AECOM

Site Investigation Report

Route 37 / I-295 Reconstruction

RI Department of Transportation

Project number: 60680132

November 22, 2022

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Quality information

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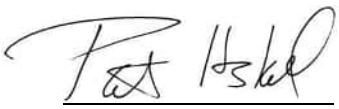			
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Revision History

Revision	Revision date	Details
A	09/29/2022	RIDOT Draft
B	11/23/2022	Final

Distribution List

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1. Introduction

AECOM, in cooperation with Aetna Bridge Company (Aetna) prepared this Site Investigation Report (SIR) on behalf of the Rhode Island Department of Transportation (RIDOT) in support of the Interstate 295 (I-295) / Route 37 interchange reconstruction project. This environmental site assessment was performed to guide management of environmental media during performance of construction activities and to meet the requirements for an environmental site investigation given in Section 1.8.8 of the Rhode Island Remediation Regulations (RIDEM, 2022). A SIR checklist is attached as **Appendix A**.

1.1 Site and Project Description

The project area is limited to the portion of the RIDOT right-of-way (ROW) on I-295 from Route 6 interchange (northern extent) to the Route 37 interchange (southern extent), including the following areas (Site):

- The northbound and southbound lanes, median, and shoulders of I-295 extending approximately 2,000 feet north and south of Route 37;
- The on and offramp shoulders and infield areas of the Route 37 / I-295 interchange;
- The portion of Route 37 west of Route 5; and
- Portions of I-295 Northbound, and the associated shoulders and median areas between the Route 37 / I-295 interchange and the offramp from I-295N to Route 6.

The project area is depicted on **Figure 1.**

Construction activities with the potential to disturb soil in these areas will consist of the following:

- Excavation to a depth of approximately five feet below ground surface (bgs) to install spread footings for bridges associated with the Route 37 crossings of the Washington Secondary Multi-Use Trail, Cranston Street, and I-295 and the flyover from Route 37 East to I-295 North;
- Shallow excavation (less than 2 feet) and regrading associated with the onramps and offramps at the Route 37 / I-295 interchange;
- Shallow excavation (less than 2 feet) between Phenix Avenue and Route 6, associated with roadway expansion to allow the addition of a travel lane to I-295 Northbound; and
- Excavation to a depth of up to six feet bgs to allow construction of stormwater detention basins, infiltration basins, and bioswales in accordance with the Rhode Island Stormwater Management, Design, and Installation Rules (250-RICR-150-10-8) and the Rhode Island Stormwater Design and Installation Standards Manual (RIDEM, 2015).

Groundwater is not expected to be encountered during performance of this work, and therefore direct assessment of groundwater was not performed as part of this investigation.

1.2 Regulatory Status

During performance of the site investigation, soil samples were collected and analyzed for potential constituents of concern. The first such samples were collected during test pitting performed in support of stormwater management design. In two samples collected to assess soil quality at depths below planned infiltration basins, metals concentrations were detected at concentrations slightly greater than the Residential Direct Exposure Criteria. As a result of these detections, a Notice of Release of Hazardous Materials (NOR) was submitted to the Rhode Island Department of Environmental Management (RIDEM) on July 11, 2022. A copy of the Notice of Release is provided in **Appendix B**. Additional information regarding the nature of soil impacts at the site are provided in Sections 2.0 and 3.0.

1.3 Prior Reports

Following submittal of the NOR, AECOM performed a Phase I environmental site assessment of the project site to identify potential environmental conditions associated with the work. A copy of the Phase I Modified Site Assessment is provided as **Appendix C** to this report. The Phase I Environmental Site Assessment identified two de minimis environmental conditions in connection with the Site. These conditions were related to the use of the Site for motor vehicle transportation, which makes it likely that incidental spills associated with vehicles travelling on the roadways have occurred, and the former use of the Washington Secondary Bike Trail, located east of I-295 and Route 37, as a railroad track, and thus it is possible that residual impacted soils commonly associated with railroads (petroleum hydrocarbons, PAHs, and metals) may be present in the vicinity of the bike path. One property located on Scituate Ave adjacent to I-295 southbound contained a trucking operation that was identified as a recognized environmental condition (REC) for the Site. However, because construction activities in this area are limited to the expansion of pavement on I-295N, impacts from this property are unlikely to have affected soil to be managed as part of the project. No historical RECs or controlled RECs were identified in connection with the Site, and therefore focused assessment for potential contamination from this off-site property was not considered necessary in the performance of the site investigation. Other similar sites identified in environmental records and databases in the vicinity of the Site are neither located upgradient nor immediately adjacent to the project site.

1.4 Environmental Setting

The Site is located on a highway right-of-way and is abutted by residential, commercial, and industrial properties, including recreational use public spaces, such as the Washington Secondary Trail, upon which a portion of the project work will be completed. The site is not subject to any Environmental Land Usage Restrictions, and therefore, Residential Direct Exposure Criteria apply to soil at the Site. The Site is in area that is classified as a GA groundwater area, where use of groundwater as untreated domestic water supply is possible. Therefore, GA Leachability Criteria apply to soil at the site, and GA Groundwater Objectives apply to groundwater at the Site. Depth to groundwater at the site is variable with shallow groundwater in low-lying areas and depths greater than 10 feet expected at higher elevations.

Surface water bodies at the project site include the following:

- Ralph's Pond, an impoundment of Meshanticut Brook, a Class B freshwater stream and a tributary of the Pawtuxet River. Ralph's Pond provides stormwater retention for I-295 and is bisected by I-295 Northbound between the Route 37 / I-295 interchange and Phenix Avenue.
- Simmons Brook crosses under I-295 in Johnston, north of the Plainfield Pike (Route 14) interchange and east (downstream) of the Simmons Lower Reservoir. Simmons Brook is a Class B freshwater stream and a tributary of the Pocasset River.
- Dry Brook crosses under I-295 in Johnson at Central Avenue. Dry Brook is a Class B freshwater stream and a tributary of the Pocasset River.

Two water supply wells are located east of the project site where Route 12 (Scituate Avenue) crosses I-295. These water supply wells serve the Camp Champlin scout camp. The project site is outside the wellhead protection area for these wells.

Several wetland areas are present at the project site, including the following:

- Low-lying areas and infiltration basins associated with the I-295 / Route 37 interchange and adjacent to Ralph's Pond,
- Marginal wetlands associated with Simmons Brook and Simmons Lower Reservoir, and

Marginal wetlands associated with Dry Brook.

2. Site Investigation Activities

Site investigation activities were performed at the project site to assess soil quality in the areas where construction that disturbs environmental media is planned. The construction activities that involve excavation of soil include the following excavation activities:

- Excavation of spread footings, which are expected to extend to a depth of four feet below ground surface, will be performed to support construction of the following overpasses:
  - Route 37 overpass above I-295,
  - Route 37 East onramp flyover to I-295 North,
  - Route 37 overpass above Cranston Street; and
  - Route 37 overpass above the Washington Secondary Trail.
- Excavation of shallow soil for roadway expansion between Phenix Avenue in Cranston and Central Avenue in Johnston.
- Excavation of infiltration basins in the following locations:
  - I-295 median north of the Route 37 overpass,
  - I-295 median south of the Route 37 overpass,
  - Infield of the offramp from I-295 North to Route 37 west,
  - Shoulder of I-295 North south of Phenix Avenue,
  - I-295 median between Scituate Avenue in Cranston (Route 12) and Plainfield Pike,
  - I-295 median between Plainfield Pike and Scituate Avenue in Johnston, and
  - I-295 median south of Central Avenue in Johnston.

Direct assessment of groundwater was not performed as part of this investigation, because groundwater is not expected to be encountered during construction.

