15	04/23/18 15:53	3,200.8	AM
Lead, Dissolved	ND		mg/l	0.0010	--	1	04/23/18 08:15	04/23/18 15:53	3,200.8	AM
Nickel, Dissolved	ND		mg/l	0.0020	--	1	04/23/18 08:15	04/23/18 15:53	3,200.8	AM
Selenium, Dissolved	ND		mg/l	0.0050	--	1	04/23/18 08:15	04/23/18 15:53	3,200.8	AM
Silver, Dissolved	ND		mg/l	0.0004	--	1	04/23/18 08:15	04/23/18 15:53	3,200.8	AM
Zinc, Dissolved	ND		mg/l	0.0100	--	1	04/23/18 08:15	04/23/18 15:53	3,200.8	AM

Prep Information

Digestion Method: EPA 3005A

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Dissolved Metals - Mansfield Lab for sample(s): 01 Batch: WG1108811-1										
Iron, Dissolved	ND		mg/l	0.050	--	1	04/23/18 08:15	04/23/18 15:53	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
Dissolved Metals - Mansfield Lab for sample(s): 01 Batch: WG1108954-1										
Mercury, Dissolved	ND		mg/l	0.00020	--	1	04/23/18 15:22	04/24/18 18:50	3,245.1	EA

Prep Information

Digestion Method: EPA 245.1

Lab Control Sample Analysis

Batch Quality Control

Project Name: BOSTON COLLEGE IISS

Project Number: 128271-016

Lab Number: L1813817

Report Date: 04/25/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Dissolved Metals - Mansfield Lab Associated sample(s): 01 Batch: WG1108807-2								
Antimony, Dissolved	113		-		85-115	-		
Arsenic, Dissolved	112		-		85-115	-		
Cadmium, Dissolved	113		-		85-115	-		
Chromium, Dissolved	112		-		85-115	-		
Copper, Dissolved	112		-		85-115	-		
Lead, Dissolved	97		-		85-115	-		
Nickel, Dissolved	111		-		85-115	-		
Selenium, Dissolved	**124**	Q	-		85-115	-		
Silver, Dissolved	114		-		85-115	-		
Zinc, Dissolved	111		-		85-115	-		
Dissolved Metals - Mansfield Lab Associated sample(s): 01 Batch: WG1108811-2								
Iron, Dissolved	100		-		85-115	-		
Dissolved Metals - Mansfield Lab Associated sample(s): 01 Batch: WG1108954-2								
Mercury, Dissolved	103		-		85-115	-		

Matrix Spike Analysis
Batch Quality Control

Project Name: BOSTON COLLEGE IISS
Project Number: 128271-016

Lab Number: L1813817
Report Date: 04/25/18

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: WG1108807-3 QC Sample: L1813817-01 Client ID: HA-B7 (OW)												
Antimony, Dissolved	ND	0.5	0.6053	121		-	-		70-130	-		20
Arsenic, Dissolved	0.0019	0.12	0.1436	118		-	-		70-130	-		20
Cadmium, Dissolved	0.0003	0.051	0.0601	117		-	-		70-130	-		20
Chromium, Dissolved	0.0013	0.2	0.2283	113		-	-		70-130	-		20
Copper, Dissolved	0.0138	0.25	0.2951	112		-	-		70-130	-		20
Lead, Dissolved	ND	0.51	0.6008	118		-	-		70-130	-		20
Nickel, Dissolved	0.0028	0.5	0.5244	104		-	-		70-130	-		20
Selenium, Dissolved	ND	0.12	0.1309	109		-	-		70-130	-		20
Silver, Dissolved	0.0118	0.05	0.0690	114		-	-		70-130	-		20
Zinc, Dissolved	0.0118	0.5	0.6750	**133**	Q	-	-		70-130	-		20
Dissolved Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1108811-3 QC Sample: L1813817-01 Client ID: HA-B7 (OW)												
Iron, Dissolved	0.082	1	1.08	100		-	-		75-125	-		20
Dissolved Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1108954-3 QC Sample: L1813817-01 Client ID: HA-B7 (OW)												
Mercury, Dissolved	ND	0.005	0.00496	99		-	-		75-125	-		20

