

S-1758-020
November 11, 2019

Massachusetts Department of Environmental Protection – Northeast Region
Bureau of Waste Site Cleanup
Attn: Erik Johnson
205B Lowell Street
Wilmington, MA 01887

Re: **Immediate Response Action (IRA) Status Report**
Gallows Hill Park
Salem, Massachusetts
RTN 3-35355

Dear Erik:

On behalf of City of Salem Department of Planning and Community Development Office, Tighe & Bond has prepared this Immediate Response Action (IRA) Status report for the Gallows Hill Park site located at 50 Proctor Street in Salem, Massachusetts in accordance with the Massachusetts Contingency Plan (MCP, 310 CMR 40.0000). The subject site is shown on a USGS Site Locus map (Figure 1), MassDEP Priority Resources map (Figure 2), and an Orthophotograph (Figure 3) provided in Appendix A.

Site Release Background

The Gallows Hills Park area consists of two parcels, listed at 53 Hanson Street (the main park parcel) and 50 Proctor Street (sometimes referred to as Mansell Field). The two parcels are separated by a right-of-way area, which is also owned by the City and part of the park area. These features are depicted on Figure 3.

During due diligence investigations that were being completed at the site in November 2018 in preparation for future park renovation work, elevated levels of arsenic were detected in shallow soils in a grass covered area on the eastern portion of the park on the 50 Proctor Street parcel. Subsequent hand boring soil sampling program completed by Tighe & Bond in this area in December 2018 indicated that a condition that could pose an Imminent Hazard (IH) to human health was triggered in accordance with MCP.

On December 19, 2018, the Massachusetts Department of Environmental Protection (MassDEP) issued Release Tracking Number (RTN) 3-35355 to the site. As an interim measure following initial notification to MassDEP, the City of Salem installed a snow fence “warning” barrier (with signage also posted) around the area of concern, and this area was closed to the general public. On January 17, 2019, Tighe & Bond submitted an IRA Plan to MassDEP for site RTN 3-35355. Under the IRA Plan, further mitigation measures were completed to address the IH condition, and further assessment was also completed. In May 2019, Tighe & Bond submitted an IRA Status report to MassDEP, which reviewed the mitigation measures that were installed and briefly summarized the assessment activities that were completed. Mitigation measures included the installation of a six-foot high chain link construction fence around the area of potential concern with warning signs posted. The approximate locations where this occurred are shown on Figure 4 provided in Appendix A. On September 10, 2019, Tighe & Bond submitted Phase I - Tier Classification report for site RTN 3-35355, which reviewed the comprehensive investigations completed across the subject site parcel to delineate site impacts. That submittal also included an IRA Status update.



Description of Additional Response Actions Completed Since

The additional assessment activities completed since the September 2019 IRA Status Report included the following:

- Collection of in-situ soil samples for preliminary disposal characterization analysis.
- Collection of sediment samples in off-site drainage swale.
- Continued fence maintenance and monitoring.

Preliminary Waste Disposal Characterization: In preparation for future response actions, a preliminary in-situ disposal characterization program was completed to help determine if site soils may be classified as a hazardous waste once generated.

On October 21, 2019, Tighe & Bond personnel collected 10 soil samples (HB-201 through HB-210) from the subject site in areas where total arsenic concentrations had previously been detected at concentrations above 500 milligrams per kilogram in shallow soils. During this event, Tighe & Bond surveyed the approximate sampling locations using a Global Positioning System (GPS) unit with sub-meter accuracy. The approximate locations of these additional shallow soil samples are depicted on Figure 5 in Appendix A.

The soil samples were collected using hand tools from the top two feet (or less) from below the grass and organic layer in these areas. Between sampling locations, the equipment was wiped down and then washed with a brush and non-phosphate detergent (i.e.,alconox) solution. Each sample was submitted for toxicity characteristic leaching procedure (TCLP) analysis for arsenic.

Off-Site Sediment Sample Collection: As you are also aware, a neighboring resident at 37 Proctor Street (i.e., east of the park across Proctor Street) discussed with MassDEP their concerns about potential impacts associated with a drainage swale to the rear of their property. Based on our research, that swale is connected to and receives flow from the underground storm drain system that crosses 50 Proctor Street park parcel and historical mapping indicates that it was likely part of an open stream channel that previously crossed the subject site and the properties across Proctor Street during earlier tannery operations.

In an email dated September 4, 2019, Tighe & Bond submitted a proposed sediment sampling plan to MassDEP for review and comment. In an email dated September 5, 2019, Erik Johnson acknowledged receipt of that plan, and had no comments relative to that scope. During a site meeting with MassDEP and EPA personnel on September 11, 2019, the drainage swale area was also reviewed, and it was generally agreed that the flow in the swale through the culverted system is constant (i.e., this is a culverted stream channel).

On October 21, 2019, Tighe & Bond personnel collected sediment samples from the off-site drainage swale area for laboratory analysis. During this event, Tighe & Bond surveyed the approximate sampling locations using the GPS unit, to the extent feasible. Prior to this event, the City obtained access permission for Tighe & Bond from the affected property owners.

Tighe & Bond collected 10 sediment samples (ID: SED-1 through SED-10) from the swale. The base of this open "stream channel" is approximately 50 feet in length, and sampling was conducted from "downstream to upstream" at approximate 5-foot intervals. The approximate locations of the samples are depicted on the Off-Site Sediment Sampling Plan provided as Figure 6 in Appendix A. At the time of this event, the water level in the drainage swale was generally 6 to 10 inches in depth, with slightly deeper depths where the drainage swale begins (i.e., at the discharge culvert for the stream). The width of the surface flow within the drainage swale was generally between approximately 3 and 4 feet, as it narrows to the

approximate 18-inch concrete effluent culvert pipe on the downstream portion of the drainage swale. In general, no stagnant water was observed in the swale. The steep bank areas surrounding the base of the drainage swale generally consists of rip-rap rock and/or small boulders, with overgrown vegetation.

Using dedicated scoopulas , Tighe Bond collected sediment samples from approximately 0 to 6-inches below surface grade at each location. In general, the sample descriptions were very consistent at each location (except SED-1), with sediment samples generally consisting of coarse sand, some gravel and trace silt. At sample SED-1 location, fine to coarse sand, little gravel, and trace silt were encountered. No organics were encountered in the sediments at each location.

Each of the sediment sample was submitted for laboratory analysis of arsenic.

Fence Maintenance and Monitoring: Consistent with the program reviewed in the September 2019 IRA Status Report submittal, the City has continued their weekly inspections of the temporary construction fencing as part of IRA “maintenance and monitoring program” for the site. Copies of field sheets for the first two inspection events are provided in Appendix D.

It should be also mentioned that MassDEP visited the site with Tighe & Bond on October 21, 2019 and it was noted that one section of the construction fence was missing. Following an email notification between the City, MassDEP, and Tighe & Bond on this date, the City had this fence section area replaced.

During a November 7, 2019 site visit, we observed the on-going cleanup work that is being conducted by Environmental Protection Agency’s (EPA’s) Emergency Response and Removal Section (under MassDEP oversight) to the rear of the 1, 3 and 5 Langdon Street properties abutting the subject site to the north under separate off-site RTN 3-35400. As MassDEP is aware, a portion of the subject Mansell Field area is being used by EPA (through an access agreement with the City) for staging equipment and for accessing the rear portions of these three residential properties for their contaminated soil excavation work. Further discussion regarding these activities along (and over) the City’s property line will be presented in future submittals.

Lastly, during our visits, we also noted the polyethylene sheeting that was placed over each of the former test pit areas within this fenced-in area were each still intact (i.e., weighted down).

Laboratory Results and Discussion

The soil and sediment samples collected during the activities described above were submitted to ESS Laboratory (ESS) of Cranston, Rhode Island for analysis. Summary tables are provided in Appendix C, and the laboratory reports are provided in Appendix D.

Preliminary Waste Disposal Characterization Results: Table 1 provided in Appendix C summarizes the results for the 10 shallow soil samples submitted for TCLP arsenic analysis. Within the table, TCLP arsenic results are reporting in milligram per liter (mg/L) with results compared to the hazardous waste threshold of 5 mg/L for arsenic.

As summarized in Table 1, TCLP arsenic was below the hazardous waste threshold of 5 mg/L in each of the samples, except in sample HB-203 which had TCLP arsenic at 5.5 mg/L. Tighe & Bond subsequently requested that the laboratory analyze the three samples with the highest TCLP arsenic results for total arsenic. Those results are also summarized in Table 1 and compared to Method 1, S-1 standard of 20 milligrams per kilogram (mg/kg) for reference. As shown, arsenic concentrations in these three samples ranged between 480 mg/kg and 1,170 mg/kg which is consistent with previous site findings.

Based on these findings, it appears the majority of soils at the subject site would not be characterized as hazardous waste (due to elevated TCLP arsenic levels) once soils are generated for off-site disposal.

Sediment Sample Results: Table 2 provided in Appendix C summarizes the results for the 10 sediment samples collected from the off-site drainage swale. Within Table 2, sediment results are compared to Probable Effects Concentrations (PECs), as referenced in MassDEP's Revised Sediment Screening Values, technical update document of January 2006. For further reference, sediment results are also compared to Method 1, S-1 standards.

As summarized in Table 2, arsenic detections in the 10 sediment samples ranged between 3.70 mg/kg and 8.10 mg/kg, well below the PEC screening value of 33 mg/kg.

Based on these findings, there is no evidence that former tannery operations at the 50 Proctor Street park parcel (i.e., subject of RTN 3-35355) has impacted the off-site drainage swale via stormwater runoff and/or from the earlier stream flow across the park parcel.

Management of Remediation Waste

No remediation wastes were generated during the IRA activities described herein.

Description of Remaining IRA

As documented in earlier submittals, the IRA condition at the site has not been eliminated because the construction fence is "temporary" in nature, and therefore the IH condition in site soils is still a concern that requires continued monitoring and maintenance until either permanent fencing is installed and/or cleanup response actions are completed. Therefore, the City will continue the fence maintenance and monitoring program, until either a permanent fence is installed and/or site remediation occurs.

If you have any questions or comments, please feel free to me at 413.572.3222 (office) or 617.548.8939 (cell) at your earliest convenience.

Very truly yours,

TIGHE & BOND, INC.



Todd D. Kirton, LSP
Senior Hydrologist

Appendices

Appendix A – Figures

Appendix B – Summary Tables

Appendix C – Laboratory Reports

Appendix D – Copies of City's Weekly Inspection Sheets (August through October 2019)