2.1 Test Pits

On April 25 and 27, 2022, Aetna advanced a series of test pits under AECOM supervision for use in evaluation of drainage and assessment of soil quality. Test pit locations are shown on **Figure 2 through 4**. An AECOM inspector logged soil types and collected two soil samples from each test pit for analysis of typical potential highway contaminants, which included volatile organic compounds (VOCs), total petroleum hydrocarbons (TPH), semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), total metals, and chlorinated pesticides. Samples were also analyzed for grain size and double-ring infiltrometer tests performed to develop design parameters for construction of infiltration basins. Soil samples for analytical testing were collected from depths above the water table to characterize soil to be excavated for construction of the infiltration basin and from depths below the planned basins for evaluation of soil quality that would remain following construction to ensure that the infiltration basin was not being constructed atop soil sufficiently contaminated that it might generate a groundwater plume. Test pit photo logs are presented in **Appendix D**. The results of soil quality testing are presented in Section 3.1. The results of grain size analysis and infiltration test are being incorporated into the stormwater design.

2.2 Soil Borings

Between May 24 and June 18, 2022 and between October 2 and 13, 2022, AECOM supervised the performance of a geotechnical soil boring program. Geotechnical soil borings were installed in the vicinity of highway overpasses, bridges, and highway signs for purposes of design of spread footings for the structures. Soil boring locations are shown on **Figure 2**. As part of this effort, soil samples were collected from the interval expected to be excavated for the footings. Soil samples were analyzed for VOCs, SVOCs, TPH, PCBs, pesticides, and metals, and selected samples were analyzed for additional Rhode Island Resource Recover Corporation (RIRRC) waste disposal parameters to

enable pre-characterization for disposal, if necessary. Soil samples for VOC analysis were collected as grab samples from the interval in the top four feet with the highest photoionization detector response during pre-clearing of the soil boring. Soil samples for other analyses were composited through the top two to four feet of depth, the former of which is the depth to which excavation will be performed for highway lane expansion and the latter of which is the depth at which spread footings for bridges and retaining walls are expected to be constructed. Boring logs for completed borings are presented in **Appendix E**. Results are discussed in Section 3.0.

2.3 Hand Augers

Between June 14 and 15, 2022 AECOM advanced a series of hand auger borings alongside the I-295 Northbound pavement in the areas where excavation for expansion of the roadway surface is planned. Hand auger locations are shown on **Figure 2 through 4**. Samples were collected from a depth of zero to two feet to characterize soil that would be excavated for highway construction. Soil samples were analyzed for VOCs, SVOCs, TPH, PCBs, pesticides, and metals. Soil samples for VOC analysis were collected as grab samples from the interval with the highest photoionization detector response during drilling. Soil samples for other analyses were composited through the top two feet of depth. Results are discussed in Section 3.0.

3. Investigation Findings

Results of the soil investigation indicate minimal anthropogenic impacts across the project site. While metals were detected in three samples at concentrations slightly above Residential Direct Exposure Criteria (R DEC) and TPH was detected at concentrations below the R DEC in all samples analyzed, VOCs not suspected of being laboratory contaminants (e.g., acetone and methylene chloride) were detected in only 1 of 37 samples analyzed, and other anthropogenic organic chemicals were detected in 9 of 24 samples analyzed with PAH concentrations exceeding R DEC in only one sample. Analytical results are summarized in Tables 1 to 3, and laboratory analytical reports are provided in **Appendix F**. Analytical tables compare results to the R DEC, the GA Leachability Criterion (LC), and the Industrial/Commercial DEC (I/C DEC). The GA LC is applicable to the site, because the site is located in a GA drinking water area, and the R DEC is applicable despite the bulk of the site being a limited access highway, because the site is not controlled under an Environmental Land Usage Restriction (ELUR) that restricts site use to non-residential activities. Soil containing concentrations in excess of either of these values will be treated as RIDEM-jurisdictional soil in the project soil management plan.

3.1 Test Pits

Analytical results for soil samples collected from stormwater test pits are presented in **Table 1**. Concentrations of metals in two samples exceeded the R DEC. All other results were in compliance with applicable RI Method 1 Remedial Soil Objectives. TPH was detected in all of the test pit soil quality analytical samples at concentrations ranging from 15.1 to 487 mg/kg.

Lead was detected in one sample collected from test pit TP-3 at a depth of 6 to 7 feet below ground surface (bgs) at a concentration of 151 milligrams per kilogram (mg/kg), which is slightly above the R DEC of 150 mg/kg. TPH concentrations in this sample were 165 mg/kg, suggesting that the lead may be a residue from the historic use of leaded gasoline. This sample was collected from below the planned depth of excavation for an infiltration basin to be constructed in the median of I-295, immediately north of the Route 37 overpass.

Beryllium was detected in one sample collected from test pit TP-6 at a depth of 6 to 9.5 feet at a concentration of 2.1 mg/kg, which is above the R DEC of 1.5 mg/kg. The sample was collected in native soil below the planned depth of excavation for an infiltration basin to be constructed in the median of I-295, north of the Plainfield Pike (Route 14) interchange. TPH and PAHs were also detected at low concentrations in this sample, but no other evidence of contamination was observed. Furthermore, the concentration of beryllium detected is not unusual for natural soils in southern New England (Brown and Thomas, 2014, e.g.). Based on the depth of the sample, the relatively low concentration of beryllium in the sample, the absence of other evidence of contamination, and the absence of a likely source, it is suspected that the result represents a background condition. However, given the limited scope of the project, a background study to demonstrate compliance with RI Remediation Regulations is not planned at this time.

Elevated detection limits for arsenic and beryllium were obtained at test pit TP-5, and elevated detection limits for PAHs were obtained at test pit TP-2. The latter results were due to the presence of TPH at concentrations slightly below the default R DEC. While neither of these conditions is inferred to indicate jurisdictional soil in these areas, additional samples of excavated material from these areas will be analyzed for these parameters prior to designating material for reuse offsite or as near-surface soil at the site.

3.2 Soil Borings

Analytical results for soil samples collected from geotechnical borings are presented in **Table 2**. Concentrations of arsenic in one sample and TPH in another sample exceeded the R DEC. All other results were in compliance with applicable RI Remediation Regulation standards. TPH was detected in each of the soil boring soil quality analytical samples at concentrations ranging from 22.8 to 133 mg/kg.

Arsenic was detected in a sample collected at a depth of 0 to 4 feet bgs at a concentration of 12.8 mg/kg, which is above the R DEC of 7 mg/kg. This sample was collected from the planned depth of excavation for a spread footer for the Route 37 crossing of the Washington Secondary Trail. Soil

excavated from the Washington Secondary Trail, which is a former railroad bed, will be managed as jurisdictional.

TPH were detected in a sample collected from soil boring SB09 at a depth of 0 to 2 feet at a concentration of 644 mg/kg, which is above the default R DEC and GA PMC of 500 mg/kg. The RI Remediation Regulations (Sections 1.92.B.4.b.(1)(BB) and 1.92.B.4.b.(2)(BB) allow for use of a 1,000 mg/kg criterion for TPH, provided that short-term risks are adequately managed. Given that this sample is representative of soil on a restricted-access highway right-of-way, AECOM believes it appropriate to apply a 1,000 mg/kg R DEC for this location. Similarly, given the absence of VOCs in the sample which indicates that the TPH is comprised of a less soluble fraction, AECOM believes it is appropriate to apply a 1,000 mg/kg GA LC for this location. The use of the 1,000 mg/kg TPH criterion is discussed further in Section 3.5 below.

3.3 Hand Augers

Analytical results for soil samples collected from hand auger borings are presented in **Table 3**. Concentrations of beryllium in one sample and PAHs in another exceeded R DEC. All other results were in compliance with applicable RI Remediation Regulation standards. TPH was detected in all of the hand auger boring soil quality analytical samples at concentrations ranging from 37.3 to 238 mg/kg.