Lab Duplicate Analysis
Batch Quality Control

Project Name: BOSTON COLLEGE IISS
Project Number: 128271-016

Lab Number: L1813817
Report Date: 04/25/18

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Dissolved Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1108807-4 QC Sample: L1813817-01 Client ID: HA-B7 (OW)						
Antimony, Dissolved	ND	ND	mg/l	NC		20
Arsenic, Dissolved	0.0019	0.0018	mg/l	6		20
Cadmium, Dissolved	0.0003	0.0003	mg/l	8		20
Chromium, Dissolved	0.0013	0.0012	mg/l	12		20
Copper, Dissolved	0.0138	0.0130	mg/l	6		20
Lead, Dissolved	ND	ND	mg/l	NC		20
Nickel, Dissolved	0.0028	0.0023	mg/l	**21**	Q	20
Selenium, Dissolved	ND	ND	mg/l	NC		20
Silver, Dissolved	0.0118	0.0106	mg/l	11		20
Zinc, Dissolved	0.0118	0.0107	mg/l	10		20
Dissolved Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1108811-4 QC Sample: L1813817-01 Client ID: HA-B7 (OW)						
Iron, Dissolved	0.082	0.079	mg/l	4		20
Dissolved Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1108954-4 QC Sample: L1813817-01 Client ID: HA-B7 (OW)						
Mercury, Dissolved	ND	ND	mg/l	NC		20

INORGANICS
&
MISCELLANEOUS

Project Name: BOSTON COLLEGE IISS
Project Number: 128271-016

Lab Number: L1813817
Report Date: 04/25/18

SAMPLE RESULTS

Lab ID: L1813817-01
Client ID: HA-B7 (OW)
Sample Location: CHESTNUT HILL, MA

Sample Depth:
Matrix: Water

Date Collected: 04/19/18 11:05
Date Received: 04/19/18
Field Prep: Field Filtered (Dissolved Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total Suspended	260		mg/l	5.0	NA	1	-	04/20/18 11:30	121,2540D	JT

Project Name: BOSTON COLLEGE IISS
Project Number: 128271-016
Lab Number: L1813817
Report Date: 04/25/18

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: WG1108236-1										
Solids, Total Suspended	ND		mg/l	5.0	NA	1	-	04/20/18 11:30	121,2540D	JT

Lab Duplicate Analysis
Batch Quality Control

Project Name: BOSTON COLLEGE IISS
Project Number: 128271-016

Lab Number: L1813817
Report Date: 04/25/18

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1108236-2 QC Sample: L1813499-01 Client ID: DUP Sample						
Solids, Total Suspended	33	37	mg/l	11		29

Project Name: BOSTON COLLEGE IISS
Project Number: 128271-016

Lab Number: L1813817
Report Date: 04/25/18

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(*)
L1813817-01A	Plastic 250ml HNO3 preserved	A	<2	<2	3.2	Y	Absent		AG-2008S(180),CR-2008S(180),FE-RI(180),AS-2008S(180),PB-2008S(180),ZN-2008S(180),NI-2008S(180),SE-2008S(180),CD-2008S(180),CU-2008S(180),SB-2008S(180),HG-R(28)
L1813817-01B	Plastic 950ml unpreserved	A	7	7	3.2	Y	Absent		TSS-2540(7)

*Values in parentheses indicate holding time in days

Project Name:	BOSTON COLLEGE IISS	**Lab Number:**	L1813817
Project Number:	128271-016	**Report Date:**	04/25/18

GLOSSARY

Acronyms

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).
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.
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.
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.
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

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.

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.

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 Condensation Product".
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

Report Format: Data Usability Report

Project Name:	BOSTON COLLEGE IISS	**Lab Number:**	L1813817
Project Number:	128271-016	**Report Date:**	04/25/18

Data Qualifiers

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.

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

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 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.

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

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

Report Format: Data Usability Report

Project Name:	BOSTON COLLEGE IISS	**Lab Number:**	L1813817
Project Number:	128271-016	**Report Date:**	04/25/18

REFERENCES

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

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.