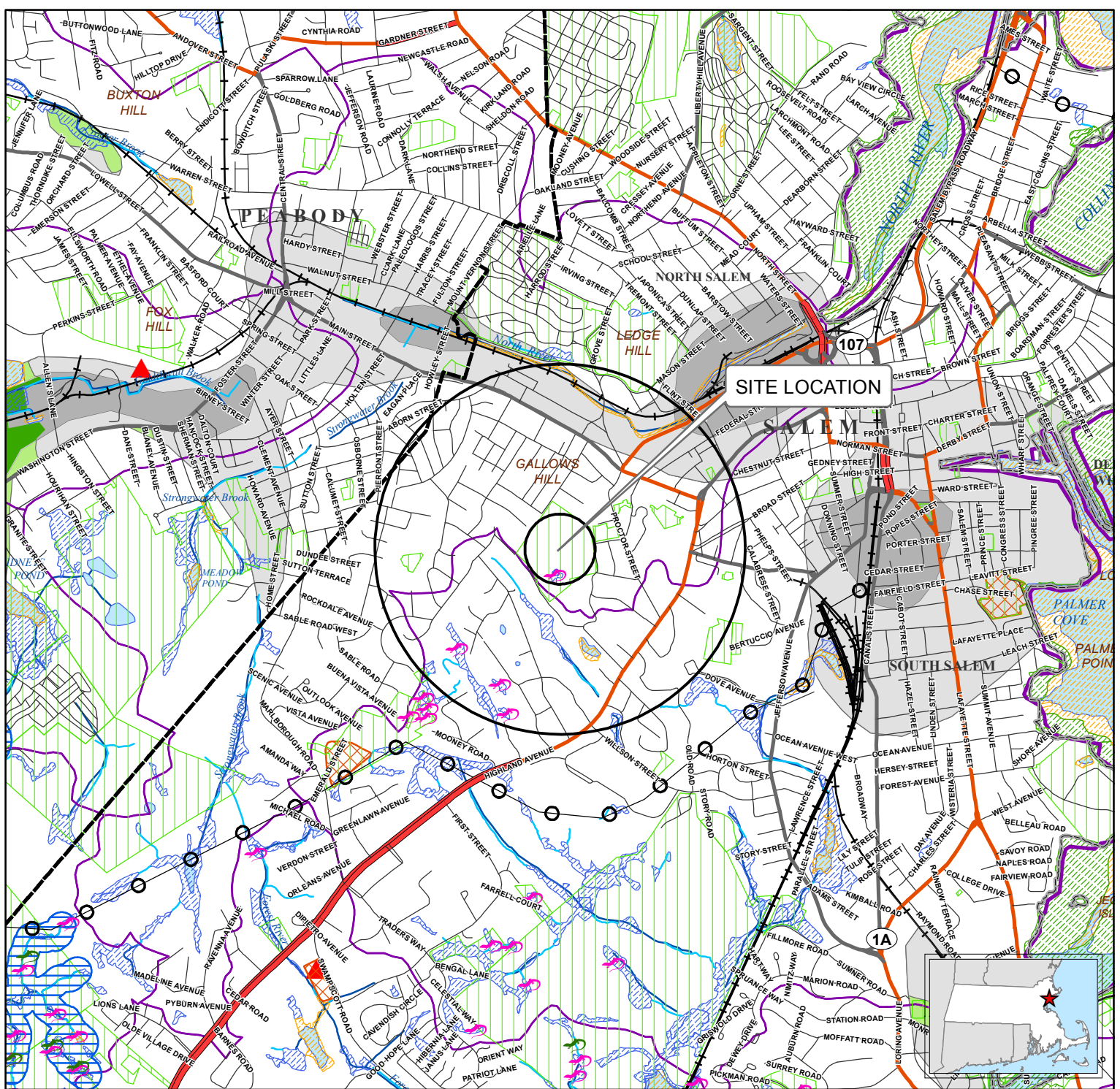
Appendix E – Report Limitations



FIGURE 1
SITE LOCATION

Gallows Hill Park
Salem, Massachusetts

November 2018



Legend













































- | | | |
|---|--|---|
|  NHESP Certified Vernal Pools |  Powerline |  MassDEP Open Water |
|  NHESP Potential Vernal Pools |  Pipeline |  MassDEP Inland Wetlands |
|  Non-Landfill Solid Waste Sites |  Track or Trail |  MassDEP Coastal Wetlands |
|  Community Public Water Supply - Surface Water |  Trains |  MassDEP Not Interpreted Wetlands |
|  Community Public Water Supply - Groundwater |  Public Surface Water Supply Protection Area (Zone A) |  Public Surface Water Supply (PSWS) |
|  Non-Community Non-Transient Public Water Supply |  DEP Approved Wellhead Protection Area (Zone I) |  Water Bodies |
|  Non-Community Transient Public Water Supply |  DEP Approved Wellhead Protection Area (Zone II) |  Non-Potential Drinking Water Source Area - High Yield |
|  Non-Community Transient Public Water Supply |  DEP Interim Wellhead Protection Area (IWPA) |  Non-Potential Drinking Water Source Area - Medium Yield |
|  Limited Access Highway |  Protected and Recreational Open Space |  Potentially Productive Medium Yield Aquifer |
|  Multi-Lane Highway, NOT Limited Access |  Solid Waste Landfill |  Potentially Productive High Yield Aquifer |
|  Other Numbered Highway |  Area of Critical Environmental Concern (ACEC) |  County Boundary |
|  Major Road - Collector |  NHESP Priority Habitats for Rare Species |  Town Boundary |
|  Minor Street or Road |  NHESP Estimated Habitats for Rare Wildlife | |
|  Aqueducts |  EPA Designated Sole Source Aquifer | |
|  Hydrologic Connections |  Major Drainage Basin | |
|  Stream/Intermittent Stream |  Sub Drainage Basin | |

FIGURE 2
PRIORITY RESOURCE MAP

Gallows Hill Park
Salem, Massachusetts

Data source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology
Circles indicate 500-foot and half-mile radii.
Data valid as of January 2019.

January 2019

Tighe & Bond
Engineers | Environmental Specialists



Legend

- Sewer Manholes
- Drain Manholes
- + Hydrants
- Water Mains
- Sewer Pipes
- Drain Pipes
- Approximate Site Parcel

Tighe&Bond
Engineers | Environmental Specialists

Based on MassGIS Color Orthophotography (2013-2014).
Parcels Boundaries (FY 11) are approximate, downloaded from
MassGIS. Utility data provided by City of Salem Engineering Dept.

1:2,400
0 100 200
Feet



FIGURE 3 ORTHOGRAPH

Gallows Hill Park
Salem, Massachusetts

January 2019



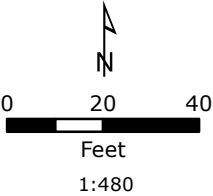
**FIGURE 4
IRA FENCE
MONITORING PLAN**

LEGEND

- Approximate Location of
construction chain link
fence installation
- Disposal Site Boundary
Subject RTN 3-35355

See figure 3 for Utility References

LOCUS MAP



NOTES

1. Based on MassGIS Color Orthophotography (2013).
2. Parcels (FY 2011) downloaded from MassGIS and are approximate.
3. Utility data provided by City of Salem Engineering Dept.

**Gallows Hill Park
50 Proctor Street
Salem, Massachusetts**

RTN 3-35355

November 2019

Tighe&Bond
Engineers | Environmental Specialists

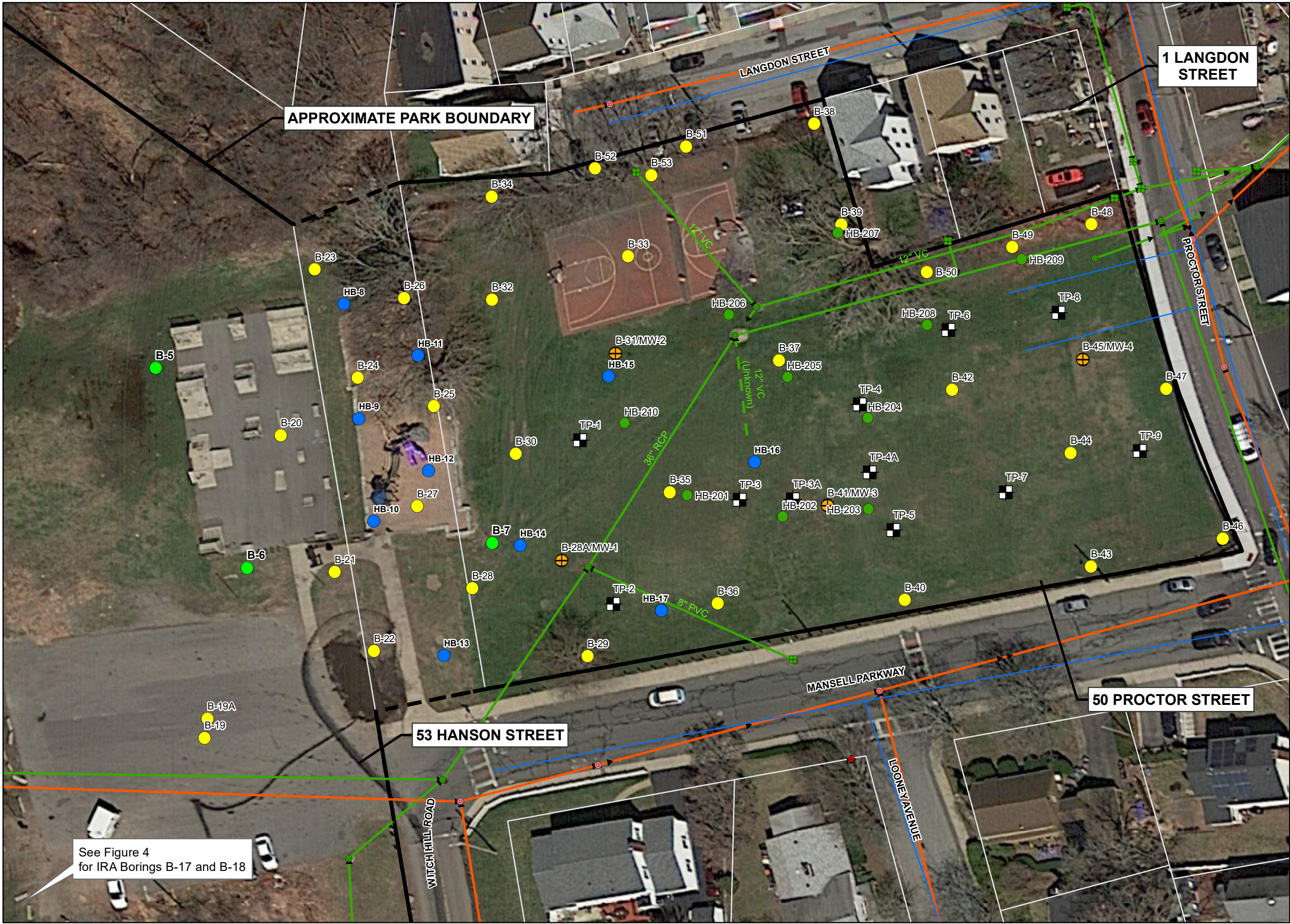


FIGURE 5
Preliminary In-Situ Disposal
Characterization Sampling
Plan

LEGEND

- October 2019 Hand Borings for Preliminary Soil Disposal Characterization
- IRA Soil Boring
- IRA Boring Completed as Well
- IRA Test Pit
- Earlier Hand Boring Location (Approximate)
- Earlier Drilling Location (Approximate)
- Approximate Park Boundary

LOCUS MAP

0 20 40
Feet
1:480

NOTES

1. Based on Google(C) Imagery (2018)
2. Parcels (FY 2011) downloaded from MassGIS and are approximate.
3. Utility data provided by City of Salem Engineering Dept., and supplemented by camera utility line survey completed by city, 2-6-19

Gallows Hill Park
50 Proctor Street
Salem, Massachusetts

RTN 3-35355

November 2019

Tighe&Bond
Engineers | Environmental Specialists

See Figure 4
for IRA Borings B-17 and B-18

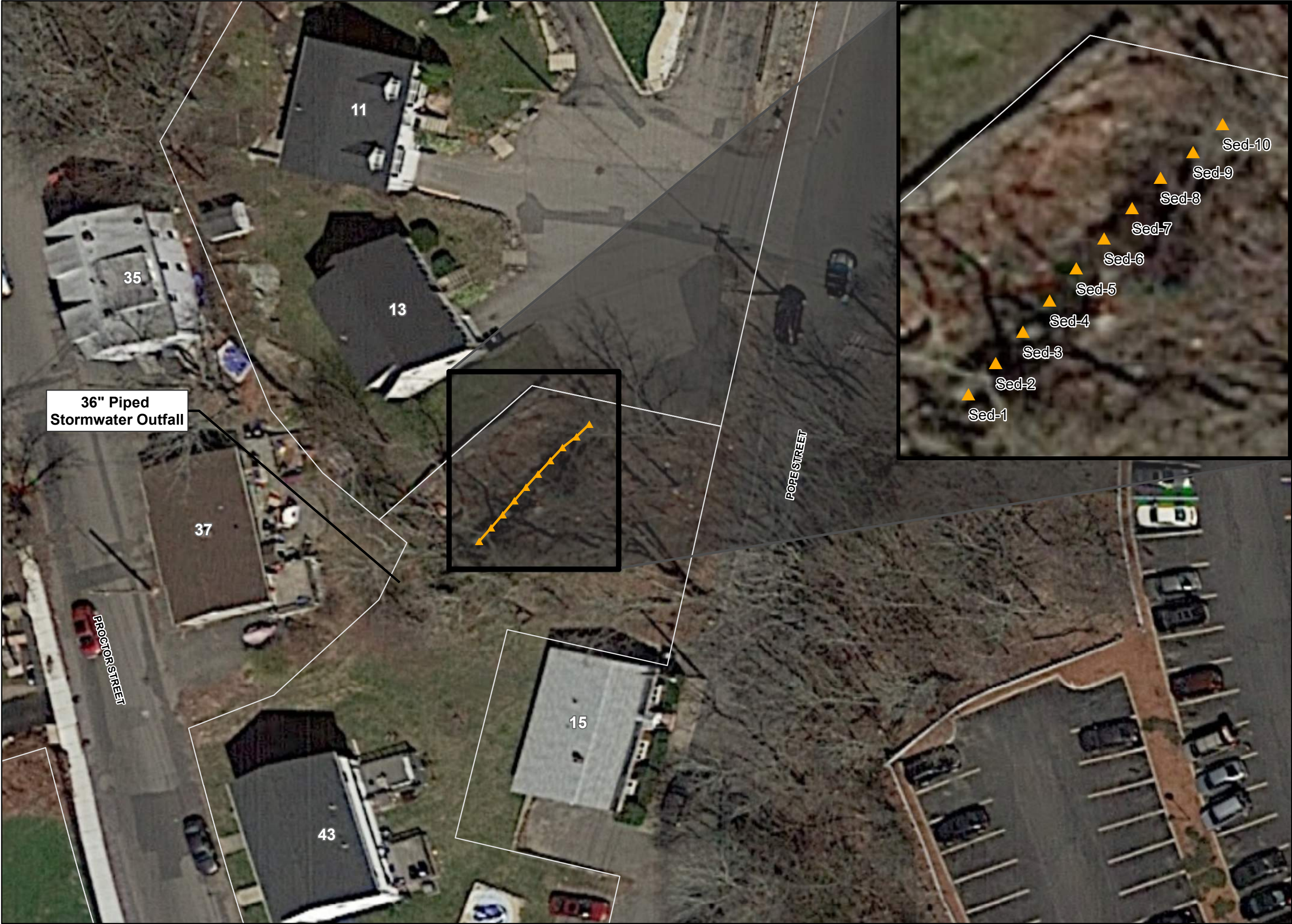


FIGURE 6
Off-Site Drainage
Swale Sampling Plan

LEGEND

▲ Approximate Sediment Sample Location

□ Approximate Parcel Boundary

LOCUS MAP

0 10 20
Feet
1:300

OTHER NOTES

1. Based on Google(C) Imagery (2018)
2. Parcels (FY 2011) downloaded from MassGIS and are approximate.
3. Utility data provided by City of Salem Engineering Dept., and supplemented by camera utility line survey completed by City, 2-6-19
4. Samples collected by Tighe & Bond, October 2019

Gallows Hill Park
50 Proctor Street
Salem, Massachusetts

November 2019

Tighe&Bond
Engineers | Environmental Specialists

TABLE 1 - Summary of Preliminary Soil Disposal Characterization Results

Gallows Hill Park
50 Proctor Street
Salem, Massachusetts

Analyses	MCP - Method 1 Standards S-1/GW-3	Hazardous Waste Threshold	Sediment Sample:	HB-201	HB-202	HB-203	HB-204	HB-205	HB-206	HB-207	HB-208	HB-209	HB-210
			Sample Date:	10/21/19	10/21/19	10/21/19	10/21/19	10/21/19	10/21/19	10/21/19	10/21/19	10/21/19	10/21/19
TCLP Metals (mg/L)													
Arsenic ⁽¹⁾	-	5		2.30	0.367	5.50	4.51	3.36	3.64	0.437	0.108	0.463	2.40
Metals (total - mg/kg)													
Arsenic ⁽²⁾	20	-		-	-	1,090	1,170	-	480	-	-	-	-

NOTES:
⁽¹⁾ Results reported in milligrams per liter (mg/L)
⁽²⁾ Results in milligrams per kilogram (mg/kg)

TABLE 2 - Summary of Off-Site Drainage Swale Sediment Results

Gallows Hill Park
50 Proctor Street
Salem, Massachusetts

Analyses	MassDEP Sediment Screening Criteria ⁽¹⁾	MCP - Method 1 Standards S-1/GW-2S-1/GW-3		Sediment Sample:	SED-1	SED-2	SED-3	SED-4	SED-5	SED-6	SED-7	SED-8	SED-9	SED-10
				Sample Depth ⁽²⁾ :	0-6"	0-6"	0-6"	0-6"	0-6"	0-6"	0-6"	0-6"	0-6"	0-6"
				Sample Date:	10/21/19	10/21/19	10/21/19	10/21/19	10/21/19	10/21/19	10/21/19	10/21/19	10/21/19	10/21/19
Metals														
Arsenic	33	20	20		3.71	4.43	7.50	3.70	4.54	5.60	6.98	5.78	8.10	5.23

NOTES:

Results in milligrams per kilogram (mg/kg)

⁽¹⁾ Probable Effects Concentrations (PECs), as referenced in MassDEP's Revised Sediment Screening Values, technical update document of January 2006.