Beryllium was detected at a concentration of 2.02 mg/kg in a composite sample collected at a depth of 1.5 feet bgs from two borings advanced within the infield of the Route 37 interchange to the east of I-295 North in an area designated for roadway expansion as part of the interchange reconstruction. While this concentration could represent a background condition, a background study to demonstrate compliance with RI Remediation Regulations is not planned at this time.

The polycyclic aromatic hydrocarbons (PAHs) benzo(a)pyrene and chrysene were detected in a composite sample collected at a depth of one foot bgs at concentrations above the R DEC of 0.4 mg/kg for these compounds. This sample was collected from the shoulder of I-295 North in an area of roadway expansion planned north of the Phenix Avenue overpass.

3.4 Data Quality Assessment / Data Useability Evaluation

Prior to evaluation of results, laboratory analytical results were reviewed for data quality. Summary data quality information is included in the laboratory reports provided in **Appendix F**. Data quality non-conformances are summarized and discussed below.

- There were minor chain-of-custody (COC) issues, such as not noting sample preservatives on some COCs. Samples were collected in laboratory-supplied glassware, so preservative information was provided on the sample labels. Sample custody was maintained throughout for all sample packages, and these minor non-conformances have no effect on data quality.
- Laboratory continuing calibration verification checks, laboratory control samples and laboratory control sample duplicates, and matrix spike and matrix spike duplicate were out-of-conformance for some samples. However, the results for constituents detected on site were not affected, and thus data quality was not impacted by these non-conformances.
- In some instances, samples arrived at the laboratory at temperatures above default acceptance criteria. However, these samples were delivered to the laboratory on the same day of collection and were still in the process of being chilled and therefore laboratory data quality was not affected.
- Two VOC samples were analyzed slightly outside holding time (RW-1 [2-4] and B-109-2'). The results for these samples were all non-detect. The laboratory reporting limits are flagged as estimated values due to this non-conformance.
- Matrix effects were apparent in some cases, which resulted in elevated detection limits for certain analytes in specific samples. At the two locations (TP-2 and TP-5) where elevated detection limits exceed RIDEM Method 1 Standards, the results are highlighted in **Tables 1**.

The above non-conformances do not significantly affect data usability. However, the elevated detection limits for PAHs at TP-2 will be considered in evaluation of reuse of soil generated in that

area. The elevated detection limits for arsenic and beryllium at TP-5 are not expected to affect soil management, as design changes have eliminated the need to perform excavation in that area.

3.5 Evaluation of Impacts

Anthropogenic impacts to soil in the project corridor appear to be limited. PAH concentrations above R DEC were detected in shallow soil in the area north of Phenix Avenue. The source of these impacts is assumed to be either motor oil runoff from the asphalt road surface or migration of particles from petroleum-based road materials. It is possible that such impacts are present elsewhere in the project corridor, but no other PAH concentrations approaching the R DEC were detected during the investigation program. TPH were also detected at a concentration of 644 mg/kg in shallow soil in the median located south of Scituate Avenue and are believed to be motor oil runoff. The SMP for the site will address potential PAH and TPH impacts both in the area of known impacts and in the evaluation of soil excavated as part of the construction program. Soil with concentrations of an analyte exceeding the R DEC or GA LC will be treated as jurisdictional soil in the soil management plan for the project.

As discussed in Section 3.2, a R DEC and GA PMC of 1,000 mg/kg is proposed for TPH on the Route 295 corridor during this project. This criterion is proposed, consistent with Sections 1.9.2 B.4.b(1)(BB) and 1.9.2 B.4.b(2)(BB), based on the limited potential for exposure on the restricted access highway and the absence of more soluble volatile petroleum constituents in samples with elevated TPH concentrations. This criterion is not proposed for management of soil in the area of the Washington Secondary Trail, which is used for recreational purposes, or in the area of Cranston Street, where pedestrian traffic is not restricted.

Lead concentrations marginally above the R DEC were detected in soil at depths of greater than 6 feet bgs in the I-295 median in the area north of Route 37. The source of the lead is unknown but could be associated with historic runoff of leaded gasoline from the roadway. It is possible that such impacts are present elsewhere in the project corridor, but no other lead concentrations approaching the R DEC were detected during the investigation program. The SMP will address potential lead impacts during construction of the stormwater detention basin in this area and in the evaluation of soil excavated as part of the construction program.

Arsenic concentrations in one sample exceeded the 7 mg/kg R DEC. An arsenic concentration of 12.8 mg/kg was detected in shallow soil in sample B105/B106 (0-4), which is located on the Washington Secondary Trail. This detection may represent impacts from former railroad operations in this area. Arsenic was not detected at concentrations greater than 15 mg/kg. While the average arsenic concentration is well below 7 mg/kg, hundreds of samples would be required for a site the size of the project site to calculate an average concentration in accordance with RI Remediation Regulations Section 1.13.3.A. Therefore, soil excavated for construction along the Washington Secondary Trail will be treated as jurisdictional.

An assessment of beryllium concentrations was performed to develop a site-specific statistical determination of background concentrations, using analytical data for which results and detection limits did not exceed the 1.5 mg/kg R DEC. There were 20 such results evaluated using a background threshold value test in ProUCL v. 5.1. The results of the analysis indicated that there were insufficient observations to calculate a background value based on the number of samples and the statistical distribution of values. Therefore, soil with beryllium concentrations in excess of the R DEC will be treated as jurisdictional.

Beryllium concentrations greater than the R DEC were observed in two locations:

- in shallow soil in a portion of the Route 37 / I-295 interchange in area where the roadway will be widened to accommodate the new interchange, and
- in deep soil in the area where a bioswale will be constructed north of the Plainfield Pike.

Aside from the TPH result discussed above, analytical results obtained during the site investigation were below default GA LC. While metals were not analyzed by SPLP at most locations, metals concentrations were generally consistent with background levels and, thus, evaluation of leachability was not considered necessary. Therefore, unless differing conditions are encountered during project construction activities, soils to be managed are not expected to represent a threat to groundwater quality. Given that and the limited impacts overall and because site construction activities will not

extend to the water table, groundwater was not assessed as part of the site investigation. Based on the results presented herein, stormwater that accumulates in site investigation are not expected to represent a contamination hazard. Stormwater management will be performed in accordance with RI stormwater regulations and the RIDEM Stormwater Design and Installation Manual (2015). Impacts are considered immobile and will not affect neighboring properties.

Soil from the I-295 median and shoulder will be treated as non-jurisdictional with the exception of soil in the median, where I-295N is being expanded between the Phenix Avenue and Scituate Avenue overpasses. Soil may be stockpiled and characterized in larger volumes generated as part of construction activities to reassess its regulatory status for reuse.

3.6 Evaluation of Remedial Alternatives and Recommendations

A SMP is being developed to guide handling, characterization, reuse, and disposal of soil excavated during performance of the interchange reconstruction. The SMP will also serve as a Remedial Action Work Plan in accordance with Section 1.10 of the RI Remediation Regulations and will therefore address appropriate management of jurisdictional soil to remain in place in areas where construction will be performed.

Consistent with RIDOT programmatic practices, the scope of the SMP will only address soil to be encountered in construction areas, as the project area will continue its use as a restricted-access highway for the foreseeable future with minimal potential for exposure, and assessment and remediation of the entire highway corridor would be both infeasible and would be addressing impacts that are consistent with normal part highway operations that will continue in the future.

Options for management of jurisdictional soil in conjunction with the construction project include the following:

- No action – leaving impacted soil in place or placing it adjacent to construction areas,
- Excavation and disposal at an off-site facility,
- Excavation and reuse on-site under a clean soil or asphalt cap in support of the construction activities, and
- Excavation and reuse off-site at a property with a RIDEM-approved soil management plan that allows for import of material meeting the characteristics of the soil to be managed.