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: m/p-xylene, o-xylene
EPA 8260C: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), Methyl methacrylate, 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
EPA 300: DW: Bromide
EPA 6860: SCM: Perchlorate
EPA 9010: NPW and SCM: Amenable Cyanide Distillation
SM4500: NPW: Amenable Cyanide, Dissolved Oxygen; 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.
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, SM4500CI-D, SM2320B, SM2540C, SM4500H-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**, EPA 351.1, 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 624: Volatile Halocarbons & Aromatics,
EPA 608: 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: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, SM9222D.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Be, Cd, Cr, Cu, 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, Pb, Mn, Ni, Se, Ag, 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

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: 4/19/18

ALPHA Job # L1813817

H&A Information
- H&A Client:
- H&A Address: 465 Medford Street
- Suite 2200, Boston, MA 02129
- H&A Phone: 617-886-7380
- H&A Fax:
- H&A Email: Cworthy@haleyaldrich.com

Project Information
- Project Name: Boston College IISS
- Project Location: Chestnut Hill, MA
- Project # 128271-0178
- (Use Project name as Project #) ☐
- Project Manager: C. Worthy
- ALPHAQuote #:

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

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

Regulatory Requirements (Program/Criteria)
MA RCS-1

Note: Select State from menu & identify criteria.

Billing Information
- ☐ Same as Client Info
- PO #

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 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 Initials	Depth	1. TSS	2. Dissolved Metals						Sample Specific Comments	Total Bottles
13817-01	HA-B7(OW)	4/19/2018	11:05	AQ	LCN	NA	X	X						*Sample Field Filtered	2
Container Type							P	P							
Preservative							A	C							

Preservative Code:
A = None
B = HCl
C = HNO_3
D = H_2SO_4
E = NaOH
F = MeOH
G = $NaHSO_4$
H = $Na_2S_2O_3$

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
	4-19-18 1141		4/19/18 1631
	4/19/18 1613	AAL	4/19/18 1630
AAL	4/19/18 1825		4-19-18 1825

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 2 (8/9/2016)

ANALYTICAL REPORT

Lab Number:	L1839470
Client:	Haley & Aldrich, Inc. 465 Medford Street, Suite 2200 Charlestown, MA 02129-1400
ATTN:	Cole Worthy
Phone:	(617) 886-7341
Project Name:	BOSTON COLLEGE IISS
Project Number:	128271-016
Report Date:	10/05/18

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: BOSTON COLLEGE IISS
Project Number: 128271-016

Lab Number: L1839470
Report Date: 10/05/18

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L1839470-01	HA18-B7 (OW)-100118	WATER	CHESTNUT HILL, MA	10/01/18 12:35	10/01/18

Project Name: BOSTON COLLEGE IISS **Lab Number:** L1839470

Project Number: 128271-016 **Report Date:** 10/05/18

MADEP MCP Response Action Analytical Report Certification

This form provides certifications for all samples performed by MCP methods. Please refer to the Sample Results and Container Information sections of this report for specification of MCP methods used for each analysis. The following questions pertain only to MCP Analytical Methods.

An affirmative response to questions A through F is required for "Presumptive Certainty" status		
A	Were all samples received in a condition consistent with those described on the Chain-of-Custody, properly preserved (including temperature) in the field or laboratory, and prepared/analyzed within method holding times?	YES
B	Were the analytical method(s) and all associated QC requirements specified in the selected CAM protocol(s) followed?	YES
C	Were all required corrective actions and analytical response actions specified in the selected CAM protocol(s) implemented for all identified performance standard non-conformances?	YES
D	Does the laboratory report comply with all the reporting requirements specified in CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data?"	YES
E a.	VPH, EPH, and APH Methods only: Was each method conducted without significant modification(s)? (Refer to the individual method(s) for a list of significant modifications).	N/A
E b.	APH and TO-15 Methods only: Was the complete analyte list reported for each method?	N/A
F	Were all applicable CAM protocol QC and performance standard non-conformances identified and evaluated in a laboratory narrative (including all "No" responses to Questions A through E)?	YES

A response to questions G, H and I is required for "Presumptive Certainty" status		
G	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocol(s)?	YES
H	Were all QC performance standards specified in the CAM protocol(s) achieved?	YES
I	Were results reported for the complete analyte list specified in the selected CAM protocol(s)?	NO

For any questions answered "No", please refer to the case narrative section on the following page(s).

Please note that sample matrix information is located in the Sample Results section of this report.

Project Name: BOSTON COLLEGE IISS
Project Number: 128271-016
Lab Number: L1839470
Report Date: 10/05/18

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. All specific QC information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated 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.

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 table. The information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications.