⁽²⁾ Sample depth considered approximate.



CERTIFICATE OF ANALYSIS

Todd Kirton
Tighe & Bond
120 Front Street, Suite 7
Worcester, MA 01608

RE: Gallows Hill Park Salem (S-1758-020)
ESS Laboratory Work Order Number: 19J0737

This signed Certificate of Analysis is our approved release of your analytical results. These results are only representative of sample aliquots received at the laboratory. ESS Laboratory expects its clients to follow all regulatory sampling guidelines. Beginning with this page, the entire report has been paginated. This report should not be copied except in full without the approval of the laboratory. Samples will be disposed of thirty days after the final report has been delivered. If you have any questions or concerns, please feel free to call our Customer Service Department.

Laurel Stoddard
Laboratory Director

REVIEWED

By ESS Laboratory at 12:46 pm, Oct 29, 2019

Analytical Summary

The project as described above has been analyzed in accordance with the ESS Quality Assurance Plan. This plan utilizes the following methodologies: US EPA SW-846, US EPA Methods for Chemical Analysis of Water and Wastes per 40 CFR Part 136, APHA Standard Methods for the Examination of Water and Wastewater, American Society for Testing and Materials (ASTM), and other recognized methodologies. The analyses with these noted observations are in conformance to the Quality Assurance Plan. In chromatographic analysis, manual integration is frequently used instead of automated integration because it produces more accurate results.

The test results present in this report are in compliance with TNI and relative state standards, and/or client Quality Assurance Project Plans (QAPP). The laboratory has reviewed the following: Sample Preservations, Hold Times, Initial Calibrations, Continuing Calibrations, Method Blanks, Blank Spikes, Blank Spike Duplicates, Duplicates, Matrix Spikes, Matrix Spike Duplicates, Surrogates and Internal Standards. Any results which were found to be outside of the recommended ranges stated in our SOPs will be noted in the Project Narrative.



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem

ESS Laboratory Work Order: 19J0737

SAMPLE RECEIPT

The following samples were received on October 22, 2019 for the analyses specified on the enclosed Chain of Custody Record.

To achieve CAM compliance for MCP data, ESS Laboratory has reviewed all QA/QC Requirements and Performance Standards listed in each method. Holding times and preservation have also been reviewed. All CAM requirements have been performed and achieved unless noted in the project narrative.

Each method has been set-up in the laboratory to reach required MCP standards. The methods for aqueous VOA and Soil Methanol VOA have known limitations for certain analytes. The regulatory standards may not be achieved due to these limitations. In addition, for all methods, matrix interferences, dilutions, and %Solids may elevate method reporting limits above regulatory standards. ESS Laboratory can provide, upon request, a Limit Checker (regulatory standard comparison spreadsheet) electronic deliverable which will highlight these exceedances.

Question I: All samples for Metals were analyzed for a subset of the required MCP list per the client's request.

Lab Number	Sample Name	Matrix	Analysis
19J0737-01	HB-201	Soil	1311, 1311/6010C
19J0737-02	HB-202	Soil	1311, 1311/6010C
19J0737-03	HB-203	Soil	1311, 1311/6010C
19J0737-04	HB-204	Soil	1311, 1311/6010C
19J0737-05	HB-205	Soil	1311, 1311/6010C
19J0737-06	HB-206	Soil	1311, 1311/6010C
19J0737-07	HB-207	Soil	1311, 1311/6010C
19J0737-08	HB-208	Soil	1311, 1311/6010C
19J0737-09	HB-209	Soil	1311, 1311/6010C
19J0737-10	HB-210	Soil	1311, 1311/6010C



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem

ESS Laboratory Work Order: 19J0737

PROJECT NARRATIVE

No unusual observations noted.

End of Project Narrative.

DATA USABILITY LINKS

To ensure you are viewing the most current version of the documents below, please clear your internet cookies for www.ESSLaboratory.com. Consult your IT Support personnel for information on how to clear your internet cookies.

[Definitions of Quality Control Parameters](#)

[Semivolatile Organics Internal Standard Information](#)

[Semivolatile Organics Surrogate Information](#)

[Volatile Organics Internal Standard Information](#)

[Volatile Organics Surrogate Information](#)

[EPH and VPH Alkane Lists](#)



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem

ESS Laboratory Work Order: 19J0737

CURRENT SW-846 METHODOLOGY VERSIONS

Analytical Methods

1010A - Flashpoint
6010C - ICP
6020A - ICP MS
7010 - Graphite Furnace
7196A - Hexavalent Chromium
7470A - Aqueous Mercury
7471B - Solid Mercury
8011 - EDB/DBCP/TCP
8015C - GRO/DRO
8081B - Pesticides
8082A - PCB
8100M - TPH
8151A - Herbicides
8260B - VOA
8270D - SVOA
8270D SIM - SVOA Low Level
9014 - Cyanide
9038 - Sulfate
9040C - Aqueous pH
9045D - Solid pH (Corrosivity)
9050A - Specific Conductance
9056A - Anions (IC)
9060A - TOC
9095B - Paint Filter
MADEP 04-1.1 - EPH
MADEP 18-2.1 - VPH

Prep Methods

3005A - Aqueous ICP Digestion
3020A - Aqueous Graphite Furnace / ICP MS Digestion
3050B - Solid ICP / Graphite Furnace / ICP MS Digestion
3060A - Solid Hexavalent Chromium Digestion
3510C - Separatory Funnel Extraction
3520C - Liquid / Liquid Extraction
3540C - Manual Soxhlet Extraction
3541 - Automated Soxhlet Extraction
3546 - Microwave Extraction
3580A - Waste Dilution
5030B - Aqueous Purge and Trap
5030C - Aqueous Purge and Trap
5035A - Solid Purge and Trap

SW846 Reactivity Methods 7.3.3.2 (Reactive Cyanide) and 7.3.4.1 (Reactive Sulfide) have been withdrawn by EPA. These methods are reported per client request and are not NELAP accredited.



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem

ESS Laboratory Work Order: 19J0737

MassDEP Analytical Protocol Certification Form

MADEP RTN: _____

This form provides certification for the following data set: **19J0737-01 through 19J0737-10**

Matrices: ☐ Ground Water/Surface Water ☒ Soil/Sediment ☐ Drinking Water ☐ Air ☐ Other: _____

CAM Protocol (check all that apply below):

- | | | | | | |
|--|--|--|---|--|---|
| <input type="checkbox"/> 8260 VOC
CAM II A | <input type="checkbox"/> 7470/7471 Hg
CAM III B | <input type="checkbox"/> MassDEP VPH
(GC/PID/FID)
CAM IV A | <input type="checkbox"/> 8082 PCB
CAM V A | <input type="checkbox"/> 9014 Total
Cyanide/PAC
CAM VI A | <input type="checkbox"/> 6860 Perchlorate
CAM VIII B |
| <input type="checkbox"/> 8270 SVOC
CAM II B | <input type="checkbox"/> 7010 Metals
CAM III C | <input type="checkbox"/> MassDEP VPH
(GC/MS)
CAM IV C | <input type="checkbox"/> 8081 Pesticides
CAM V B | <input type="checkbox"/> 7196 Hex Cr
CAM VI B | <input type="checkbox"/> MassDEP APH
CAM IX A |
| <input checked="" type="checkbox"/> 6010 Metals
CAM III A | <input type="checkbox"/> 6020 Metals
CAM III D | <input type="checkbox"/> MassDEP EPH
CAM IV B | <input type="checkbox"/> 8151 Herbicides
CAM V C | <input type="checkbox"/> Explosives
CAM VIII A | <input type="checkbox"/> TO-15 VOC
CAM IX B |

Affirmative responses to questions A through F are 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 <input checked="" type="checkbox"/> No <input type="checkbox"/> |
| B | Were the analytical method(s) and all associated QC requirements specified in the selected CAM protocol(s) followed? | Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> |
| 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 <input checked="" type="checkbox"/> No <input type="checkbox"/> |
| D | Does the laboratory report comply with all the reporting requirements specified in the CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data"? | Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> |
| E | VPH, EPH, APH and TO-15 only: a. Was each method conducted without significant modification(s)? (Refer to the individual method(s) for a list of significant modifications).
b. APH and TO-15 Methods only: Was the complete analyte list reported for each method? | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| 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 <input checked="" type="checkbox"/> No <input type="checkbox"/> |

Responses to Questions G, H and I below are required for "Presumptive Certainty" status

- | | | |
|---|--|---|
| G | Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocols(s)?
Data User Note: Data that achieve "Presumptive Certainty" status may not necessarily meet the data usability and representativeness requirements described in 310 CMR 40. 1056 (2)(k) and WSC-07-350. | Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> * |
| H | Were all QC performance standards specified in the CAM protocol(s) achieved? | Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> * |
| I | Were results reported for the complete analyte list specified in the selected CAM protocol(s)? | Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> * |

***All negative responses must be addressed in an attached laboratory narrative.**

I, the undersigned, attest under the pains and penalties of perjury that, based upon my personal inquiry of those responsible for obtaining the information, the material contained in this analytical report is, to the best of my knowledge and belief, accurate and complete.

Signature: Laurel Stoddard

Printed Name: Laurel Stoddard

Date: October 28, 2019

Position: Laboratory Director



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: HB-201
Date Sampled: 10/21/19 11:00
Percent Solids: N/A

ESS Laboratory Work Order: 19J0737
ESS Laboratory Sample ID: 19J0737-01
Sample Matrix: Soil
Units: mg/L

Extraction Method: 3005A TCLP

1311 TCLP Metals

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>TCLP Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Arsenic	2.30 (0.050)		1311/6010C		1	KJK	10/24/19 3:22	50	50	CJ92361



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: HB-201
Date Sampled: 10/21/19 11:00
Percent Solids: N/A
Initial Volume: 100
Final Volume: 2000
Extraction Method: 1311

ESS Laboratory Work Order: 19J0737
ESS Laboratory Sample ID: 19J0737-01
Sample Matrix: Soil
Units: °C
Analyst: DEL
Prepared: 10/22/19 22:00

TCLP Extraction by 1311

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Batch</u>
Temperature (Min C)	20.7 (N/A)		1311		1	DEL	10/23/19 15:15	CJ92250
Temperature (Max C)	21.5 (N/A)		1311		1	DEL	10/23/19 15:15	CJ92250
Temperature (Range)	Temperature is not within 23 +/-2 °C. (N/A)							



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: HB-202
Date Sampled: 10/21/19 11:10
Percent Solids: N/A

ESS Laboratory Work Order: 19J0737
ESS Laboratory Sample ID: 19J0737-02
Sample Matrix: Soil
Units: mg/L

Extraction Method: 3005A TCLP

1311 TCLP Metals

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>TCLP Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Arsenic	0.367 (0.050)		1311/6010C		1	KJK	10/24/19 3:26	50	50	CJ92361



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: HB-202
Date Sampled: 10/21/19 11:10
Percent Solids: N/A
Initial Volume: 100
Final Volume: 2000
Extraction Method: 1311

ESS Laboratory Work Order: 19J0737
ESS Laboratory Sample ID: 19J0737-02
Sample Matrix: Soil
Units: °C
Analyst: DEL
Prepared: 10/22/19 22:00

TCLP Extraction by 1311

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Batch</u>
Temperature (Min C)	20.7 (N/A)		1311		1	DEL	10/23/19 15:15	CJ92250
Temperature (Max C)	21.5 (N/A)		1311		1	DEL	10/23/19 15:15	CJ92250
Temperature (Range)	Temperature is not within 23 +/-2 °C. (N/A)							



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: HB-203
Date Sampled: 10/21/19 11:20
Percent Solids: N/A

ESS Laboratory Work Order: 19J0737
ESS Laboratory Sample ID: 19J0737-03
Sample Matrix: Soil
Units: mg/L

Extraction Method: 3005A TCLP

1311 TCLP Metals

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>TCLP Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Arsenic	5.50 (0.050)		1311/6010C		1	KJK	10/24/19 3:30	50	50	CJ92361



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: HB-203
Date Sampled: 10/21/19 11:20
Percent Solids: N/A
Initial Volume: 100
Final Volume: 2000
Extraction Method: 1311

ESS Laboratory Work Order: 19J0737
ESS Laboratory Sample ID: 19J0737-03
Sample Matrix: Soil
Units: °C
Analyst: DEL
Prepared: 10/22/19 22:00

TCLP Extraction by 1311

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Batch</u>
Temperature (Min C)	20.7 (N/A)		1311		1	DEL	10/23/19 15:15	CJ92250
Temperature (Max C)	21.5 (N/A)		1311		1	DEL	10/23/19 15:15	CJ92250
Temperature (Range)	Temperature is not within 23 +/-2 °C. (N/A)							



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: HB-204
Date Sampled: 10/21/19 11:30
Percent Solids: N/A

ESS Laboratory Work Order: 19J0737
ESS Laboratory Sample ID: 19J0737-04
Sample Matrix: Soil
Units: mg/L

Extraction Method: 3005A TCLP

1311 TCLP Metals

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>TCLP Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Arsenic	4.51 (0.050)		1311/6010C		1	KJK	10/24/19 3:36	50	50	CJ92361