Of these, the no action alternative will not meet the requirements of the Remediation Regulations and would run the risk of making conditions worse by bringing impacted subsurface soil nearer to the surface. The other alternatives can all meet the requirements of the RI Remediation Regulations and control potential exposure to jurisdictional soil encountered during construction activities. Because impacts to soil are limited and consistent with the current and future use of the site as a highway, reuse on-site is the preferred alternative. This alternative is also the most feasible, as such material will be needed to construct some of the bridge abutments needed as part of this project and will not needlessly utilize limited landfill space. The alternative for excavation and disposal will be retained for excess material and material that does not meet GA LC, if any is encountered, as reuse of such material on the project site would not be consistent with the Remediation Regulations. Excavation and reuse off-site is likely to be less feasible, as it is dependent upon project timing and the presence of a site in need of material consistent with that to be managed on the project. However, it will be retained as an alternative in the SMP subject to RIDEM approval.

The SMP will recommend excavation of shallow jurisdictional soil and capping of deeper jurisdictional soil below a clean soil cap and will allow for reuse of jurisdictional soil beneath asphalt or a clean soil cap.

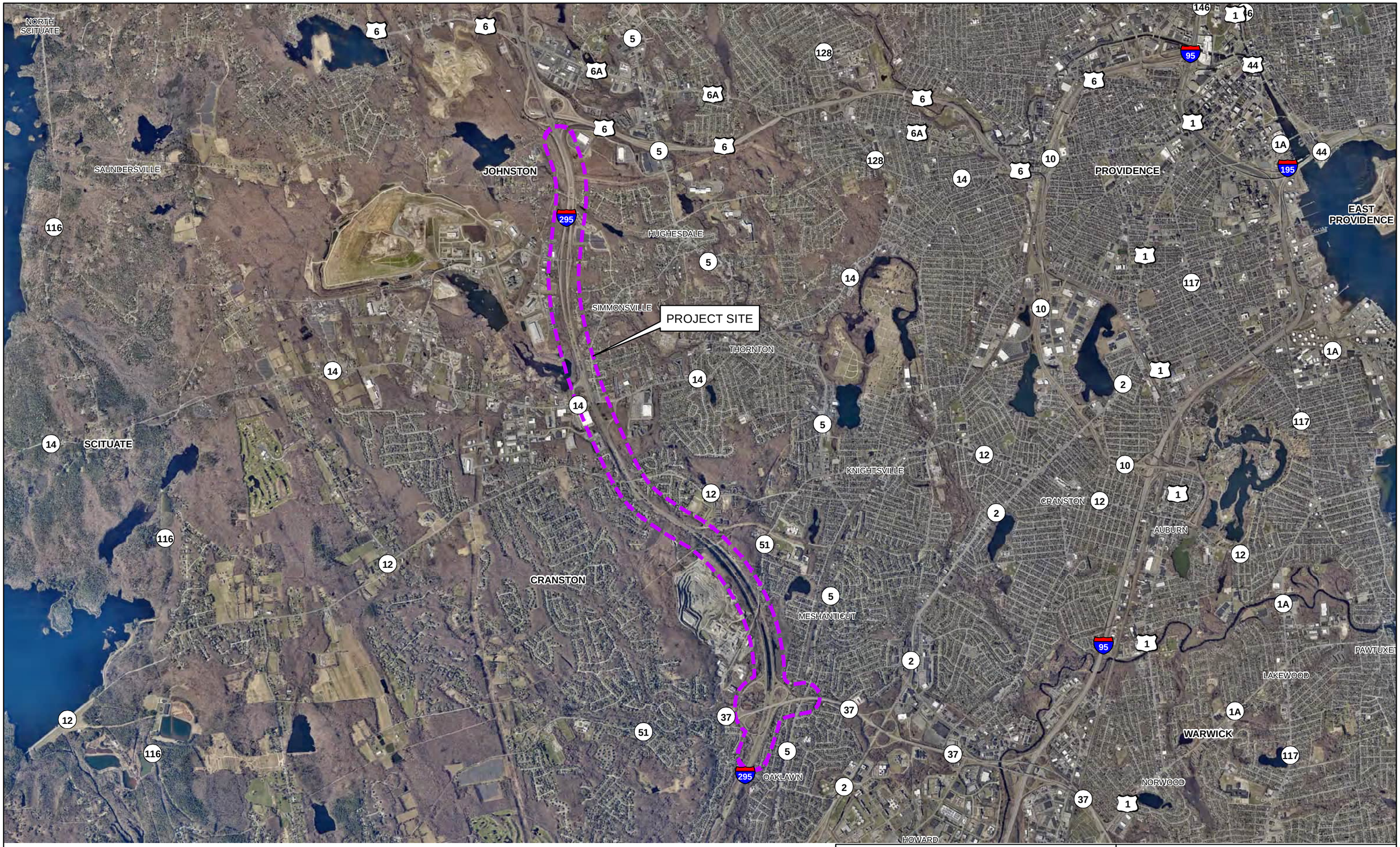
4. References

Brown, C.J. & M.A. Thomas, 2014. Major and trace element geochemistry and background concentrations for soils in Connecticut. Northeastern Geoscience 32: 1-37.

State of Rhode Island Department of Environmental Management (RIDEM), 2015. Rhode Island Stormwater Design and Installation Standards Manual.

State of Rhode Island Department of Environmental Management (RIDEM), 2022. Rules and Regulation for the Investigation and Remediation of Hazardous Materials Releases. 250-RICR-140-30-1.

Figures



AECOM

SOURCE
ORTHOIMAGERY FROM RIGIS, 04/2022.

0 1,750 3,500 Feet

N

ROUTE 37 / I-295 INTERCHANGE RECONSTRUCTION
RI DEPARTMENT OF TRANSPORTATION
CRANSTON & JOHNSTON, RI

DATE: 09/23/2022	DRWN: JB	

FIGURE 1
SITE LOCUS MAP

LEGEND

- GEOTECHNICAL BORING
- HAND AUGER BORING
- TEST PIT

AECOM

SOURCE
ORTHOIMAGERY FROM RIGIS, 04/2022.

0 240 480 Feet

N

ROUTE 37 / I-295 INTERCHANGE RECONSTRUCTION
RI DEPARTMENT OF TRANSPORTATION
CRANSTON & JOHNSTON, RI

DATE: 09/27/2022 | DRWN: JB

FIGURE 2
INVESTIGATION LOCATIONS
ROUTE 37 / I-295 INTERCHANGE AREA

TP-5
PROPOSED SWALE
HA-10
HA-9
HA-8
HA-7
HA-6
HA-5
HA-4
HA-3
TP-4
PROPOSED BASIN
CRANSTON
MESHANTICUT
295
12
5
51

LEGEND
- GEOTECHNICAL BORING
- HAND AUGER BORING
- TEST PIT

SOURCE
ORTHOIMAGERY FROM RIGIS, 04/2022.

0 375 750 Feet

N

ROUTE 37 / I-295 INTERCHANGE RECONSTRUCTION
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FIGURE 3
INVESTIGATION LOCATIONS
I-295N EXPANSION - SOUTHERN AREA

JOHNSTON
HUGHESDALE
SIMMONSVILLE
THORNTON
PROPOSED BASIN
TP-7
SB-9
HA-15
SB-6
HA-14
TP-6
PROPOSED SWALE
HA-13
HA-12
HA-11
6
5
6A
128
295
14

LEGEND
- GEOTECHNICAL BORING
- HAND AUGER BORING
- TEST PIT

SOURCE
ORTHOIMAGERY FROM RIGIS, 04/2022.