Please see the associated ADEx data file for a comparison of laboratory reporting limits that were achieved with the regulatory Numerical Standards requested on the Chain of Custody.

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 Client Service Representative 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 Client Services at 800-624-9220 with any questions.

Project Name:	BOSTON COLLEGE IISS	**Lab Number:**	L1839470
Project Number:	128271-016	**Report Date:**	10/05/18

Case Narrative (continued)

MCP Related Narratives

Dissolved Metals

In reference to question I:

All samples were analyzed for a subset of MCP analytes per client request.

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: Kelly Stenstrom

Title: Technical Director/Representative Date: 10/05/18

METALS

Project Name: BOSTON COLLEGE IISS
Lab Number: L1839470
Project Number: 128271-016
Report Date: 10/05/18

SAMPLE RESULTS

Lab ID: L1839470-01
Client ID: HA18-B7 (OW)-100118
Sample Location: CHESTNUT HILL, MA
Date Collected: 10/01/18 12:35
Date Received: 10/01/18
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
MCP Dissolved Metals - Mansfield Lab											
Silver, Dissolved	ND		mg/l	0.007	--	1	10/05/18 07:55	10/05/18 14:46	EPA 3005A	97,6010D	PE

Project Name: BOSTON COLLEGE IISS
Project Number: 128271-016
Lab Number: L1839470
Report Date: 10/05/18

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
MCP Dissolved Metals - Mansfield Lab for sample(s): 01 Batch: WG1164522-1										
Silver, Dissolved	ND		mg/l	0.007	--	1	10/05/18 07:55	10/05/18 14:01	97,6010D	PE

Prep Information

Digestion Method: EPA 3005A

Lab Control Sample Analysis

Batch Quality Control

Project Name: BOSTON COLLEGE IISS

Project Number: 128271-016

Lab Number: L1839470

Report Date: 10/05/18

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
MCP Dissolved Metals - Mansfield Lab Associated sample(s): 01 Batch: WG1164522-2 WG1164522-3								
Silver, Dissolved	102		100		80-120	2		20

Project Name: BOSTON COLLEGE IISS
Project Number: 128271-016

Lab Number: L1839470
Report Date: 10/05/18

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(*)
L1839470-01A	Plastic 250ml HNO3 preserved	A	<2	<2	3.4	Y	Absent		MCP-AG-6010S-10(180)

*Values in parentheses indicate holding time in days

Project Name:	BOSTON COLLEGE IISS	**Lab Number:**	L1839470
Project Number:	128271-016	**Report Date:**	10/05/18

GLOSSARY

Acronyms

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.
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.
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

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.

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.

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.

Report Format: Data Usability Report

Project Name:	BOSTON COLLEGE IISS	**Lab Number:**	L1839470
Project Number:	128271-016	**Report Date:**	10/05/18

Data Qualifiers

A - Spectra identified as "Aldol Condensation Product".

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.

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

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 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.

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

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

Report Format: Data Usability Report

Project Name:	BOSTON COLLEGE IISS	**Lab Number:**	L1839470
Project Number:	128271-016	**Report Date:**	10/05/18

REFERENCES

97 EPA Test Methods (SW-846) with QC Requirements & Performance Standards for the Analysis of EPA SW-846 Methods under the Massachusetts Contingency Plan, WSC-CAM-IIA, IIB, IIIA, IIIB, IIIC, IIID, VA, VB, VC, VIA, VIB, VIIIA and VIIIB, July 2010.

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: m/p-xylene, o-xylene
EPA 8260C: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), Methyl methacrylate, 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
EPA 300: DW: Bromide
EPA 6860: SCM: Perchlorate
EPA 9010: NPW and SCM: Amenable Cyanide Distillation
SM4500: NPW: Amenable Cyanide, Dissolved Oxygen; 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.
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, SM4500CI-D, SM2320B, SM2540C, SM4500H-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**, EPA 351.1, 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 624: Volatile Halocarbons & Aromatics,
EPA 608: 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: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, SM9222D.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Be, Cd, Cr, Cu, 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, Pb, Mn, Ni, Se, Ag, 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: 10/1/18

ALPHA Job #: L1839470

H&A Information

H&A Client: Boston College
H&A Address: 465 Medford St
Boston, MA 02129-1400
H&A Phone: 617-886-7400
H&A Fax:
H&A Email: Cworthy, Siberg, Kalepidis

These samples have been previously analyzed by Alpha ☐

Other project specific requirements/comments:

Project Information

Project Name: Boston College IISS
Project Location: Chestnut Hill, MA
Project #: 128271-016
(Use Project name as Project #) ☑
Project Manager: C. Worthy
ALPHAQuote #:

Turn-Around Time

Standard ☑ Due Date:
Rush (if pre approved) ☐ # of Days: 5 Day

Deliverables

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

Regulatory Requirements (Program/Criteria)

MA

Note: Select State from menu & identify criteria.