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: HB-204
Date Sampled: 10/21/19 11:30
Percent Solids: N/A
Initial Volume: 100
Final Volume: 2000
Extraction Method: 1311

ESS Laboratory Work Order: 19J0737
ESS Laboratory Sample ID: 19J0737-04
Sample Matrix: Soil
Units: °C
Analyst: DEL
Prepared: 10/22/19 22:00

TCLP Extraction by 1311

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Batch</u>
Temperature (Min C)	20.7 (N/A)		1311		1	DEL	10/23/19 15:15	CJ92250
Temperature (Max C)	21.5 (N/A)		1311		1	DEL	10/23/19 15:15	CJ92250
Temperature (Range)	Temperature is not within 23 +/-2 °C. (N/A)							



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: HB-205
Date Sampled: 10/21/19 12:00
Percent Solids: N/A

ESS Laboratory Work Order: 19J0737
ESS Laboratory Sample ID: 19J0737-05
Sample Matrix: Soil
Units: mg/L

Extraction Method: 3005A TCLP

1311 TCLP Metals

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>TCLP Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Arsenic	3.36 (0.050)		1311/6010C		1	KJK	10/24/19 3:54	50	50	CJ92361



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: HB-205
Date Sampled: 10/21/19 12:00
Percent Solids: N/A
Initial Volume: 100
Final Volume: 2000
Extraction Method: 1311

ESS Laboratory Work Order: 19J0737
ESS Laboratory Sample ID: 19J0737-05
Sample Matrix: Soil
Units: °C
Analyst: DEL
Prepared: 10/22/19 22:00

TCLP Extraction by 1311

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Batch</u>
Temperature (Min C)	20.7 (N/A)		1311		1	DEL	10/23/19 15:15	CJ92250
Temperature (Max C)	21.5 (N/A)		1311		1	DEL	10/23/19 15:15	CJ92250
Temperature (Range)	Temperature is not within 23 +/-2 °C. (N/A)							



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: HB-206
Date Sampled: 10/21/19 12:10
Percent Solids: N/A

ESS Laboratory Work Order: 19J0737
ESS Laboratory Sample ID: 19J0737-06
Sample Matrix: Soil
Units: mg/L

Extraction Method: 3005A TCLP

1311 TCLP Metals

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>TCLP Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Arsenic	3.64 (0.050)		1311/6010C		1	KJK	10/24/19 3:59	50	50	CJ92361



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: HB-206
Date Sampled: 10/21/19 12:10
Percent Solids: N/A
Initial Volume: 100
Final Volume: 2000
Extraction Method: 1311

ESS Laboratory Work Order: 19J0737
ESS Laboratory Sample ID: 19J0737-06
Sample Matrix: Soil
Units: °C
Analyst: DEL
Prepared: 10/22/19 22:00

TCLP Extraction by 1311

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Batch</u>
Temperature (Min C)	20.7 (N/A)		1311		1	DEL	10/23/19 15:15	CJ92250
Temperature (Max C)	21.5 (N/A)		1311		1	DEL	10/23/19 15:15	CJ92250
Temperature (Range)	Temperature is not within 23 +/-2 °C. (N/A)							



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: HB-207
Date Sampled: 10/21/19 12:20
Percent Solids: N/A

ESS Laboratory Work Order: 19J0737
ESS Laboratory Sample ID: 19J0737-07
Sample Matrix: Soil
Units: mg/L

Extraction Method: 3005A TCLP

1311 TCLP Metals

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>TCLP Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Arsenic	0.437 (0.050)		1311/6010C		1	KJK	10/24/19 4:05	50	50	CJ92361



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: HB-207
Date Sampled: 10/21/19 12:20
Percent Solids: N/A
Initial Volume: 100
Final Volume: 2000
Extraction Method: 1311

ESS Laboratory Work Order: 19J0737
ESS Laboratory Sample ID: 19J0737-07
Sample Matrix: Soil
Units: °C
Analyst: DEL
Prepared: 10/22/19 22:00

TCLP Extraction by 1311

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Batch</u>
Temperature (Min C)	20.7 (N/A)		1311		1	DEL	10/23/19 15:15	CJ92250
Temperature (Max C)	21.5 (N/A)		1311		1	DEL	10/23/19 15:15	CJ92250
Temperature (Range)	Temperature is not within 23 +/-2 °C. (N/A)							



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: HB-208
Date Sampled: 10/21/19 12:30
Percent Solids: N/A

ESS Laboratory Work Order: 19J0737
ESS Laboratory Sample ID: 19J0737-08
Sample Matrix: Soil
Units: mg/L

Extraction Method: 3005A TCLP

1311 TCLP Metals

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>TCLP Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Arsenic	0.108 (0.050)		1311/6010C		1	KJK	10/24/19 9:19	50	50	CJ92361



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: HB-208
Date Sampled: 10/21/19 12:30
Percent Solids: N/A
Initial Volume: 100
Final Volume: 2000
Extraction Method: 1311

ESS Laboratory Work Order: 19J0737
ESS Laboratory Sample ID: 19J0737-08
Sample Matrix: Soil
Units: °C
Analyst: DEL
Prepared: 10/22/19 22:00

TCLP Extraction by 1311

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Batch</u>
Temperature (Min C)	20.7 (N/A)		1311		1	DEL	10/23/19 15:15	CJ92250
Temperature (Max C)	21.5 (N/A)		1311		1	DEL	10/23/19 15:15	CJ92250
Temperature (Range)	Temperature is not within 23 +/-2 °C. (N/A)							



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: HB-209
Date Sampled: 10/21/19 12:40
Percent Solids: N/A

ESS Laboratory Work Order: 19J0737
ESS Laboratory Sample ID: 19J0737-09
Sample Matrix: Soil
Units: mg/L

Extraction Method: 3005A TCLP

1311 TCLP Metals

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>TCLP Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Arsenic	0.463 (0.050)		1311/6010C		1	KJK	10/24/19 4:13	50	50	CJ92361



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: HB-209
Date Sampled: 10/21/19 12:40
Percent Solids: N/A
Initial Volume: 100
Final Volume: 2000
Extraction Method: 1311

ESS Laboratory Work Order: 19J0737
ESS Laboratory Sample ID: 19J0737-09
Sample Matrix: Soil
Units: °C
Analyst: DEL
Prepared: 10/22/19 22:00

TCLP Extraction by 1311

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Batch</u>
Temperature (Min C)	20.7 (N/A)		1311		1	DEL	10/23/19 15:15	CJ92250
Temperature (Max C)	21.5 (N/A)		1311		1	DEL	10/23/19 15:15	CJ92250
Temperature (Range)	Temperature is not within 23 +/-2 °C. (N/A)							



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: HB-210
Date Sampled: 10/21/19 12:50
Percent Solids: N/A

ESS Laboratory Work Order: 19J0737
ESS Laboratory Sample ID: 19J0737-10
Sample Matrix: Soil
Units: mg/L

Extraction Method: 3005A TCLP

1311 TCLP Metals

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>TCLP Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Arsenic	2.40 (0.050)		1311/6010C		1	KJK	10/24/19 4:19	50	50	CJ92361



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: HB-210
Date Sampled: 10/21/19 12:50
Percent Solids: N/A
Initial Volume: 100
Final Volume: 2000
Extraction Method: 1311

ESS Laboratory Work Order: 19J0737
ESS Laboratory Sample ID: 19J0737-10
Sample Matrix: Soil
Units: °C
Analyst: DEL
Prepared: 10/22/19 22:00

TCLP Extraction by 1311

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Batch</u>
Temperature (Min C)	20.7 (N/A)		1311		1	DEL	10/23/19 15:15	CJ92250
Temperature (Max C)	21.5 (N/A)		1311		1	DEL	10/23/19 15:15	CJ92250
Temperature (Range)	Temperature is not within 23 +/-2 °C. (N/A)							



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem

ESS Laboratory Work Order: 19J0737

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
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1311 TCLP Metals

Batch CJ92361 - 3005A_TCLP

Blank

Arsenic	ND	0.050	mg/L							
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LCS

Arsenic	0.508	0.050	mg/L	0.5000	102	80-120				
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LCS Dup

Arsenic	0.521	0.050	mg/L	0.5000	104	80-120	2	20		
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CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond

Client Project ID: Gallows Hill Park Salem

ESS Laboratory Work Order: 19J0737

Notes and Definitions

Z18	Temperature is not within 23 +/- 2 °C.
U	Analyte included in the analysis, but not detected
ND	Analyte NOT DETECTED at or above the MRL (LOQ), LOD for DoD Reports, MDL for J-Flagged Analytes
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
MDL	Method Detection Limit
MRL	Method Reporting Limit
LOD	Limit of Detection
LOQ	Limit of Quantitation
DL	Detection Limit
I/V	Initial Volume
F/V	Final Volume
§	Subcontracted analysis; see attached report
1	Range result excludes concentrations of surrogates and/or internal standards eluting in that range.
2	Range result excludes concentrations of target analytes eluting in that range.
3	Range result excludes the concentration of the C9-C10 aromatic range.
Avg	Results reported as a mathematical average.
NR	No Recovery
[CALC]	Calculated Analyte
SUB	Subcontracted analysis; see attached report
RL	Reporting Limit
EDL	Estimated Detection Limit
MF	Membrane Filtration
MPN	Most Probably Number
TNTC	Too numerous to Count
CFU	Colony Forming Units



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem

ESS Laboratory Work Order: 19J0737

ESS LABORATORY CERTIFICATIONS AND ACCREDITATIONS

ENVIRONMENTAL

Rhode Island Potable and Non Potable Water: LAI00179
<http://www.health.ri.gov/find/labs/analytical/ESS.pdf>

Connecticut Potable and Non Potable Water, Solid and Hazardous Waste: PH-0750
http://www.ct.gov/dph/lib/dph/environmental_health/environmental_laboratories/pdf/OutofStateCommercialLaboratories.pdf

Maine Potable and Non Potable Water, and Solid and Hazardous Waste: RI00002
<http://www.maine.gov/dhhs/meedc/environmental-health/dwp/partners/labCert.shtml>

Massachusetts Potable and Non Potable Water: M-RI002
<http://public.dep.state.ma.us/Labcert/Labcert.aspx>

New Hampshire (NELAP accredited) Potable and Non Potable Water, Solid and Hazardous Waste: 2424
<http://des.nh.gov/organization/divisions/water/dwgb/nhelap/index.htm>

New York (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: 11313
<http://www.wadsworth.org/labcert/elap/comm.html>

New Jersey (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: RI006
http://datamine2.state.nj.us/DEP_OPRA/OpraMain/pi_main?mode=pi_by_site&sort_order=PI_NAMEA&Select+a+Site:=58715

United States Department of Agriculture Soil Permit: P330-12-00139

Pennsylvania: 68-01752
<http://www.dep.pa.gov/Business/OtherPrograms/Labs/Pages/Laboratory-Accreditation-Program.aspx>

ESS Laboratory Sample and Cooler Receipt Checklist

Client: Tighe & Bond - KPB/TB/MM

ESS Project ID: 19J0737
 Date Received: 10/22/2019
 Project Due Date: 10/29/2019
 Days for Project: 5 Day

Shipped/Delivered Via: ESS Courier

1. Air bill manifest present? ☐ No
 Air No.: NA
2. Were custody seals present? ☐ No
3. Is radiation count <100 CPM? ☐ Yes
4. Is a Cooler Present? ☐ Yes
 Temp: 0.3 Iced with: Ice
5. Was COC signed and dated by client? ☐ Yes

6. Does COC match bottles? ☐ Yes
7. Is COC complete and correct? ☐ Yes
8. Were samples received intact? ☐ Yes
9. Were labs informed about short holds & rushes? ☒ Yes / ☒ No / ☒ NA
10. Were any analyses received outside of hold time? ☒ Yes / ☒ No

11. Any Subcontracting needed? ☒ Yes / ☒ No
 ESS Sample IDs: _____
 Analysis: _____
 TAT: _____

12. Were VOAs received? ☒ Yes / ☒ No
 a. Air bubbles in aqueous VOAs? ☒ Yes / ☒ No
 b. Does methanol cover soil completely? ☒ Yes / ☒ No / ☒ NA

13. Are the samples properly preserved? ☒ Yes / ☒ No
 a. If metals preserved upon receipt: Date: _____ Time: _____ By: _____
 b. Low Level VOA vials frozen: Date: _____ Time: _____ By: _____

Sample Receiving Notes:

14. Was there a need to contact Project Manager? ☒ Yes / ☒ No
 a. Was there a need to contact the client? ☒ Yes / ☒ No
 Who was contacted? _____ Date: _____ Time: _____ By: _____

Sample Number	Container ID	Proper Container	Air Bubbles Present	Sufficient Volume	Container Type	Preservative	Record pH (Cyanide and 608 Pesticides)
01	401811	Yes	NA	Yes	4 oz. Jar - Unpres	NP	
02	401810	Yes	NA	Yes	4 oz. Jar - Unpres	NP	
03	401809	Yes	NA	Yes	4 oz. Jar - Unpres	NP	
04	401808	Yes	NA	Yes	4 oz. Jar - Unpres	NP	
05	401807	Yes	NA	Yes	4 oz. Jar - Unpres	NP	
06	401806	Yes	NA	Yes	4 oz. Jar - Unpres	NP	
07	401805	Yes	NA	Yes	4 oz. Jar - Unpres	NP	
08	401804	Yes	NA	Yes	4 oz. Jar - Unpres	NP	
09	401803	Yes	NA	Yes	4 oz. Jar - Unpres	NP	
10	401802	Yes	NA	Yes	4 oz. Jar - Unpres	NP	

2nd Review

Were all containers scanned into storage/lab?

Are barcode labels on correct containers?

Are all Flashpoint stickers attached/container ID # circled?

Are all Hex Chrome stickers attached?

Are all QC stickers attached?

Are VOA stickers attached if bubbles noted?