0 700 1,400 Feet

N

ROUTE 37 / I-295 INTERCHANGE RECONSTRUCTION
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FIGURE 4
INVESTIGATION LOCATIONS
I-295N EXPANSION - NORTHERN AREA

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Tables

Table 1
Soil Pre-Charcterization Data - Test Pit Samples
Route 37 / I-295 Interchange Project
Cranston/Johnston, Rhode Island

Location	GA Leachability Criteria (GA LC)	Residential Direct Exposure Criteria (DEC)	Industrial Comercial DEC (IC DEC)	Sample ID, Date, and Lab Deliverable ID													
Sample ID				TP-1 (0-6)	TP-1 (6-7)	TP-2 (0-6)	TP-2 (6-7)	TP-3 (0-6)	TP-3 (6-7)	TP-4 (0-6)	TP-4 (6-7)	TP-5 (0-6)	TP-5 (6-7)	TP6 5ft	TP6 9.5ft	TP7 (0-6)	TP7 (6-7)
Sampling Date				4/25/2022	4/25/2022	4/25/2022	4/25/2022	4/25/2022	4/25/2022	4/26/2022	4/26/2022	4/26/2022	4/26/2022	4/27/2022	4/27/2022	4/27/2022	4/27/2022
Lab Report Number				J4157-1		J4157-1		J4157-1		J4157-1		J4157-1		J4175-1		J4175-1	
TPH (mg/kg)																	
TPH	500 / 1,000*	500 / 1,000*	2,500	**139**	**487**	**435**	**487**	**185**	**165**	**62.3**	**44.1**	**48.5**	**49.9**	**78.2**	**36.3**	**31.7**	**15.1**
VOCs (mg/kg)																	
Acetone	NE	7,800	10,000	< 0.0487	< 0.0394	< 0.00789	< 0.115	< 0.0581	< 0.0355	< 0.0347	< 0.0356	**0.157**	**0.0472**	< 0.0412	< 0.0346	**0.0555**	< 0.0314
Methylene Chloride	NE	45	760	< 0.00975	< 0.00788	**0.0221**	**0.0237**	< 0.0116	< 0.00710	**0.00951**	**0.0119**	**0.0190**	**0.0152**	**0.0124**	**0.00720**	**0.0145**	**0.0102**
Total Chlorinated VOCs	NE	NE	NE	ND	ND	**0.0221**	**0.0237**	ND	ND	**0.00951**	**0.0119**	**0.0190**	**0.0152**	**0.0124**	**0.0072**	**0.0145**	**0.0102**
Total VOCs	NE	NE	NE	ND	ND	**0.0221**	**0.0237**	ND	ND	**0.00951**	**0.0119**	**0.176**	**0.0624**	**0.0124**	**0.0072**	**0.0700**	**0.0102**
PAHs (mg/kg)																	
Acenaphthene	NE	43	10,000	< 0.0823	< 0.186	< 0.416	< 0.978	**0.0977**	< 0.318	< 0.0708	< 0.0664	< 0.0691	< 0.0727	< 0.0730	< 0.0834	< 0.0733	< 0.0710
Anthracene	NE	35	10,000	< 0.0823	< 0.186	< 0.416	< 0.978	**0.128**	< 0.318	< 0.0708	< 0.0664	< 0.0691	< 0.0727	**0.170**	< 0.0834	< 0.0733	< 0.0710
Benzo(a)anthracene	NE	0.9	7.8	< 0.0823	< 0.186	< 0.416	< 0.978	**0.275**	**0.324**	< 0.0708	< 0.0664	< 0.0691	< 0.0727	**0.4366**	< 0.0834	< 0.0733	< 0.0710
Benzo(a)pyrene	240	0.4	0.8	< 0.0823	< 0.186	< 0.416	< 0.978	**0.211**	< 0.318	< 0.0708	< 0.0664	< 0.0691	< 0.0727	**0.394**	< 0.0834	< 0.0733	< 0.0710
Benzo(b)fluoranthene	NE	0.9	7.8	< 0.0823	< 0.186	< 0.416	< 0.978	**0.218**	< 0.318	< 0.0708	< 0.0664	< 0.0691	< 0.0727	**0.289**	< 0.0834	< 0.0733	< 0.0710
Benzo(g,h,i)perylene	NE	0.8	10,000	< 0.0823	< 0.186	< 0.416	< 0.978	**0.124**	< 0.318	< 0.0708	< 0.0664	< 0.0691	< 0.0727	**0.231**	< 0.0834	< 0.0733	< 0.0710
Benzo(k)fluoranthene	NE	0.9	78	< 0.0823	< 0.186	< 0.416	< 0.978	**0.212**	< 0.318	< 0.0708	< 0.0664	< 0.0691	< 0.0727	**0.379**	< 0.0834	< 0.0733	< 0.0710
Chrysene	NE	0.4	780	< 0.0823	< 0.186	< 0.416	< 0.978	**0.260**	< 0.318	< 0.0708	< 0.0664	< 0.0691	< 0.0727	**0.379**	< 0.0834	< 0.0733	< 0.0710
Dibenzo(a,h)anthracene	NE	0.4	0.8	< 0.0823	< 0.186	< 0.416	< 0.978	< 0.0754	< 0.318	< 0.0708	< 0.0664	< 0.0691	< 0.0727	**0.0801**	< 0.0834	< 0.0733	< 0.0710
Fluoranthene	NE	20	10,000	< 0.0823	< 0.186	< 0.416	< 0.978	**0.555**	**0.686**	< 0.0708	**0.0694**	< 0.0691	< 0.0727	**0.778**	**0.993**	< 0.0733	< 0.0710
Indeno(1,2,3-cd)pyrene	NE	0.9	7.8	< 0.0823	< 0.186	< 0.416	< 0.978	**0.116**	< 0.318	< 0.0708	< 0.0664	< 0.0691	< 0.0727	**0.22**	< 0.0834	< 0.0733	< 0.0710
Phenanthrene	NE	40	10,000	< 0.0823	< 0.186	< 0.416	< 0.978	**0.433**	**0.437**	< 0.0708	< 0.0664	< 0.0691	< 0.0727	**0.382**	< 0.0834	< 0.0733	< 0.0710
Pyrene	NE	13	10,000	< 0.0823	< 0.186	< 0.416	< 0.978	**0.418**	**0.534**	< 0.0708	< 0.0664	< 0.0691	< 0.0727	**0.634**	**0.874**	< 0.0733	< 0.0710
bis(2-Ethylhexyl)phthalate	NE	46	410	< 0.206	< 0.466	< 1.040	< 2.450	< 0.189	< 0.795	< 0.177	< 0.166	< 0.342	< 0.182	< 0.183	< 0.209	**1.39**	< 0.178
Total PAHs	NE	NE	NE	ND	ND	ND	ND	**3.048**	**1.981**	ND	**0.0694**	ND	ND	**4.3727**	**1.867**	ND	ND
Metals (mg/kg)																	
Arsenic	NE	7	7	**2.25**	**2.33**	< 2.33	< 2.79	**1.99**	**2.00**	**1.76**	< 1.62	< 3.15	< 8.10	**2.04**	**2.21**	**2.30**	< 1.63
Barium	NE	5,500	10,000	**23.3**	**30.1**	**23.3**	**32.6**	**43.7**	**38.7**	**26.2**	**22.2**	**17.1**	**16.1**	**13.0**	**16.3**	**15.0**	**18.0**
Beryllium	NE	1.5	1.5	< 0.618	**1.40**	**1.42**	**1.40**	**0.772**	**0.641**	**0.696**	**0.644**	< 2.63	< 2.70	**1.03**	**2.1**	**0.777**	**0.693**
Cadmium	NE	39	1,000	< 0.618	< 0.689	< 0.776	< 0.930	**0.647**	**1.44**	< 0.524	< 0.541	< 1.05	< 2.70	< 0.513	< 0.58	< 0.542	< 0.542
Chromium	NE	1,400	10,000	**9.02**	**11.3**	**13.2**	**10.8**	**11.8**	**11.3**	**9.86**	**6.96**	< 5.26	< 5.40	**4.34**	**4.74**	**3.86**	**7.92**
Copper	NE	3,100	10,000	**8.13**	**10.9**	**60.9**	**9.29**	**508**	**1,100**	**9.88**	**8.41**	< 5.26	< 5.40	**3.86**	**2.31**	**4.56**	**4.53**
Lead	NE	150	500	**6.85**	**7.50**	**14.6**	**8.94**	**68**	**151**	**9.84**	**8.05**	**19.4**	**25.2**	**10.7**	**17.9**	**13.6**	**9.62**
Manganese	NE	390	10,000	**130**	**90.4**	**93.0**	**82.3**	**141**	**86.4**	**141**	**122**	**216**	**310**	**109**	**110**	**126**	**124**
Mercury	NE	23	610	< 0.0585	< 0.0656	< 0.0745	< 0.0892	**0.116**	**0.17**	< 0.0524	< 0.0483	< 0.0478	< 0.0555	< 0.0486	< 0.0576	< 0.0542	< 0.0472
Nickel	NE	1,000	10,000	**6.72**	**8.41**	**8.37**	**6.03**	**12.00**	**16.3**	**7.09**	**5.30**	**2.22**	<5.4	**2.70**	**2.20**	**2.64**	**5.04**
Vanadium	NE	550	10,000	**12.8**	**12.9**	**14.6**	**10.2**	**17.9**	**15.7**	**12.3**	**9.85**	< 7.89	< 8.10	**7.96**	**10.2**	**6.49**	**6.33**
Zinc	NE	6,000	10,000	**24.2**	**38.4**	**60.7**	**29.6**	**261**	**540**	**31.0**	**29.6**	**61.0**	**103**	**39.6**	**57.0**	**51.0**	**41.4**
Metals (mg/L)																	
Copper	NE	NE	NE	NA	NA	NA	NA	**0.137**	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	15	NE	NE	NA	NA	NA	NA	< 0.015	NA	NA	NA	NA	NA	NA	NA	NA	NA
PCBs (mg/kg)																	
Aroclor-1254	NE	NE	NE	**0.0255**	< 0.0282	< 0.0322	< 0.0383	**0.135**	**0.0931**	< 0.0219	< 0.0220	< 0.0208	< 0.0220	< 0.0218	< 0.0244	< 0.0219	< 0.0215
Total PCBs	10	10	10	**0.0255**	ND	ND	ND	**0.135**	**0.0931**	ND	ND	ND	ND	ND	ND	ND	ND
Pesticides (mg/kg)																	
Total Pesticides	NE	NE	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Notes:

This is a summary table. Only those anlaytes that are detected are shown.
Detected analytes presented in **bold text**.

Exceedances of Direct Exposure Criteria indicated by the indicated shading: Residential DEC | Industrial Commercial DEC

< = Analyte not detected at concentration above given reporting limit.

NA = Sample not analyzed for given parameter.

ND = No analytes detected for this analysis.

* The default GA LC and R DEC for TPH is 500 mg/kg. It may be adjusted to 1,000 mg/kg with RIDEM approval of adequate risk management.

Table 2
Soil Pre-Charcterization Data - Geotechnical Soil Borings
Route 37 / I-295 Interchange Project
Cranston/Johnston, Rhode Island

Location	GA Leachability Criteria (GA LC)	Residential Direct Exposure Criteria (DEC)	Industrial Comercial DEC (IC DEC)	Sample Location (Depth), Date, and Lab Deliverable ID																				
Sample ID				B101 (1-3)	RW1 (2-4)	B101/RW1 (0-4)	B102 (2)	RW3 (1)	RW4 (2.5)	B102/RW3/RW4 (0-4)	B103 (1)	B104 (1)	B103 / B104 (0-4)	B105 (1)	B106 (1)	B105 / B106 (0-4)	B107 (2)	B107 (0-4)	B109 (2)	B108 (1)	B110 (2)	B110/B108 (0-4)	SB06 (0-2)	SB09 (0-2)
Sampling Date				10/3/2022	6/16/2022	10/4/2022	6/10/2022	6/10/2022	6/10/2022	6/10/2022	5/24/2022	5/24/2022	5/24/2022	5/20/2022	5/20/2022	5/20/2022	5/26/2022	5/26/2022	6/17/2022	6/6/2022	6/1/2022	6/6/2022	10/13/2022	10/13/2022
Lab Report Number				J7487-1	J5417-1	J5417-1	J5061-1				J4677-1			J4602-1			J4760-1	J4760-1	J5417-1	J4927-1	J4857-1	J4927-1	J4927-1	J4857-1
TPH (mg/kg)																								
TPH*	500	500	2,500			**60.5**				**22.8**			**80.6**			**133**		**92.5**				**83.2**	**133**	**644**
VOCs (mg/kg)																								
2-Hexanone	NE	NE	NE	< 0.00915	< 0.00770 J		< 0.00785	< 0.00818	< 0.00676		< 0.0245	**0.0604**		< 0.0125	< 0.00995		< 0.01620		< 0.00795 J	< 0.00908	< 0.00851		< 0.00714	< 0.00668
4-Isopropyltoluene	NE	NE	NE	< 0.00915	< 0.00385 J		< 0.00393	< 0.00409	< 0.00338		< 0.0122	**0.0156**		< 0.00625	< 0.00497		< 0.02089		< 0.00397 J	< 0.00454	< 0.00426		< 0.00714	< 0.00668
Total Chlorinated VOCs	NE	NE	NE	ND	ND		ND	ND	ND		ND	ND		ND	ND		ND		ND	ND	ND		ND	ND
Total VOCs	NE	NE	NE	ND	ND		ND	ND	ND		ND	0.0760		ND	ND		ND		ND	ND	ND		ND	ND
PAHs (mg/kg)																								
Acenaphthylene	NE	23	10,000			< 0.0698				< 0.0687			< 0.0683			**0.0990**		< 0.0712				< 0.0727	< 0.0732	< 0.370
Benzo(a)anthracene	NE	0.9	7.8			< 0.0698				< 0.0687			< 0.0683			**0.221**		< 0.0712				< 0.0727	**0.0853**	< 0.370
Benzo(a)pyrene	240	0.4	0.8			< 0.0698				< 0.0687			< 0.0683			**0.195**		< 0.0712				< 0.0727	**0.0747**	< 0.370
Benzo(b)fluoranthene	NE	0.9	7.8			< 0.0698				< 0.0687			< 0.0683			**0.328**		< 0.0712				< 0.0727	**0.107**	< 0.370
Benzo(g,h,i)perylene	NE	0.8	10,000			< 0.0698				< 0.0687			< 0.0683			**0.111**		< 0.0712				< 0.0727	< 0.0732	< 0.370
Benzo(k)fluoranthene	NE	0.9	78			< 0.0698				< 0.0687			< 0.0683			**0.189**		< 0.0712				< 0.0727	**0.0796**	< 0.370
Chrysene	NE	0.4	780			< 0.0698				< 0.0687			< 0.0683			**0.269**		< 0.0712				< 0.0727	**0.0936**	< 0.370
Fluoranthene	NE	20	10,000			< 0.0698				< 0.0687			**0.0797**			**0.396**		**0.0864**				< 0.0727	**0.193**	< 0.370
Indeno(1,2,3-cd)pyrene	NE	0.9	7.8			< 0.0698				< 0.0687			< 0.0683			**0.132**		< 0.0712				< 0.0727	< 0.0732	< 0.370
Phenanthrene	NE	40	10,000			< 0.0698				< 0.0687			< 0.0683			**0.113**		< 0.0712				< 0.0727	**0.0781**	< 0.370
Pyrene	NE	13	10,000			< 0.0698				< 0.0687			**0.0999**			**0.391**		< 0.0712				< 0.0727	**0.148**	< 0.370
Total PAHs	NE	NE	NE			ND				ND			**0.1796**			**2.444**		**0.0864**				ND	**0.859**	ND
Metals (mg/kg)																								
Arsenic	NE	7	7			< 3.14				< 0.144			**2.82**			**12.8**		< 1.54				**1.56**	**3.72**	< 3.25
Barium	NE	5,500	10,000			<41.9				**17.6**			**29.5**			**26.8**		**27.1**				**17.9**	< 43.5	< 43.4
Beryllium	NE	1.5	1.5			< 0.419				< 0.481			**0.625**			< 0.529		< 0.514				< 0.515	**0.701**	< 0.434
Cadmium	NE	39	1,000			< 0.837				< 0.481			< 0.490			< 0.529		< 0.514				< 0.515	< 0.869	< 0.868
Chromium	NE	1,400	10,000			**13.3**				**7.40**			**13.1**			**7.38**		**11.0**				**11.3**	**20.7**	**5.88**
Copper	NE	3,100	10,000			**10.8**				**7.67**			**18.6**			**20.3**		**10.1**				**31.8**	**23.0**	**5.65**
Lead	NE	150	500			**7.32**				**5.53**			**9.21**			**29.4**		**28.4**				**28.2**	**121**	**7.00**
Manganese	NE	390	10,000			**176**				**98.3**			**229**			**125**		**146**				**102**	**199**	**144**
Mercury	NE	23	610			< 0.0487				< 0.0460			< 0.0490			< 0.0472		<0.0485				<0.0538	< 0.0453	**0.0803**
Nickel	NE	1,000	10,000			**9.95**				**4.54**			**7.87**			**5.77**		**6.47**				**5.11**	< 0.869	< 8.68
Vanadium	NE	550	10,000			**10.9**				**7.18**			< 2.94			**8.30**		**6.87**				**7.38**	**18.0**	< 10.8
Zinc	NE	6,000	10,000			**30.3**				**17.5**			**43.0**			**31.6**		**34.5**				**35.5**	**111**	**39.9**
PCBs (mg/kg)																								
Aroclor-1254	NE	NE	NE			< 0.0206				< 0.0206			< 0.0192			**0.0301**		**0.188**				< 0.0223	< 0.0219	< 0.0219
Total PCBs	10	10	10			ND				ND			ND			**0.0301**		**0.188**				ND	ND	ND
Pesticides (mg/kg)																								
4,4-DDE	NE	NE	NE			< 0.00825				< 0.00626			< 0.00787			< 0.0826		< 0.00857				< 0.00891	**0.206**	< 0.00876
4,4-DDT	NE	NE	NE			< 0.00825				< 0.00626			< 0.00787			< 0.0826		< 0.00857				< 0.00891	**0.0577**	< 0.00876
Total Pesticides	NE	NE	NE			ND				ND			ND			ND		ND				ND	**0.264**	ND
Reactivity (mg/kg)																								
Reactive Cyanide	NE	NE	NE										< 59.3			< 58.8								
Reactive Sulfide	NE	NE	NE										< 158			< 157								
Other																								
Flashpoint	NE	NE	NE										Negative			Negative								
Percent Solids	NE	NE	NE	95.5	97.1	94.6				95.5			96.3			92.5		89.3	96.0	96.3	94.3	89.3	89.5	89.3
pH (S.U.)	NE	NE	NE										5.9			7.9								
Specific conductance (umhos/cm)	NE	NE	NE										30.8			184								