Billing Information

☐ Same as Client Info
PO #

Disposal Site Information

Please identify below location of applicable disposal facilities.

Disposal Facility:
☐ NJ ☐ NY
☐ Other:

Sample Filtration

☑ Done
☐ Lab to do
Preservation
☐ Lab to do
(Please Specify below)

ANALYSIS

1. Dissolved silver

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	1. Dissolved silver	Total Bottles	Sample Specific Comments
39470 -01	HA18-B7(OW)-100118	10/1/2018	12:35	AQ	MD	X	1	Sample was field filtered

Container Type: P
Preservative: C

1 TOTAL

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.

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
	10/1/18		10/1/18 1610
	10/1/18 1635		AAL 10/1/18 1650
	10/1/18 1830		10/1/18 18:30

Document ID: 20455 Rev 1 (1/28/2016)

ANALYTICAL REPORT

Lab Number:	L1918984
Client:	Haley & Aldrich, Inc. 465 Medford Street, Suite 2200 Charlestown, MA 02129-1400
ATTN:	Heather Scranton
Phone:	(617) 886-7400
Project Name:	BOSTON COLLEGE-IISS
Project Number:	128271-016
Report Date:	05/13/19

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: BOSTON COLLEGE-IISS
Project Number: 128271-016

Lab Number: L1918984
Report Date: 05/13/19

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L1918984-01	2019 RECEIVING	WATER	CHESTNUT HILL, MA	05/07/19 10:15	05/07/19

Project Name:	BOSTON COLLEGE-IISS	**Lab Number:**	L1918984
Project Number:	128271-016	**Report Date:**	05/13/19

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:  Kelly Stenstrom

Title: Technical Director/Representative Date: 05/13/19

METALS

Project Name: BOSTON COLLEGE-IISS **Lab Number:** L1918984

Project Number: 128271-016 **Report Date:** 05/13/19

SAMPLE RESULTS

Lab ID: L1918984-01 Date Collected: 05/07/19 10:15

Client ID: 2019 RECEIVING Date Received: 05/07/19

Sample Location: CHESTNUT HILL, MA 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	0.00400	--	1	05/09/19 18:15	05/10/19 12:06	EPA 3005A	3,200.8	AM
Arsenic, Total	ND		mg/l	0.00100	--	1	05/09/19 18:15	05/10/19 12:06	EPA 3005A	3,200.8	AM
Cadmium, Total	ND		mg/l	0.00020	--	1	05/09/19 18:15	05/10/19 12:06	EPA 3005A	3,200.8	AM
Chromium, Total	ND		mg/l	0.00100	--	1	05/09/19 18:15	05/10/19 12:06	EPA 3005A	3,200.8	AM
Copper, Total	0.00298		mg/l	0.00100	--	1	05/09/19 18:15	05/10/19 12:06	EPA 3005A	3,200.8	AM
Iron, Total	0.965		mg/l	0.050	--	1	05/09/19 18:15	05/10/19 00:52	EPA 3005A	19,200.7	LC
Lead, Total	0.00286		mg/l	0.00100	--	1	05/09/19 18:15	05/10/19 12:06	EPA 3005A	3,200.8	AM
Mercury, Total	ND		mg/l	0.00020	--	1	05/08/19 16:08	05/08/19 19:29	EPA 245.1	3,245.1	EA
Nickel, Total	ND		mg/l	0.00200	--	1	05/09/19 18:15	05/10/19 12:06	EPA 3005A	3,200.8	AM
Selenium, Total	ND		mg/l	0.00500	--	1	05/09/19 18:15	05/10/19 12:06	EPA 3005A	3,200.8	AM
Silver, Total	ND		mg/l	0.00040	--	1	05/09/19 18:15	05/10/19 12:06	EPA 3005A	3,200.8	AM
Zinc, Total	ND		mg/l	0.01000	--	1	05/09/19 18:15	05/10/19 12:06	EPA 3005A	3,200.8	AM
Total Hardness by SM 2340B - Mansfield Lab											
Hardness	128		mg/l	0.660	NA	1	05/09/19 18:15	05/10/19 00:52	EPA 3005A	19,200.7	LC
General Chemistry - Mansfield Lab											
Chromium, Trivalent	ND		mg/l	0.010	--	1		05/10/19 12:06	NA	107,-	