Initials MB
☒ Yes / ☒ No
☒ Yes / ☒ No / ☒ NA
☒ Yes / ☒ No / ☒ NA
☒ Yes / ☒ No / ☒ NA
☒ Yes / ☒ No / ☒ NA

Completed
 By: MB

Date & Time: 10/22/19 2050

ESS Laboratory Sample and Cooler Receipt Checklist

Client: Tighe & Bond - KPBTB/MM ESS Project ID: 19J0737
Date Received: 10/22/2019
Reviewed By: [Signature] Date & Time: 10/22/9 2110
Delivered By: [Signature] 11/22/9 2110

ESS Laboratory

Division of Thielsch Engineering, Inc.
185 Frances Avenue, Cranston RI 02910
Tel. (401) 461-7181 Fax (401) 461-4486
www.esslaboratory.com

CHAIN OF CUSTODY

Turn Time: Std 5 day Rush:

Regulatory State: MA

Is this project for any of the following?:

☒ MA-MCP ☐ CT-RCP ☐ RGP ☐ Remediation

Project # S-1752 Project Name Gallows Hill Park, Salem MA

Contact Person Todd Kertun Address 120 Front St

City Warwick State MA Zip Code 01083 PO #

Telephone Number 401-461-7181 Email Address Kelen@ThielschEng.com / TDK@ThielschEng.com

FAX Number

ESS Lab ID

Collection Date

Collection Time

Sample Type

Sample Matrix

Sample ID

Analysis

ESS Lab #

Reporting Limits

Electronic Deliverables

Limit Checker

Excel

Other (Please Specify) → PDF

ESS Lab # 1950737

Reporting Limits S-1 / S-2 / S-3

Electronic Deliverables ☒ Limit Checker ☒ Excel

Other (Please Specify) → PDF

ESS Lab # 1950737

Reporting Limits S-1 / S-2 / S-3

Electronic Deliverables ☒ Limit Checker ☒ Excel

Other (Please Specify) → PDF

ESS Lab # 1950737

Reporting Limits S-1 / S-2 / S-3

Electronic Deliverables ☒ Limit Checker ☒ Excel

Other (Please Specify) → PDF

ESS Lab # 1950737

Reporting Limits S-1 / S-2 / S-3

Electronic Deliverables ☒ Limit Checker ☒ Excel

Other (Please Specify) → PDF

ESS Lab # 1950737

Reporting Limits S-1 / S-2 / S-3

Electronic Deliverables ☒ Limit Checker ☒ Excel

Other (Please Specify) → PDF

ESS Lab # 1950737

Reporting Limits S-1 / S-2 / S-3

Electronic Deliverables ☒ Limit Checker ☒ Excel

Other (Please Specify) → PDF

Laboratory Use Only

Cooler Present:

Seals Intact:

Cooler Temperature: 0.3°C

Relinquished by: (Signature, Date & Time)

Received By: (Signature, Date & Time)

Relinquished by: (Signature, Date & Time)

Received By: (Signature, Date & Time)

Relinquished by: (Signature, Date & Time)

Received By: (Signature, Date & Time)

Relinquished by: (Signature, Date & Time)

Received By: (Signature, Date & Time)

Relinquished by: (Signature, Date & Time)

Received By: (Signature, Date & Time)

Sampled by: KC

Comments:

Use Gallows Hill, Salem Pairs

Relinquished By: (Signature, Date & Time)

Received By: (Signature, Date & Time)

Relinquished By: (Signature, Date & Time)

Received By: (Signature, Date & Time)

Relinquished By: (Signature, Date & Time)

Received By: (Signature, Date & Time)

Relinquished By: (Signature, Date & Time)

Received By: (Signature, Date & Time)

Relinquished By: (Signature, Date & Time)

Received By: (Signature, Date & Time)

Please specify "Other" preservative and containers types in this space

Relinquished By: (Signature, Date & Time)

Received By: (Signature, Date & Time)

Relinquished By: (Signature, Date & Time)

Received By: (Signature, Date & Time)

Relinquished By: (Signature, Date & Time)

Received By: (Signature, Date & Time)

Relinquished By: (Signature, Date & Time)

Received By: (Signature, Date & Time)

Relinquished By: (Signature, Date & Time)

Received By: (Signature, Date & Time)



CERTIFICATE OF ANALYSIS

Todd Kirton
Tighe & Bond
120 Front Street, Suite 7
Worcester, MA 01608

RE: Gallows Hill Park Salem (S-1758-020)
ESS Laboratory Work Order Number: 19J0738

This signed Certificate of Analysis is our approved release of your analytical results. These results are only representative of sample aliquots received at the laboratory. ESS Laboratory expects its clients to follow all regulatory sampling guidelines. Beginning with this page, the entire report has been paginated. This report should not be copied except in full without the approval of the laboratory. Samples will be disposed of thirty days after the final report has been delivered. If you have any questions or concerns, please feel free to call our Customer Service Department.

Laurel Stoddard
Laboratory Director

REVIEWED

By ESS Laboratory at 12:50 pm, Oct 29, 2019

Analytical Summary

The project as described above has been analyzed in accordance with the ESS Quality Assurance Plan. This plan utilizes the following methodologies: US EPA SW-846, US EPA Methods for Chemical Analysis of Water and Wastes per 40 CFR Part 136, APHA Standard Methods for the Examination of Water and Wastewater, American Society for Testing and Materials (ASTM), and other recognized methodologies. The analyses with these noted observations are in conformance to the Quality Assurance Plan. In chromatographic analysis, manual integration is frequently used instead of automated integration because it produces more accurate results.

The test results present in this report are in compliance with TNI and relative state standards, and/or client Quality Assurance Project Plans (QAPP). The laboratory has reviewed the following: Sample Preservations, Hold Times, Initial Calibrations, Continuing Calibrations, Method Blanks, Blank Spikes, Blank Spike Duplicates, Duplicates, Matrix Spikes, Matrix Spike Duplicates, Surrogates and Internal Standards. Any results which were found to be outside of the recommended ranges stated in our SOPs will be noted in the Project Narrative.



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem

ESS Laboratory Work Order: 19J0738

SAMPLE RECEIPT

The following samples were received on October 22, 2019 for the analyses specified on the enclosed Chain of Custody Record.

To achieve CAM compliance for MCP data, ESS Laboratory has reviewed all QA/QC Requirements and Performance Standards listed in each method. Holding times and preservation have also been reviewed. All CAM requirements have been performed and achieved unless noted in the project narrative.

Each method has been set-up in the laboratory to reach required MCP standards. The methods for aqueous VOA and Soil Methanol VOA have known limitations for certain analytes. The regulatory standards may not be achieved due to these limitations. In addition, for all methods, matrix interferences, dilutions, and %Solids may elevate method reporting limits above regulatory standards. ESS Laboratory can provide, upon request, a Limit Checker (regulatory standard comparison spreadsheet) electronic deliverable which will highlight these exceedances.

Question I: All samples for Metals were analyzed for a subset of the required MCP list per the client's request.

Lab Number	Sample Name	Matrix	Analysis
19J0738-01	SED-1	Sediment	6010C
19J0738-02	SED-2	Sediment	6010C
19J0738-03	SED-3	Sediment	6010C
19J0738-04	SED-4	Sediment	6010C
19J0738-05	SED-5	Sediment	6010C
19J0738-06	SED-6	Sediment	6010C
19J0738-07	SED-7	Sediment	6010C
19J0738-08	SED-8	Sediment	6010C
19J0738-09	SED-9	Sediment	6010C
19J0738-10	SED-10	Sediment	6010C



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem

ESS Laboratory Work Order: 19J0738

PROJECT NARRATIVE

No unusual observations noted.

End of Project Narrative.

DATA USABILITY LINKS

To ensure you are viewing the most current version of the documents below, please clear your internet cookies for www.ESSLaboratory.com. Consult your IT Support personnel for information on how to clear your internet cookies.

[Definitions of Quality Control Parameters](#)

[Semivolatile Organics Internal Standard Information](#)

[Semivolatile Organics Surrogate Information](#)

[Volatile Organics Internal Standard Information](#)

[Volatile Organics Surrogate Information](#)

[EPH and VPH Alkane Lists](#)



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem

ESS Laboratory Work Order: 19J0738

CURRENT SW-846 METHODOLOGY VERSIONS

Analytical Methods

1010A - Flashpoint
6010C - ICP
6020A - ICP MS
7010 - Graphite Furnace
7196A - Hexavalent Chromium
7470A - Aqueous Mercury
7471B - Solid Mercury
8011 - EDB/DBCP/TCP
8015C - GRO/DRO
8081B - Pesticides
8082A - PCB
8100M - TPH
8151A - Herbicides
8260B - VOA
8270D - SVOA
8270D SIM - SVOA Low Level
9014 - Cyanide
9038 - Sulfate
9040C - Aqueous pH
9045D - Solid pH (Corrosivity)
9050A - Specific Conductance
9056A - Anions (IC)
9060A - TOC
9095B - Paint Filter
MADEP 04-1.1 - EPH
MADEP 18-2.1 - VPH

Prep Methods

3005A - Aqueous ICP Digestion
3020A - Aqueous Graphite Furnace / ICP MS Digestion
3050B - Solid ICP / Graphite Furnace / ICP MS Digestion
3060A - Solid Hexavalent Chromium Digestion
3510C - Separatory Funnel Extraction
3520C - Liquid / Liquid Extraction
3540C - Manual Soxhlet Extraction
3541 - Automated Soxhlet Extraction
3546 - Microwave Extraction
3580A - Waste Dilution
5030B - Aqueous Purge and Trap
5030C - Aqueous Purge and Trap
5035A - Solid Purge and Trap

SW846 Reactivity Methods 7.3.3.2 (Reactive Cyanide) and 7.3.4.1 (Reactive Sulfide) have been withdrawn by EPA. These methods are reported per client request and are not NELAP accredited.



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem

ESS Laboratory Work Order: 19J0738

MassDEP Analytical Protocol Certification Form

MADEP RTN: _____

This form provides certification for the following data set: **19J0738-01 through 19J0738-10**

Matrices: ☐ Ground Water/Surface Water ☒ Soil/Sediment ☐ Drinking Water ☐ Air ☐ Other: _____

CAM Protocol (check all that apply below):

- | | | | | | |
|--|--|--|---|--|---|
| <input type="checkbox"/> 8260 VOC
CAM II A | <input type="checkbox"/> 7470/7471 Hg
CAM III B | <input type="checkbox"/> MassDEP VPH
(GC/PID/FID)
CAM IV A | <input type="checkbox"/> 8082 PCB
CAM V A | <input type="checkbox"/> 9014 Total
Cyanide/PAC
CAM VI A | <input type="checkbox"/> 6860 Perchlorate
CAM VIII B |
| <input type="checkbox"/> 8270 SVOC
CAM II B | <input type="checkbox"/> 7010 Metals
CAM III C | <input type="checkbox"/> MassDEP VPH
(GC/MS)
CAM IV C | <input type="checkbox"/> 8081 Pesticides
CAM V B | <input type="checkbox"/> 7196 Hex Cr
CAM VI B | <input type="checkbox"/> MassDEP APH
CAM IX A |
| <input checked="" type="checkbox"/> 6010 Metals
CAM III A | <input type="checkbox"/> 6020 Metals
CAM III D | <input type="checkbox"/> MassDEP EPH
CAM IV B | <input type="checkbox"/> 8151 Herbicides
CAM V C | <input type="checkbox"/> Explosives
CAM VIII A | <input type="checkbox"/> TO-15 VOC
CAM IX B |

Affirmative responses to questions A through F are 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 <input checked="" type="checkbox"/> No <input type="checkbox"/> |
| B | Were the analytical method(s) and all associated QC requirements specified in the selected CAM protocol(s) followed? | Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> |
| 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 <input checked="" type="checkbox"/> No <input type="checkbox"/> |
| D | Does the laboratory report comply with all the reporting requirements specified in the CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data"? | Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> |
| E | VPH, EPH, APH and TO-15 only: a. Was each method conducted without significant modification(s)? (Refer to the individual method(s) for a list of significant modifications).
b. APH and TO-15 Methods only: Was the complete analyte list reported for each method? | Yes <input type="checkbox"/> No <input type="checkbox"/>
Yes <input type="checkbox"/> No <input type="checkbox"/> |
| 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 <input checked="" type="checkbox"/> No <input type="checkbox"/> |

Responses to Questions G, H and I below are required for "Presumptive Certainty" status

- | | | |
|---|---|---|
| G | Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocols(s)?
Data User Note: Data that achieve "Presumptive Certainty" status may not necessarily meet the data usability and representativeness requirements described in 310 CMR 40.1056 (2)(k) and WSC-07-350. | Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> * |
| H | Were all QC performance standards specified in the CAM protocol(s) achieved? | Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> * |
| I | Were results reported for the complete analyte list specified in the selected CAM protocol(s)? | Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> * |

***All negative responses must be addressed in an attached laboratory narrative.**

I, the undersigned, attest under the pains and penalties of perjury that, based upon my personal inquiry of those responsible for obtaining the information, the material contained in this analytical report is, to the best of my knowledge and belief, accurate and complete.