Notes:

This is a summary table. Only those anlaytes that are detected are shown.
Detected analytes presented in **bold text**.

Exceedances of Direct Exposure Criteria indicated by the indicated shading: Residential DEC | Industrial Commercial DEC

Exceedances of Leachability Criteria indicated by color-coded borders around a value .

< = Analyte not detected at concentration above given reporting limit.

NA = Sample not analyzed for given parameter.

ND = None detected

Table 3
Soil Pre-Charcterization Data - Hand Auger Borings
Route 37 / I-295 Interchange Project
Cranston/Johnston, Rhode Island

Location	GA Leachability Criteria (GA LC)	Residential Direct Exposure Criteria (DEC)	Industrial Comercial DEC (IC DEC)	Sample Location (Dpeth), Date, and Lab Deliverable ID																				
Sample ID				HA1 (1.5)	HA2 (1.5)	HA1, HA2 (1.5)	HA3 (1)	HA4 (2)	HA5 (2)	HA3, HA4, HA5 (2)	HA6 (1)	HA7 (1)	HA8 (1)	HA6, HA7, HA8 (1)	HA9 (1.5)	HA10 (1)	HA9, HA10 (1)	HA11 (1.5)	HA12 (1)	HA11, HA12 (1)	HA13 (1.5)	HA14 (1.5)	HA13, HA14 (1.5)	HA15 (1.5)
Sampling Date				6/15/2022	6/15/2022	6/15/2022	6/14/2022	6/15/2022	6/15/2022	6/15/2022	6/14/2022	6/14/2022	6/14/2022	6/14/2022	6/14/2022	6/14/2022	6/14/2022	6/14/2022	6/14/2022	6/14/2022	6/15/2022	6/15/2022	6/15/2022	6/15/2022
Lab Report Number				J5169-1			J5169-1				J5169-1				J5169-1			J5169-1			J5169-1			J5169-1
TPH (mg/kg)																								
TPH*	500	500	2,500			**87.8**				**157**				**238**			**184**			**74.6**			**101**	**37.3**
VOCs (mg/kg)																								
2-Hexanone	NE	NE	NE	< 0.0109	< 0.0143		< 0.00896	< 0.00821	< 0.0217		< 0.0106	< 0.00809	< 0.0103		< 0.00334	< 0.0114		< 0.0102	< 0.00951		< 0.00957	< 0.0136		< 0.00888
Methylene Chloride	NE	45	760	**0.0147**	**0.0154**		< 0.00896	**0.0176**	**0.0348**		< 0.0106	< 0.00809	< 0.0103		< 0.00334	< 0.0114		**0.0135**	**0.0132**		< 0.00957	**0.0299**		**0.0232**
Total Chlorinated VOCs	NE	NE	NE	**0.0147**	**0.0154**		ND	**0.0176**	**0.0348**		ND	ND	ND		ND	ND		**0.0135**	**0.0132**		ND	**0.0299**		**0.0232**
Total VOCs	NE	NE	NE	**0.0147**	**0.0154**		ND	**0.0176**	**0.0348**		ND	ND	ND		ND	ND		**0.0135**	**0.0132**		ND	**0.0299**		**0.0232**
PAHs (mg/kg)																								
Acenaphthylene	NE	23	10,000			< 0.0785				< 0.161				< 0.155			< 0.377			< 0.360			< 0.0782	< 0.0672
Benzo(a)anthracene	NE	0.9	7.8			< 0.0785				< 0.161				**0.660**			< 0.377			< 0.360			< 0.0782	< 0.0672
Benzo(a)pyrene	240	0.4	0.8			< 0.0785				< 0.161				**0.594**			< 0.377			< 0.360			< 0.0782	< 0.0672
Benzo(b)fluoranthene	NE	0.9	7.8			< 0.0785				< 0.161				**0.643**			< 0.377			< 0.360			< 0.0782	< 0.0672
Benzo(g,h,i)perylene	NE	0.8	10,000			< 0.0785				< 0.161				**0.456**			< 0.377			< 0.360			< 0.0782	< 0.0672
Benzo(k)fluoranthene	NE	0.9	78			< 0.0785				< 0.161				**0.519**			< 0.377			< 0.360			< 0.0782	< 0.0672
Chrysene	NE	0.4	780			< 0.0785				< 0.161				**0.651**			< 0.377			< 0.360			< 0.0782	< 0.0672
Dibenzo(a,h)anthracene	NE	0.4	0.8			< 0.0785				< 0.161				**0.158**			< 0.377			< 0.360			< 0.0782	< 0.0672
Fluoranthene	NE	20	10,000			< 0.0785				**0.232**				**1.17**			< 0.377			< 0.360			< 0.0782	< 0.0672
Indeno(1,2,3-cd)pyrene	NE	0.9	7.8			< 0.0785				< 0.161				**0.428**			< 0.377			< 0.360			< 0.0782	< 0.0672
Phenanthrene	NE	40	10,000			< 0.0785				< 0.161				**0.512**			< 0.377			< 0.360			< 0.0782	< 0.0672
Pyrene	NE	13	10,000			< 0.0785				**0.187**				**0.976**			< 0.377			< 0.360			< 0.0782	< 0.0672
Total PAHs	NE	NE	NE			ND				**0.419**				**6.77**			ND			ND			ND	ND
Metals (mg/kg)																								
Arsenic	NE	7	7			**1.80**				< 1.69				**2.47**			**1.66**			**2.89**			**2.10**	< 1.43
Barium	NE	5,500	10,000			**56.9**				**66.8**				**42.0**			**45.0**			**28.7**			**22.0**	**14.0**
Beryllium	NE	1.5	1.5			**2.02**				**0.753**				**0.688**			**0.726**			**0.676**			**1.06**	< 0.475
Cadmium	NE	39	1,000			< 0.566				< 0.565				< 0.572			< 0.545			< 0.511			< 0.540	< 0.475
Chromium	NE	1,400	10,000			**15.4**				**15.6**				**11.3**			**13.6**			**8.89**			**6.66**	**2.73**
Copper	NE	3,100	10,000			**28.1**				**23.2**				**16.1**			**16.6**			**10.5**			**8.11**	**3.87**
Lead	NE	150	500			**19.2**				**86.5**				**59.2**			**41.0**			**19.5**			**11.9**	**6.59**
Manganese	NE	390	10,000			**187**				**285**				**189**			**198**			**138**			**120**	**105**
Mercury	NE	23	610			< 0.0553				< 0.0617				< 0.0554			< 0.0504			< 0.0517			< 0.0549	< 0.0507
Nickel	NE	1,000	10,000			**10.1**				**8.93**				**7.90**			**7.45**			**5.25**			**5.32**	**2.23**
Vanadium	NE	550	10,000			**14.5**				**14.9**				**11.9**			**11.90**			**10.9**			**7.65**	**5.17**
Zinc	NE	6,000	10,000			**63.1**				**59.1**				**66.6**			**53.5**			**37.1**			**38.3**	**19.9**
PCBs (mg/kg)																								
Aroclor-1254	NE	NE	NE			< 0.0223				< 0.0246				**0.071**			< 0.0226			< 0.0210			< 0.0238	< 0.0209
Total PCBs	10	10	10			ND				ND				**0.071**			ND			ND			ND	ND