Project Name: BOSTON COLLEGE-IISS **Lab Number:** L1918984

Project Number: 128271-016 **Report Date:** 05/13/19

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 Batch: WG1235009-1										
Mercury, Total	ND		mg/l	0.00020	--	1	05/08/19 16:08	05/08/19 19:06	3,245.1	EA

Prep Information

Digestion Method: EPA 245.1

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 01 Batch: WG1235434-1										
Iron, Total	ND		mg/l	0.050	--	1	05/09/19 18:15	05/09/19 23:33	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 Batch: WG1235434-1										
Hardness	ND		mg/l	0.660	NA	1	05/09/19 18:15	05/09/19 23:33	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 Batch: WG1235437-1										
Antimony, Total	ND		mg/l	0.00400	--	1	05/09/19 18:15	05/10/19 10:12	3,200.8	AM
Arsenic, Total	ND		mg/l	0.00100	--	1	05/09/19 18:15	05/10/19 10:12	3,200.8	AM
Cadmium, Total	ND		mg/l	0.00020	--	1	05/09/19 18:15	05/10/19 10:12	3,200.8	AM
Chromium, Total	ND		mg/l	0.00100	--	1	05/09/19 18:15	05/10/19 10:12	3,200.8	AM
Copper, Total	ND		mg/l	0.00100	--	1	05/09/19 18:15	05/10/19 10:12	3,200.8	AM

Project Name: BOSTON COLLEGE-IISS **Lab Number:** L1918984

Project Number: 128271-016 **Report Date:** 05/13/19

Method Blank Analysis
Batch Quality Control

Lead, Total	ND	mg/l	0.00050	--	1	05/09/19 18:15	05/10/19 10:12	3,200.8	AM
Nickel, Total	ND	mg/l	0.00200	--	1	05/09/19 18:15	05/10/19 10:12	3,200.8	AM
Selenium, Total	ND	mg/l	0.00500	--	1	05/09/19 18:15	05/10/19 10:12	3,200.8	AM
Silver, Total	ND	mg/l	0.00040	--	1	05/09/19 18:15	05/10/19 10:12	3,200.8	AM
Zinc, Total	ND	mg/l	0.01000	--	1	05/09/19 18:15	05/10/19 10:12	3,200.8	AM

Prep Information

Digestion Method: EPA 3005A

Lab Control Sample Analysis

Batch Quality Control

Project Name: BOSTON COLLEGE-IISS

Project Number: 128271-016

Lab Number: L1918984

Report Date: 05/13/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01 Batch: WG1235009-2								
Mercury, Total	109		-		85-115	-		
Total Metals - Mansfield Lab Associated sample(s): 01 Batch: WG1235434-2								
Iron, Total	102		-		85-115	-		
Total Hardness by SM 2340B - Mansfield Lab Associated sample(s): 01 Batch: WG1235434-2								
Hardness	96		-		85-115	-		
Total Metals - Mansfield Lab Associated sample(s): 01 Batch: WG1235437-2								
Antimony, Total	100		-		85-115	-		
Arsenic, Total	99		-		85-115	-		
Cadmium, Total	114		-		85-115	-		
Chromium, Total	104		-		85-115	-		
Copper, Total	103		-		85-115	-		
Lead, Total	110		-		85-115	-		
Nickel, Total	106		-		85-115	-		
Selenium, Total	101		-		85-115	-		
Silver, Total	110		-		85-115	-		
Zinc, Total	111		-		85-115	-		