Signature: Laurel Stoddard

Printed Name: Laurel Stoddard

Date: October 29, 2019

Position: Laboratory Director



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: SED-1
Date Sampled: 10/21/19 09:00
Percent Solids: 80

ESS Laboratory Work Order: 19J0738
ESS Laboratory Sample ID: 19J0738-01
Sample Matrix: Sediment
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Arsenic	3.71 (2.81)		6010C		1	KJK	10/26/19 14:08	2.24	100	CJ92561



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: SED-2
Date Sampled: 10/21/19 09:10
Percent Solids: 84

ESS Laboratory Work Order: 19J0738
ESS Laboratory Sample ID: 19J0738-02
Sample Matrix: Sediment
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Arsenic	4.43 (2.34)		6010C		1	KJK	10/26/19 14:38	2.53	100	CJ92561



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: SED-3
Date Sampled: 10/21/19 09:20
Percent Solids: 85

ESS Laboratory Work Order: 19J0738
ESS Laboratory Sample ID: 19J0738-03
Sample Matrix: Sediment
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Arsenic	7.50 (2.44)		6010C		1	KJK	10/26/19 14:57	2.4	100	CJ92561



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: SED-4
Date Sampled: 10/21/19 09:30
Percent Solids: 84

ESS Laboratory Work Order: 19J0738
ESS Laboratory Sample ID: 19J0738-04
Sample Matrix: Sediment
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Arsenic	3.70 (2.78)		6010C		1	KJK	10/26/19 15:01	2.13	100	CJ92561



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: SED-5
Date Sampled: 10/21/19 09:40
Percent Solids: 84

ESS Laboratory Work Order: 19J0738
ESS Laboratory Sample ID: 19J0738-05
Sample Matrix: Sediment
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Arsenic	4.54 (1.89)		6010C		1	KJK	10/26/19 15:04	3.17	100	CJ92561



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: SED-6
Date Sampled: 10/21/19 09:50
Percent Solids: 90

ESS Laboratory Work Order: 19J0738
ESS Laboratory Sample ID: 19J0738-06
Sample Matrix: Sediment
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Arsenic	5.60 (2.76)		6010C		1	KJK	10/26/19 15:20	2	100	CJ92561



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: SED-7
Date Sampled: 10/21/19 10:00
Percent Solids: 91

ESS Laboratory Work Order: 19J0738
ESS Laboratory Sample ID: 19J0738-07
Sample Matrix: Sediment
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Arsenic	6.98 (2.15)		6010C		1	KJK	10/26/19 15:24	2.55	100	CJ92561



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: SED-8
Date Sampled: 10/21/19 10:10
Percent Solids: 91

ESS Laboratory Work Order: 19J0738
ESS Laboratory Sample ID: 19J0738-08
Sample Matrix: Sediment
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Arsenic	5.78 (2.57)		6010C		1	KJK	10/26/19 15:28	2.14	100	CJ92561



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: SED-9
Date Sampled: 10/21/19 10:20
Percent Solids: 87

ESS Laboratory Work Order: 19J0738
ESS Laboratory Sample ID: 19J0738-09
Sample Matrix: Sediment
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Arsenic	8.10 (1.70)		6010C		1	KJK	10/26/19 15:32	3.37	100	CJ92561



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: SED-10
Date Sampled: 10/21/19 10:30
Percent Solids: 88

ESS Laboratory Work Order: 19J0738
ESS Laboratory Sample ID: 19J0738-10
Sample Matrix: Sediment
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Arsenic	5.23 (1.70)		6010C		1	KJK	10/26/19 15:36	3.34	100	CJ92561



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem

ESS Laboratory Work Order: 19J0738

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
---------	--------	-----	-------	----------------	------------------	------	----------------	-----	--------------	-----------

Total Metals

Batch CJ92561 - 3050B

Blank

Arsenic	ND	2.50	mg/kg wet							
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LCS

Arsenic	172	7.35	mg/kg wet	202.0		85	80-120			
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LCS Dup

Arsenic	169	8.06	mg/kg wet	202.0		84	80-120	2	20	
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CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond

Client Project ID: Gallows Hill Park Salem

ESS Laboratory Work Order: 19J0738

Notes and Definitions

U	Analyte included in the analysis, but not detected
ND	Analyte NOT DETECTED at or above the MRL (LOQ), LOD for DoD Reports, MDL for J-Flagged Analytes
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
MDL	Method Detection Limit
MRL	Method Reporting Limit
LOD	Limit of Detection
LOQ	Limit of Quantitation
DL	Detection Limit
I/V	Initial Volume
F/V	Final Volume
§	Subcontracted analysis; see attached report
1	Range result excludes concentrations of surrogates and/or internal standards eluting in that range.
2	Range result excludes concentrations of target analytes eluting in that range.
3	Range result excludes the concentration of the C9-C10 aromatic range.
Avg	Results reported as a mathematical average.
NR	No Recovery
[CALC]	Calculated Analyte
SUB	Subcontracted analysis; see attached report
RL	Reporting Limit
EDL	Estimated Detection Limit
MF	Membrane Filtration
MPN	Most Probably Number
TNTC	Too numerous to Count
CFU	Colony Forming Units



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem

ESS Laboratory Work Order: 19J0738

ESS LABORATORY CERTIFICATIONS AND ACCREDITATIONS

ENVIRONMENTAL

Rhode Island Potable and Non Potable Water: LAI00179

<http://www.health.ri.gov/find/labs/analytical/ESS.pdf>

Connecticut Potable and Non Potable Water, Solid and Hazardous Waste: PH-0750

http://www.ct.gov/dph/lib/dph/environmental_health/environmental_laboratories/pdf/OutOfStateCommercialLaboratories.pdf

Maine Potable and Non Potable Water, and Solid and Hazardous Waste: RI00002

<http://www.maine.gov/dhhs/mecdc/environmental-health/dwp/partners/labCert.shtml>

Massachusetts Potable and Non Potable Water: M-RI002

<http://public.dep.state.ma.us/Labcert/Labcert.aspx>

New Hampshire (NELAP accredited) Potable and Non Potable Water, Solid and Hazardous Waste: 2424

<http://des.nh.gov/organization/divisions/water/dwgb/nhelap/index.htm>

New York (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: 11313

<http://www.wadsworth.org/labcert/elap/comm.html>

New Jersey (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: RI006

http://datamine2.state.nj.us/DEP_OPRA/OpraMain/pi_main?mode=pi_by_site&sort_order=PI_NAMEA&Select+a+Site:=58715

United States Department of Agriculture Soil Permit: P330-12-00139

Pennsylvania: 68-01752

<http://www.dep.pa.gov/Business/OtherPrograms/Labs/Pages/Laboratory-Accreditation-Program.aspx>

ESS Laboratory Sample and Cooler Receipt Checklist

Client: Tighe & Bond - KPB/TB/MM
 Shipped/Delivered Via: ESS Courier

ESS Project ID: 19J0738
 Date Received: 10/22/2019
 Project Due Date: 10/29/2019
 Days for Project: 5 Day

1. Air bill manifest present? ☐ No
 Air No.: NA
2. Were custody seals present? ☐ No
3. Is radiation count <100 CPM? ☐ Yes
4. Is a Cooler Present? ☐ Yes
 Temp: 0.3 Iced with: Ice
5. Was COC signed and dated by client? ☐ Yes

6. Does COC match bottles? ☐ Yes
7. Is COC complete and correct? ☐ Yes
8. Were samples received intact? ☐ Yes
9. Were labs informed about short holds & rushes? Yes / No ☒ NA
10. Were any analyses received outside of hold time? Yes / ☒ No

11. Any Subcontracting needed? Yes / ☒ No
 ESS Sample IDs: _____
 Analysis: _____
 TAT: _____

12. Were VOAs received? Yes / ☒ No
 a. Air bubbles in aqueous VOAs? Yes / No
 b. Does methanol cover soil completely? Yes / No / NA

13. Are the samples properly preserved? ☒ Yes / No
 a. If metals preserved upon receipt: Date: _____ Time: _____ By: _____
 b. Low Level VOA vials frozen: Date: _____ Time: _____ By: _____

Sample Receiving Notes:

14. Was there a need to contact Project Manager? Yes / ☒ No
 a. Was there a need to contact the client? Yes / No
 Who was contacted? _____ Date: _____ Time: _____ By: _____

Sample Number	Container ID	Proper Container	Air Bubbles Present	Sufficient Volume	Container Type	Preservative	Record pH (Cyanide and 608 Pesticides)
01	401821	Yes	NA	Yes	4 oz. Jar - Unpres	NP	
02	401820	Yes	NA	Yes	4 oz. Jar - Unpres	NP	
03	401819	Yes	NA	Yes	4 oz. Jar - Unpres	NP	
04	401818	Yes	NA	Yes	4 oz. Jar - Unpres	NP	
05	401817	Yes	NA	Yes	4 oz. Jar - Unpres	NP	
06	401816	Yes	NA	Yes	4 oz. Jar - Unpres	NP	
07	401815	Yes	NA	Yes	4 oz. Jar - Unpres	NP	
08	401814	Yes	NA	Yes	4 oz. Jar - Unpres	NP	
09	401813	Yes	NA	Yes	4 oz. Jar - Unpres	NP	
10	401812	Yes	NA	Yes	4 oz. Jar - Unpres	NP	

2nd Review

- Were all containers scanned into storage/lab?
 Are barcode labels on correct containers?
 Are all Flashpoint stickers attached/container ID # circled?
 Are all Hex Chrome stickers attached?
 Are all QC stickers attached?
 Are VOA stickers attached if bubbles noted?

Initials MB
☒ Yes / No
 Yes / No / NA
 Yes / No / NA
 Yes / No / NA
 Yes / No / NA

Completed By: [Signature] Date & Time: 10/22/19 2054

ESS Laboratory Sample and Cooler Receipt Checklist

Client: Tighe & Bond - KP/B/TB/MM ESS Project ID: 19J0738
Date Received: 10/22/2019
Reviewed By: [Signature] Date & Time: 10/22/19 2109
Delivered By: [Signature] 10/22/19 2109

ESS Laboratory

Division of Thielsch Engineering, Inc.
185 Frances Avenue, Cranston RI 02910
Tel. (401) 461-7181 Fax (401) 461-4486
www.esslaboratory.com

CHAIN OF CUSTODY

ESS Lab #		1950738											
Reporting Limits													
Electronic Deliverables		<input checked="" type="checkbox"/> Limit Checker <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Other (Please Specify) → PDE											
Analysis	Total Assay												
ESS Lab ID		Collection Date	Collection Time	Sample Type	Sample Matrix	Sample ID							
1	10/21/19	900	G	Sed	Sed-1								
2		910			Sed-2								
3		920			Sed-3								
4		930			Sed-4								
5		940			Sed-5								
6		950			Sed-6								
7		1000			Sed-7								
8		1010			Sed-8								
9		1020			Sed-9								
10		1030			Sed-10								
Container Type:							AG-Amber Glass B-BOD Bottle G-Glass P-Poly S-Sterile V-Vial O-Other						
Preservation Code:							1-Non Preserved 2-HCl 3-H2SO4 4-HNO3 5-NAOH 6-Methanol 7-Na2S2O3 8-ZnAc2, NaOH 9-NH4Cl 10-DI H2O 11-Other*						
Number of Containers:							10						
Laboratory Use Only							Sampled by: <i>Ken</i> Comments: <i>use Gallons Hill pricing</i>						
Cooler Present: <input checked="" type="checkbox"/>							Please specify "Other" preservative and containers types in this space						
Seals Intact: <input checked="" type="checkbox"/>													
Cooler Temperature: <i>0.5°C</i>													
Relinquished by: (Signature, Date & Time)			Received By: (Signature, Date & Time)			Relinquished By: (Signature, Date & Time)			Received By: (Signature, Date & Time)				
<i>[Signature]</i> 10/21/19 1700			<i>Rebridgton</i>			<i>[Signature]</i>			<i>[Signature]</i> 10/20/19 13:27				
Relinquished by: (Signature, Date & Time)			Received By: (Signature, Date & Time)			Relinquished By: (Signature, Date & Time)			Received By: (Signature, Date & Time)				
<i>[Signature]</i> 10/22/19 19:08			<i>[Signature]</i> 10/22/19 19:09										



CERTIFICATE OF ANALYSIS

Todd Kirton
Tighe & Bond
120 Front Street, Suite 7
Worcester, MA 01608

RE: Gallows Hill Park Salem (S-1758-020)
ESS Laboratory Work Order Number: 19J1124

This signed Certificate of Analysis is our approved release of your analytical results. These results are only representative of sample aliquots received at the laboratory. ESS Laboratory expects its clients to follow all regulatory sampling guidelines. Beginning with this page, the entire report has been paginated. This report should not be copied except in full without the approval of the laboratory. Samples will be disposed of thirty days after the final report has been delivered. If you have any questions or concerns, please feel free to call our Customer Service Department.

Laurel Stoddard
Laboratory Director

REVIEWED

By ESS Laboratory at 11:33 am, Nov 08, 2019

Analytical Summary

The project as described above has been analyzed in accordance with the ESS Quality Assurance Plan. This plan utilizes the following methodologies: US EPA SW-846, US EPA Methods for Chemical Analysis of Water and Wastes per 40 CFR Part 136, APHA Standard Methods for the Examination of Water and Wastewater, American Society for Testing and Materials (ASTM), and other recognized methodologies. The analyses with these noted observations are in conformance to the Quality Assurance Plan. In chromatographic analysis, manual integration is frequently used instead of automated integration because it produces more accurate results.

The test results present in this report are in compliance with TNI and relative state standards, and/or client Quality Assurance Project Plans (QAPP). The laboratory has reviewed the following: Sample Preservations, Hold Times, Initial Calibrations, Continuing Calibrations, Method Blanks, Blank Spikes, Blank Spike Duplicates, Duplicates, Matrix Spikes, Matrix Spike Duplicates, Surrogates and Internal Standards. Any results which were found to be outside of the recommended ranges stated in our SOPs will be noted in the Project Narrative.



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem

ESS Laboratory Work Order: 19J1124

SAMPLE RECEIPT

The following samples were received on October 31, 2019 for the analyses specified on the enclosed Chain of Custody Record.

To achieve CAM compliance for MCP data, ESS Laboratory has reviewed all QA/QC Requirements and Performance Standards listed in each method. Holding times and preservation have also been reviewed. All CAM requirements have been performed and achieved unless noted in the project narrative.

Each method has been set-up in the laboratory to reach required MCP standards. The methods for aqueous VOA and Soil Methanol VOA have known limitations for certain analytes. The regulatory standards may not be achieved due to these limitations. In addition, for all methods, matrix interferences, dilutions, and %Solids may elevate method reporting limits above regulatory standards. ESS Laboratory can provide, upon request, a Limit Checker (regulatory standard comparison spreadsheet) electronic deliverable which will highlight these exceedances.

These samples were originally received on 10/22/2019 as ESS Laboratory Sample IDs 19J0737-03, 19J0737-04, and 19J0737-06.

<u>Lab Number</u>	<u>Sample Name</u>	<u>Matrix</u>	<u>Analysis</u>
19J1124-01	HB-203	Soil	6010C
19J1124-02	HB-204	Soil	6010C
19J1124-03	HB-206	Soil	6010C



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem

ESS Laboratory Work Order: 19J1124

PROJECT NARRATIVE

No unusual observations noted.

End of Project Narrative.

DATA USABILITY LINKS

To ensure you are viewing the most current version of the documents below, please clear your internet cookies for www.ESSLaboratory.com. Consult your IT Support personnel for information on how to clear your internet cookies.

[Definitions of Quality Control Parameters](#)

[Semivolatile Organics Internal Standard Information](#)

[Semivolatile Organics Surrogate Information](#)

[Volatile Organics Internal Standard Information](#)

[Volatile Organics Surrogate Information](#)

[EPH and VPH Alkane Lists](#)



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem

ESS Laboratory Work Order: 19J1124

CURRENT SW-846 METHODOLOGY VERSIONS

Analytical Methods

1010A - Flashpoint
6010C - ICP
6020A - ICP MS
7010 - Graphite Furnace
7196A - Hexavalent Chromium
7470A - Aqueous Mercury
7471B - Solid Mercury
8011 - EDB/DBCP/TCP
8015C - GRO/DRO
8081B - Pesticides
8082A - PCB
8100M - TPH
8151A - Herbicides
8260B - VOA
8270D - SVOA
8270D SIM - SVOA Low Level
9014 - Cyanide
9038 - Sulfate
9040C - Aqueous pH
9045D - Solid pH (Corrosivity)
9050A - Specific Conductance
9056A - Anions (IC)
9060A - TOC
9095B - Paint Filter
MADEP 04-1.1 - EPH
MADEP 18-2.1 - VPH

Prep Methods

3005A - Aqueous ICP Digestion
3020A - Aqueous Graphite Furnace / ICP MS Digestion
3050B - Solid ICP / Graphite Furnace / ICP MS Digestion
3060A - Solid Hexavalent Chromium Digestion
3510C - Separatory Funnel Extraction
3520C - Liquid / Liquid Extraction
3540C - Manual Soxhlet Extraction
3541 - Automated Soxhlet Extraction
3546 - Microwave Extraction
3580A - Waste Dilution
5030B - Aqueous Purge and Trap
5030C - Aqueous Purge and Trap
5035A - Solid Purge and Trap

SW846 Reactivity Methods 7.3.3.2 (Reactive Cyanide) and 7.3.4.1 (Reactive Sulfide) have been withdrawn by EPA. These methods are reported per client request and are not NELAP accredited.



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem

ESS Laboratory Work Order: 19J1124

MassDEP Analytical Protocol Certification Form

MADEP RTN: _____

This form provides certification for the following data set: **19J1124-01 through 19J1124-03**

Matrices: ☐ Ground Water/Surface Water ☒ Soil/Sediment ☐ Drinking Water ☐ Air ☐ Other: _____

CAM Protocol (check all that apply below):

- | | | | | | |
|--|--|--|---|--|---|
| <input type="checkbox"/> 8260 VOC
CAM II A | <input type="checkbox"/> 7470/7471 Hg
CAM III B | <input type="checkbox"/> MassDEP VPH
(GC/PID/FID)
CAM IV A | <input type="checkbox"/> 8082 PCB
CAM V A | <input type="checkbox"/> 9014 Total
Cyanide/PAC
CAM VI A | <input type="checkbox"/> 6860 Perchlorate
CAM VIII B |
| <input type="checkbox"/> 8270 SVOC
CAM II B | <input type="checkbox"/> 7010 Metals
CAM III C | <input type="checkbox"/> MassDEP VPH
(GC/MS)
CAM IV C | <input type="checkbox"/> 8081 Pesticides
CAM V B | <input type="checkbox"/> 7196 Hex Cr
CAM VI B | <input type="checkbox"/> MassDEP APH
CAM IX A |
| <input checked="" type="checkbox"/> 6010 Metals
CAM III A | <input type="checkbox"/> 6020 Metals
CAM III D | <input type="checkbox"/> MassDEP EPH
CAM IV B | <input type="checkbox"/> 8151 Herbicides
CAM V C | <input type="checkbox"/> Explosives
CAM VIII A | <input type="checkbox"/> TO-15 VOC
CAM IX B |

Affirmative responses to questions A through F are 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 <input checked="" type="checkbox"/> No <input type="checkbox"/> |
| B | Were the analytical method(s) and all associated QC requirements specified in the selected CAM protocol(s) followed? | Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> |
| 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 <input checked="" type="checkbox"/> No <input type="checkbox"/> |
| D | Does the laboratory report comply with all the reporting requirements specified in the CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data"? | Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> |
| E | VPH, EPH, APH and TO-15 only: a. Was each method conducted without significant modification(s)? (Refer to the individual method(s) for a list of significant modifications).
b. APH and TO-15 Methods only: Was the complete analyte list reported for each method? | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| 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 <input checked="" type="checkbox"/> No <input type="checkbox"/> |

Responses to Questions G, H and I below are required for "Presumptive Certainty" status

- | | | |
|---|---|---|
| G | Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocols(s)?
Data User Note: Data that achieve "Presumptive Certainty" status may not necessarily meet the data usability and representativeness requirements described in 310 CMR 40.1056 (2)(k) and WSC-07-350. | Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> * |
| H | Were all QC performance standards specified in the CAM protocol(s) achieved? | Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> * |
| I | Were results reported for the complete analyte list specified in the selected CAM protocol(s)? | Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> * |

***All negative responses must be addressed in an attached laboratory narrative.**

I, the undersigned, attest under the pains and penalties of perjury that, based upon my personal inquiry of those responsible for obtaining the information, the material contained in this analytical report is, to the best of my knowledge and belief, accurate and complete.

Signature: Laurel Stoddard

Printed Name: Laurel Stoddard

Date: November 08, 2019

Position: Laboratory Director



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: HB-203
Date Sampled: 10/21/19 11:20
Percent Solids: 82

ESS Laboratory Work Order: 19J1124
ESS Laboratory Sample ID: 19J1124-01
Sample Matrix: Soil
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Arsenic	1090 (12.2)		6010C		1	KJK	11/07/19 17:56	0.5	100	CK90663



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: HB-204
Date Sampled: 10/21/19 11:30
Percent Solids: 77

ESS Laboratory Work Order: 19J1124
ESS Laboratory Sample ID: 19J1124-02
Sample Matrix: Soil
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Arsenic	1170 (6.84)		6010C		1	KJK	11/07/19 18:00	0.95	100	CK90663



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: HB-206
Date Sampled: 10/21/19 12:10
Percent Solids: 74

ESS Laboratory Work Order: 19J1124
ESS Laboratory Sample ID: 19J1124-03
Sample Matrix: Soil
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Arsenic	480 (6.05)		6010C		1	KJK	11/07/19 18:05	1.12	100	CK90663



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem

ESS Laboratory Work Order: 19J1124

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Total Metals										
Batch CK90663 - 3050B										
Blank										
Arsenic	ND	2.50	mg/kg wet							
LCS										
Arsenic	203	8.33	mg/kg wet	202.0		100	80-120			
LCS Dup										
Arsenic	204	6.85	mg/kg wet	202.0		101	80-120	0.4	20	



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond

Client Project ID: Gallows Hill Park Salem

ESS Laboratory Work Order: 19J1124

Notes and Definitions

U	Analyte included in the analysis, but not detected
ND	Analyte NOT DETECTED at or above the MRL (LOQ), LOD for DoD Reports, MDL for J-Flagged Analytes
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
MDL	Method Detection Limit
MRL	Method Reporting Limit
LOD	Limit of Detection
LOQ	Limit of Quantitation
DL	Detection Limit
I/V	Initial Volume
F/V	Final Volume
§	Subcontracted analysis; see attached report
1	Range result excludes concentrations of surrogates and/or internal standards eluting in that range.
2	Range result excludes concentrations of target analytes eluting in that range.
3	Range result excludes the concentration of the C9-C10 aromatic range.
Avg	Results reported as a mathematical average.
NR	No Recovery
[CALC]	Calculated Analyte
SUB	Subcontracted analysis; see attached report
RL	Reporting Limit
EDL	Estimated Detection Limit
MF	Membrane Filtration
MPN	Most Probably Number
TNTC	Too numerous to Count
CFU	Colony Forming Units



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem

ESS Laboratory Work Order: 19J1124

ESS LABORATORY CERTIFICATIONS AND ACCREDITATIONS

ENVIRONMENTAL

Rhode Island Potable and Non Potable Water: LAI00179

<http://www.health.ri.gov/find/labs/analytical/ESS.pdf>

Connecticut Potable and Non Potable Water, Solid and Hazardous Waste: PH-0750

http://www.ct.gov/dph/lib/dph/environmental_health/environmental_laboratories/pdf/OutOfStateCommercialLaboratories.pdf

Maine Potable and Non Potable Water, and Solid and Hazardous Waste: RI00002

<http://www.maine.gov/dhhs/mecdc/environmental-health/dwp/partners/labCert.shtml>

Massachusetts Potable and Non Potable Water: M-RI002

<http://public.dep.state.ma.us/Labcert/Labcert.aspx>

New Hampshire (NELAP accredited) Potable and Non Potable Water, Solid and Hazardous Waste: 2424

<http://des.nh.gov/organization/divisions/water/dwgb/nhelap/index.htm>

New York (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: 11313

<http://www.wadsworth.org/labcert/elap/comm.html>

New Jersey (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: RI006

http://datamine2.state.nj.us/DEP_OPRA/OpraMain/pi_main?mode=pi_by_site&sort_order=PI_NAMEA&Select+a+Site:=58715

United States Department of Agriculture Soil Permit: P330-12-00139

Pennsylvania: 68-01752

<http://www.dep.pa.gov/Business/OtherPrograms/Labs/Pages/Laboratory-Accreditation-Program.aspx>

ESS Laboratory Sample and Cooler Receipt Checklist

Client: Tighe & Bond - KPB/TB/MM
 Shipped/Delivered Via: ESS Courier

ESS Project ID: 19J1124
 Date Received: 10/31/2019
 Project Due Date: 11/7/2019
 Days for Project: 5 Day

1. Air bill manifest present? No
 Air No.: NA
 2. Were custody seals present? No
 3. Is radiation count <100 CPM? Yes
 4. Is a Cooler Present? NA
 Temp: N/A Iced with: None
 5. Was COC signed and dated by client? Yes

6. Does COC match bottles? Yes
 7. Is COC complete and correct? Yes
 8. Were samples received intact? Yes
 9. Were labs informed about short holds & rushes? Yes / No / NA
 10. Were any analyses received outside of hold time? Yes / No

11. Any Subcontracting needed? Yes / No
 ESS Sample IDs: _____
 Analysis: _____
 TAT: _____

12. Were VOAs received? Yes / No
 a. Air bubbles in aqueous VOAs? Yes / No
 b. Does methanol cover soil completely? Yes / No / NA

13. Are the samples properly preserved? Yes / No
 a. If metals preserved upon receipt: Date: _____ Time: _____ By: _____
 b. Low Level VOA vials frozen: Date: _____ Time: _____ By: _____

Sample Receiving Notes:

INVOICE

14. Was there a need to contact Project Manager? Yes / No
 a. Was there a need to contact the client? Yes / No
 Who was contacted? _____ Date: _____ Time: _____ By: _____

Sample Number	Container ID	Proper Container	Air Bubbles Present	Sufficient Volume	Container Type	Preservative	Record pH (Cyanide and 608 Pesticides)
01	407882	Yes	NA	Yes	Other	NP	

2nd Review

Were all containers scanned into storage/lab? Initials _____
 Are barcode labels on correct containers? Yes / No
 Are all Flashpoint stickers attached/container ID # circled? Yes / No / NA
 Are all Hex Chrome stickers attached? Yes / No / NA
 Are all QC stickers attached? Yes / No / NA
 Are VOA stickers attached if bubbles noted? Yes / No / NA

Completed By: 222 Date & Time: 10/31/19 1442
 Reviewed By: _____ Date & Time: _____
 Delivered By: _____

ESS Laboratory

Division of Thielsch Engineering, Inc.
185 Frances Avenue, Cranston RI 02910
Tel. (401) 461-7181 Fax (401) 461-4486
www.esslaboratory.com

CHAIN OF CUSTODY

Turn Time: *Std. 5 day* Rush:

Regulatory State: *MA*

Is this project for any of the following?:

☒ MA-MCP ☐ CT-RCP ☐ RGP ☐ Remediation

Project # *5-1258* Project Name *Gallus Hill Park, Salem MA*

Address *120 Front St*

State *MA* Zip Code *01903* PO #

FAX Number *Kelvin D. Fitch, Inc. / TDKim-Stylish.com*

City *Worcester* Email Address

Telephone Number

Sample ID

Sample Matrix

Sample Type

Collection Time

Collection Date

ESS Lab ID

Container Type:

Preservation Code:

AG-Amber Glass B-BOD Bottle G-Glass P-Poly S-Sterile V-Vial O-Other

1-Non Preserved 2-HCl 3-H2SO4 4-HNO3 5-NaOH 6-Methanol 7-Na2S2O3 8-ZnAc2, NaOH 9-NH4Cl 10-DI H2O 11-Other

Number of Containers: *10*

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ESS Lab # *195073* *1951124*

Reporting Limits *S-1 / S-2 / S-3*

Electronic ☒ Limit Checker ☒ Excel

Deliverables ☐ Other (Please Specify) *PDF*

Analysis

Total As

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X

X

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Company Name

Contact Person

City

State

Zip Code

FAX Number

Telephone Number

Collection Time

Collection Date

ESS Lab ID

Container Type:

Preservation Code:

AG-Amber Glass B-BOD Bottle G-Glass P-Poly S-Sterile V-Vial O-Other

1-Non Preserved 2-HCl 3-H2SO4 4-HNO3 5-NaOH 6-Methanol 7-Na2S2O3 8-ZnAc2, NaOH 9-NH4Cl 10-DI H2O 11-Other

Number of Containers: *10*

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Company Name

Contact Person

City

State

Zip Code

FAX Number

Telephone Number

Collection Time

Collection Date

ESS Lab ID

Container Type:

Preservation Code:

AG-Amber Glass B-BOD Bottle G-Glass P-Poly S-Sterile V-Vial O-Other

1-Non Preserved 2-HCl 3-H2SO4 4-HNO3 5-NaOH 6-Methanol 7-Na2S2O3 8-ZnAc2, NaOH 9-NH4Cl 10-DI H2O 11-Other

Number of Containers: *10*

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Company Name

Contact Person

City

State

Zip Code

FAX Number

Telephone Number

Collection Time

Collection Date

ESS Lab ID

Container Type:

Preservation Code:

AG-Amber Glass B-BOD Bottle G-Glass P-Poly S-Sterile V-Vial O-Other

1-Non Preserved 2-HCl 3-H2SO4 4-HNO3 5-NaOH 6-Methanol 7-Na2S2O3 8-ZnAc2, NaOH 9-NH4Cl 10-DI H2O 11-Other

Number of Containers: *10*

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Company Name

Contact Person

City

State

Zip Code

FAX Number

Telephone Number

Collection Time

Collection Date

ESS Lab ID

Container Type:

Preservation Code:

AG-Amber Glass B-BOD Bottle G-Glass P-Poly S-Sterile V-Vial O-Other

1-Non Preserved 2-HCl 3-H2SO4 4-HNO3 5-NaOH 6-Methanol 7-Na2S2O3 8-ZnAc2, NaOH 9-NH4Cl 10-DI H2O 11-Other

Number of Containers: *10*

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City of Salem Inspection Report

Mansell Field at 50 Proctor Street, Salem, MA

FENCING

Is temporary fencing intact? Yes / No

If no, describe conditions and corrective actions taken:

SITE ACTIVITY

Are there any signs of unauthorized activity within the fenced area? Yes / No

If yes, describe conditions and corrective actions taken:

OTHER OBSERVATIONS

Note any other pertinent site observations:

Inspector Name: Tom Devine

Signature: [Signature]

Title: Senior Planner

Date: 8/1/19

City of Salem Inspection Report

Mansell Field at 50 Proctor Street, Salem, MA

FENCING

Is temporary fencing intact? Yes / No

If no, describe conditions and corrective actions taken:

SITE ACTIVITY

Are there any signs of unauthorized activity within the fenced area? Yes / No

If yes, describe conditions and corrective actions taken:

OTHER OBSERVATIONS

Note any other pertinent site observations:

Inspector Name:

Tom Deane

Title:

Senior Planner

Signature:

[Signature]

Date:

8/8/19

City of Salem Inspection Report

Mansell Field at 50 Proctor Street, Salem, MA

FENCING

Is temporary fencing intact? Yes / No

If no, describe conditions and corrective actions taken:

SITE ACTIVITY

Are there any signs of unauthorized activity within the fenced area? Yes / No

If yes, describe conditions and corrective actions taken:

OTHER OBSERVATIONS

Note any other pertinent site observations:

Inspector Name: Tom Decker

Title: Senior Planner

Signature: [Signature]

Date: 8/21/19

City of Salem Inspection Report

Mansell Field at 50 Proctor Street, Salem, MA

FENCING

Is temporary fencing intact? ☒ Yes / ☐ No

If no, describe conditions and corrective actions taken:

SITE ACTIVITY

Are there any signs of unauthorized activity within the fenced area? Yes / ☒ No

If yes, describe conditions and corrective actions taken:

OTHER OBSERVATIONS

Note any other pertinent site observations:

Inspector Name: Tom Decker

Signature: [Signature]

Title: Senior Planner

Date: 9/18/19

City of Salem Inspection Report

Mansell Field at 50 Proctor Street, Salem, MA

FENCING

Is temporary fencing intact? Yes/No

If no, describe conditions and corrective actions taken:

DPW to repair damaged fencing @ state park.

SITE ACTIVITY

Are there any signs of unauthorized activity within the fenced area? Yes/No

If yes, describe conditions and corrective actions taken:

OTHER OBSERVATIONS

Note any other pertinent site observations:

Inspector Name: Tom Deane

Title: Sr. Planner

Signature: [Signature]

Date: 9/5/19

City of Salem Inspection Report

Mansell Field at 50 Proctor Street, Salem, MA

FENCING

Is temporary fencing intact? Yes / No

If no, describe conditions and corrective actions taken:

Don't repair missing segment.

SITE ACTIVITY

Are there any signs of unauthorized activity within the fenced area? Yes / No

If yes, describe conditions and corrective actions taken:

OTHER OBSERVATIONS

Note any other pertinent site observations:

Inspector Name: Tom Davis

Title: Sr. Planner

Signature: [Signature]

Date: 9/18/09

City of Salem Inspection Report

Mansell Field at 50 Proctor Street, Salem, MA

FENCING

Is temporary fencing intact? Yes / No

If no, describe conditions and corrective actions taken:

Dpw to repair segment that has come down

SITE ACTIVITY

Are there any signs of unauthorized activity within the fenced area? Yes / No

If yes, describe conditions and corrective actions taken:

OTHER OBSERVATIONS

Note any other pertinent site observations:

Inspector Name: Ton DeBruin

Title: Sr. Planner

Signature: [Signature]

Date: 9/15/19

City of Salem Inspection Report

Mansell Field at 50 Proctor Street, Salem, MA

FENCING

Is temporary fencing intact? Yes ☒ No

If no, describe conditions and corrective actions taken:

Open to repair open fence segment.

SITE ACTIVITY

Are there any signs of unauthorized activity within the fenced area? Yes ☒ No

If yes, describe conditions and corrective actions taken:

OTHER OBSERVATIONS

Note any other pertinent site observations:

Inspector Name: Tom Devine

Title: Sr. Planner

Signature: [Signature]

Date: 10/3/10

City of Salem Inspection Report

Mansell Field at 50 Proctor Street, Salem, MA

FENCING

Is temporary fencing intact? Yes ☒ No

If no, describe conditions and corrective actions taken:

Open to fix missing fence segment

SITE ACTIVITY

Are there any signs of unauthorized activity within the fenced area? Yes ☒ No

If yes, describe conditions and corrective actions taken:

OTHER OBSERVATIONS

Note any other pertinent site observations:

Inspector Name: Tom Deane
Signature: [Signature]

Title: Sr. Planner
Date: 10/10/19

City of Salem Inspection Report

Mansell Field at 50 Proctor Street, Salem, MA

FENCING

Is temporary fencing intact? Yes / No

If no, describe conditions and corrective actions taken:

UPS to repair fence gap

SITE ACTIVITY

Are there any signs of unauthorized activity within the fenced area? Yes / No

If yes, describe conditions and corrective actions taken:

OTHER OBSERVATIONS

Note any other pertinent site observations:

Inspector Name:

Tom Devine

Title:

Sr Planner

Signature:

[Signature]

Date:

10/15/19

City of Salem Inspection Report

Mansell Field at 50 Proctor Street, Salem, MA

FENCING

Is temporary fencing intact? Yes ☒ No

If no, describe conditions and corrective actions taken:

DPS to repair fence

SITE ACTIVITY

Are there any signs of unauthorized activity within the fenced area? Yes / ☒ No

If yes, describe conditions and corrective actions taken:

OTHER OBSERVATIONS

Note any other pertinent site observations:

Inspector Name: Tom Derr

Title: Sr. Planner

Signature: [Signature]

Date: 10/20/19

City of Salem Inspection Report

Mansell Field at 50 Proctor Street, Salem, MA

FENCING

Is temporary fencing intact? Yes / No

If no, describe conditions and corrective actions taken:

Contractor to repair fence

SITE ACTIVITY

Are there any signs of unauthorized activity within the fenced area? Yes / No

If yes, describe conditions and corrective actions taken:

OTHER OBSERVATIONS

Note any other pertinent site observations:

Inspector Name:

Tom DeMa

Title:

Sr Planner

Signature:

[Signature]

Date:

4/1/19

City of Salem Inspection Report

Mansell Field at 50 Proctor Street, Salem, MA

FENCING

Is temporary fencing intact? ☒ Yes / ☐ No

If no, describe conditions and corrective actions taken:

SITE ACTIVITY

Are there any signs of unauthorized activity within the fenced area? Yes / ☒ No

If yes, describe conditions and corrective actions taken:

OTHER OBSERVATIONS

Note any other pertinent site observations:

Inspector Name: Tom Deane

Signature: [Signature]

Title: Sr. Planner

Date: 4/8/19

1. This report has been prepared on behalf of and for the exclusive use of the Client and is subject to and issued in accordance with the Agreement and the provisions thereof. Documents provided on this project shall not, in whole or in part, be disseminated or conveyed to any other party, nor used by any other party without the prior written consent of Tighe & Bond. Reuse of documents by Client or others without Tighe & Bond's written permission and mutual agreement shall be at the user's sole risk, without liability on Tighe & Bond's part and Client agrees to indemnify and hold Tighe & Bond harmless from all claims, damages, and expenses, including attorney's fees, arising out of such unauthorized use or reuse.
2. Tighe & Bond acknowledges and agrees that, subject to the Limitations set forth herein and prior written approval by Tighe & Bond, this report may be provided to specific financial institutions, attorneys, title insurers, lessees and/or governmental agencies identified by Client at or about the time of issuance of the report in connection with the conveyance, mortgaging, leasing, or similar transaction involving the real property which is the subject matter of a report and any work product. Use of this report for any purpose by any persons, firm, entity, or governmental agency shall be deemed acceptance of the restrictions and conditions contained therein, these Limitations and the provisions of Tighe & Bond's Agreement with Client. No warranty, express or implied, is made by way of Tighe & Bond's performance of services or providing an environmental site assessment, including but not limited to any warranty with the contents of a report or with any and all work product.
3. Tighe & Bond performed the subsurface investigation in accordance with our Agreement (including any stated scope and schedule limitations) and used the degree of care and skill ordinarily exercised under similar circumstances by members of the profession practicing in the same or similar locality. The objective of a subsurface investigation is to evaluate the presence or absence of contamination. Where access was denied or conditions obscured, Tighe & Bond provides no opinion or report on such areas. The subsurface investigation may not identify all contaminated media as our scope may be limited to certain locations within a site or due to geologic variability, contamination variability, seasonal conditions, obstructions such as buildings, utilities, or other site features and/or other unknown conditions. Tighe & Bond performed the subsurface investigation using reasonable methods to access and identify the presence of contaminated media. Therefore, additional contaminated media may be present at the site and may be discovered during development and site work, so an appropriate cost contingency should be carried by the Client based on their risk tolerance. Tighe & Bond also makes no opinion or report of contamination that may have migrated off site unless off-site investigations are specifically including in the scope of services.
4. Findings, observations, and conclusions presented in this report, including but not limited to the extent of any subsurface explorations or other tests performed by Tighe & Bond, are limited by the scope of services outlined in the Agreement, which may establish schedule and/or budgetary constraints for an environmental assessment or phase thereof. Furthermore, while it is anticipated that each assessment will be performed in accordance with generally accepted professional practices and applicable standards (such as ASTM, etc.) and applicable state and Federal regulations, as may be further described in the report and/or the Agreement, Tighe & Bond does not assume responsibility for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of its services.

5. In preparing this report, Tighe & Bond, Inc. may have relied on certain information provided by governmental agencies or personnel as well as information and/or representations provided by other persons, firms, or entities, and on information in the files of governmental agencies made available to Tighe & Bond at the time of the site assessment. To the extent that such information, representations, or files may be inaccurate, missing, incomplete or not provided to Tighe & Bond, Tighe & Bond is not responsible. Although there may be some degree of overlap in the information provided by these various sources, Tighe & Bond does not assume responsibility for independently verifying the accuracy, authenticity, or completeness of any and all information reviewed by or received from others during the course of the site assessment.
6. The assessment presented is based solely upon information obtained or received prior to issuance of the report. If additional environmental or other relevant information is developed at a later date, Client agrees to bring such information to the attention of Tighe & Bond promptly. Upon evaluation of such information, Tighe & Bond reserves the right to recommend modification of this report and its conclusions. In addition, dense forested areas on the site created some visual and access limitations during the site reconnaissance.
7. Emerging contaminants, including per- and poly-fluorinated alkyl substances (PFAS), are hazardous materials or mixtures (including naturally occurring or manmade chemical, microbial, or radiological substances) that are characterized by having a perceived or real threat to human health, public safety, or the environment for which there are no published health standards or guidelines and there is insufficient or limited available toxicological information or toxicity information that is evolving or being re-evaluated; or there is not significant new source, pathway, or detection limit information. The state of these compounds is constantly being updated and therefore, Tighe & Bond cannot be held liable for not including these compounds in the list of analytes that are analyzed when our services are performed. Unless otherwise specified, Tighe & Bond will only analyze for compounds ordinarily included under similar circumstances by members of the profession practicing in the same or similar locality. Tighe & Bond will not be liable for not including these or any other compounds in the list of target analytes if information regarding their use is not made available by current or former operators/owners at the facility being evaluated. We will also not be liable for not analyzing for the presence of an emerging contaminant, even if that compound is detected at a later date.
8. Tighe & Bond makes no guarantee or warranty that this report (if provided to a regulatory agency) will pass a regulatory audit/review. The Licensed Site Professional (LSP), Licensed Environmental Professional (LEP), Professional Geologist (PG), Professional Engineer (PE) or other relevant professional licensure and the applicable regulatory reviewing agency may have differences of opinion on aspects of (and approaches to) the assessment, remediation, risk evaluation or closure and the regulatory agency may request additional information, sampling data, analysis and/or remediation. Such differences of opinion will not be interpreted to imply that Tighe & Bond's services were not performed competently and in accordance with the standard of care. If additional investigations, response action evaluations, or discussions are needed following a regulatory audit/review, Tighe & Bond can provide these services under a separate Agreement.

9. If an Opinion of Probable Construction Costs (OPCC) is provided, Tighe & Bond has no control over the cost or availability of labor, equipment or materials, or over market conditions or the contractor's method of pricing, and that the opinion of probable costs is made on the basis of Tighe & Bond's professional judgment and experience is based on currently available information. Tighe & Bond makes no guarantee nor warranty, expressed or implied, that the actual costs of the construction work will not vary from the OPCC.