Matrix Spike Analysis
Batch Quality Control

Project Name: BOSTON COLLEGE-IISS
Project Number: 128271-016

Lab Number: L1918984
Report Date: 05/13/19

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 QC Batch ID: WG1235009-3 QC Sample: L1918452-01 Client ID: MS Sample												
Mercury, Total	0.01384	0.005	0.01948	113		-	-		70-130	-		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1235434-3 QC Sample: L1918634-01 Client ID: MS Sample												
Iron, Total	0.099	1	1.19	109		-	-		75-125	-		20
Total Hardness by SM 2340B - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1235434-3 QC Sample: L1918634-01 Client ID: MS Sample												
Hardness	130	66.2	190	91		-	-		75-125	-		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1235437-3 QC Sample: L1918634-01 Client ID: MS Sample												
Antimony, Total	ND	0.5	0.6400	128		-	-		70-130	-		20
Arsenic, Total	ND	0.12	0.1257	105		-	-		70-130	-		20
Cadmium, Total	ND	0.051	0.06131	120		-	-		70-130	-		20
Chromium, Total	ND	0.2	0.2197	110		-	-		70-130	-		20
Copper, Total	0.02722	0.25	0.2990	109		-	-		70-130	-		20
Lead, Total	ND	0.51	0.5356	105		-	-		70-130	-		20
Nickel, Total	ND	0.5	0.5421	108		-	-		70-130	-		20
Selenium, Total	ND	0.12	0.1168	97		-	-		70-130	-		20
Silver, Total	ND	0.05	0.05808	116		-	-		70-130	-		20
Zinc, Total	0.03029	0.5	0.6057	115		-	-		70-130	-		20

Lab Duplicate Analysis

Batch Quality Control

Project Name: BOSTON COLLEGE-IISS

Project Number: 128271-016

Lab Number: L1918984

Report Date: 05/13/19

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1235009-4 QC Sample: L1918452-01 Client ID: DUP Sample						
Mercury, Total	0.01384	0.01405	mg/l	2		20
Total Hardness by SM 2340B - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1235434-4 QC Sample: L1918634-01 Client ID: DUP Sample						
Hardness	130	132	mg/l	2		20
Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1235437-4 QC Sample: L1918634-01 Client ID: DUP Sample						
Cadmium, Total	ND	ND	mg/l	NC		20
Copper, Total	0.02722	0.02885	mg/l	6		20
Lead, Total	ND	ND	mg/l	NC		20
Nickel, Total	ND	ND	mg/l	NC		20
Zinc, Total	0.03029	0.03153	mg/l	4		20

INORGANICS
&
MISCELLANEOUS

Project Name: BOSTON COLLEGE-IISS
Project Number: 128271-016
Lab Number: L1918984
Report Date: 05/13/19

SAMPLE RESULTS

Lab ID: L1918984-01
Client ID: 2019 RECEIVING
Sample Location: CHESTNUT HILL, MA
Sample Depth:
Matrix: Water

Date Collected: 05/07/19 10:15
Date Received: 05/07/19
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
pH (H)	6.9		SU	-	NA	1	-	05/08/19 17:48	121,4500H+-B	AS
Nitrogen, Ammonia	0.189		mg/l	0.075	--	1	05/08/19 17:00	05/08/19 22:49	121,4500NH3-BH	AT
Chromium, Hexavalent	ND		mg/l	0.010	--	1	05/08/19 07:00	05/08/19 08:50	121,3500CR-B	EJ

Project Name: BOSTON COLLEGE-IISS
Project Number: 128271-016
Lab Number: L1918984
Report Date: 05/13/19

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: WG1234795-1										
Chromium, Hexavalent	ND		mg/l	0.010	--	1	05/08/19 07:00	05/08/19 08:47	121,3500CR-B	EJ
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG1234827-1										
Nitrogen, Ammonia	ND		mg/l	0.075	--	1	05/08/19 17:00	05/08/19 22:40	121,4500NH3-BH	AT

Lab Control Sample Analysis

Batch Quality Control

Project Name: BOSTON COLLEGE-IISS

Project Number: 128271-016

Lab Number: L1918984

Report Date: 05/13/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1234795-2								
Chromium, Hexavalent	94		-		85-115	-		20
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1234827-2								
Nitrogen, Ammonia	105		-		80-120	-		20
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1235060-1								
pH	101		-		99-101	-		5

Matrix Spike Analysis
Batch Quality Control

Project Name: BOSTON COLLEGE-IISS
Project Number: 128271-016

Lab Number: L1918984
Report Date: 05/13/19

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: WG1234795-4 QC Sample: L1918984-01 Client ID: 2019 RECEIVING												
Chromium, Hexavalent	ND	0.1	0.097	97		-	-		85-115	-		20
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1234827-4 QC Sample: L1918991-01 Client ID: MS Sample												
Nitrogen, Ammonia	ND	4	3.81	95		-	-		80-120	-		20

Lab Duplicate Analysis

Batch Quality Control

Project Name: BOSTON COLLEGE-IISS

Project Number: 128271-016

Lab Number: L1918984

Report Date: 05/13/19

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1234795-3 QC Sample: L1918984-01 Client ID: 2019 RECEIVING						
Chromium, Hexavalent	ND	ND	mg/l	NC		20
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1234827-3 QC Sample: L1918991-01 Client ID: DUP Sample						
Nitrogen, Ammonia	ND	ND	mg/l	NC		20
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1235060-2 QC Sample: L1918984-01 Client ID: 2019 RECEIVING						
pH (H)	6.9	6.9	SU	0		5

Project Name: BOSTON COLLEGE-IISS
Project Number: 128271-016

Lab Number: L1918984
Report Date: 05/13/19

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(*)
L1918984-01A	Plastic 250ml HNO3 preserved	A	<2	<2	2.5	Y	Absent		CD-2008T(180),NI-2008T(180),ZN-2008T(180),CU-2008T(180),FE-UI(180),HARDU(180),AG-2008T(180),AS-2008T(180),HG-U(28),SE-2008T(180),CR-2008T(180),PB-2008T(180),SB-2008T(180)
L1918984-01B	Plastic 500ml H2SO4 preserved	A	<2	<2	2.5	Y	Absent		NH3-4500(28)
L1918984-01C	Plastic 950ml unpreserved	A	7	7	2.5	Y	Absent		HEXCR-3500(1),PH-4500(.01)

*Values in parentheses indicate holding time in days

Project Name:	BOSTON COLLEGE-IISS	**Lab Number:**	L1918984
Project Number:	128271-016	**Report Date:**	05/13/19

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:	BOSTON COLLEGE-IISS	**Lab Number:**	L1918984
Project Number:	128271-016	**Report Date:**	05/13/19

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.

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.

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.

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 Condensation Product".

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 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:	BOSTON COLLEGE-IISS	**Lab Number:**	L1918984
Project Number:	128271-016	**Report Date:**	05/13/19

REFERENCES

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

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.

107 Alpha Analytical - In-house calculation method.

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
EPA 8260C: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), Methyl methacrylate, 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.

EPA 6860: SCM: Perchlorate

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.
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**
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

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: 5/7/19

ALPHA Job #: L1918984

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

Project Information	
Project Name:	Boston College - IISS
Project Location:	Chesnut Hill, MA
Project #	128271-016
(Use Project name as Project #) ☐	
Project Manager:	H. Scranton, C. Worthy
ALPHAQuote #:	

H&A Information	
H&A Client:	Boston College
H&A Address:	465 Medford Street Boston, MA 02129
H&A Phone:	617-886-7400
H&A Fax:	
H&A Email:	kscalise@haleyaldrich.com

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

Billing Information
☑ Same as Client Info
PO #

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

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:

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	HEXCR-3500 & Trivalent Chromium	Total metals (NPDES RGP)	Amonia Nitrogen - SM4500	Total hardness + pH					Sample Specific Comments	Total Bottles
18984-01	2019 Receiving	5/7/2019	1015	W	TH	--	x	x	x	x						

Preservative Code:	Container Code
A = None	P = Plastic
B = HCl	A = Amber Glass
C = HNO_3	V = Vial
D = H_2SO_4	G = Glass
E = NaOH	B = Bacteria Cup
F = MeOH	C = Cube
G = $NaHSO_4$	O = Other
H = $Na_2S_2O_3$	E = Encore
K/E = Zn Ac/NaOH	D = BOD Bottle
O = Other	

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

Container Type
Preservative

Relinquished By:	Date/Time	Received By:	Date/Time
Travis [illegible]	5/7 1115	KA Oliver	5/7/19 1650
KA Oliver	5/7 1631	TKC AAL	5-7-19 1631
TKC	5-7-19 1805	[illegible]	5/7/19 1806

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)

APPENDIX E

National Historic Preservation Act Review

APPENDIX F

Laboratory Data Reports