Pesticides (mg/kg)																								
4,4-DDE	NE	NE	NE			< 0.00893				< 0.00986				< 0.00948			**0.0144**			< 0.00842			< 0.00951	< 0.00836
4,4-DDT	NE	NE	NE			< 0.00893				< 0.00986				< 0.00948			**0.0186**			< 0.00842			< 0.00951	< 0.00836
Total Pesticides	NE	NE	NE			ND				ND				ND			**0.0330**			ND			ND	ND
Reactivity (mg/kg)																								
Reactive Cyanide	NE	NE	NE																					
Reactive Sulfide	NE	NE	NE																					
Other																								
Flashpoint	NE	NE	NE																					
Percent Solids	NE	NE	NE	82.9	81.1	83.9	84.7	93.7	56.9	80.2	73.6	84.6	89.7	83.8	45.5	94.4	87.4	92.3	91.9	91.1	88.3	79.5	83.7	94.8
pH (S.U.)	NE	NE	NE																					
Specific conductance (umhos/cm)	NE	NE	NE																					

Notes:
This is a summary table. Only those anlaytes that are detected are shown.
Detected analytes presented in **bold text**.
Exceedances of Direct Exposure Criteria indicated by the indicated shading: Residential DEC; Industrial Commercial DEC
Exceedances of Leachability Criteria indicated by color-coded borders around a value .
< = Analyte not detected at concentration above given reporting limit.
NA = Sample not analyzed for given parameter.
ND = None detected

Appendix A
Site Investigation Report Checklist

1.20 Site Investigation Report (SIR) Checklist

A. The following information shall be completed and submitted with the SIR

1. Contact Name *Patrick Haskell*
2. Contact Address *AECOM, 10 Orms Street, Suite 400, Providence, RI 02904*
3. Contact Telephone *401.854.2808*
4. Site Name *Route 37 / Interstate 295 Interchange Project*
5. Site Address *Cranston & Johnston, RI*

B. Office Use Only

1. Site Investigation Report (SIR) Site
2. Project Code
3. SIR Submittal Date
4. Checklist Submittal Date

C. Directions: The box to the left of each item listed below is for the administrative review of the SIR submission and is for RIDEM Use Only. Under each item listed below, cross-reference the specific sections and pages in the SIR that provide detailed information that addresses each stated requirement. Failure to include cross-references shall delay review and approval. If an item is not applicable, simply state that it is not applicable and provide an explanation in the SIR.

1. § 1.8.3(A)(1) of this Part - List specific objectives of the SIR related to characterization of the Release, impacts of the Release and remedy.

   Objectives - Section 2.0
   Impacts - Section 3.5
   Remedy - Section 3.6

2. § 1.8.3(A)(2) of this Part - Include information reported in the Notification of Release. A copy of the Release notification form should be included in the SIR. Include information relating to short-term response, if applicable.

   Summarized in Section 1.2. NOR provided in this appendix following this form.

3. § 1.8.3(A)(3) of this Part - Include documentation of any past incidents or Releases. *N/A - See Executive Summary of Phase I in Appendix C*

4. § 1.8.3(A)(4) of this Part - Include list of prior property Owners and Operators, as well as sequencing of property transfers and time periods of occupancy. *Appendix C, Section 2.2*

5. § 1.8.3(A)(5) of this Part - Include previously existing environmental information which characterizes the Contaminated-Site and all information that led to the discovery of the Contaminated-Site.

   Previously existing environmental information – Appendix C, Executive Summary
   Discovery of contamination- Section 1.2

6. § 1.8.3(A)(6) of this Part - Include current uses and zoning of the Contaminated-Site, including brief statements of operations, processes employed, waste generated, Hazardous Materials handled, and any residential activities on the site, if applicable. (This section should be linked to the specific objectives section demonstrating how the compounds of concern in the investigation are those that are used or may have been used on the site or are those that may have impacted the site from an off-site source.)

   Current uses, zoning and operations – Section 1.4, Appendix C Exec. Summary
   Discovery of contamination – Section 1.2

7. § 1.8.3(A)(7) of this Part - Include a locus map showing the location of the site using US Geological Survey 7.5-min quadrangle map or a copy of a section of that USGS map. *Figure 1*

8. § 1.8.3(A)(8) of this Part - Include a site plan, to scale, showing:

   a. Buildings *Figures 2 through 4*

   b. Activities *N/A*

   c. Structures *Figures 2 through 4*

   d. North Arrow *Figures 1 through 4*

   e. Wells *N/A*

   f. UIC Systems, septic tanks, UST, piping and other underground structures *N/A*

   g. Outdoor Hazardous Materials storage and handling areas *N/A*

   h. Extent of paved areas *Figures 1 through 4*

   i. Location of environmental samples previously taken with analytical results *Figures 1 through 4 and Tables 1 through 3*

   j. Waste management and disposal areas *N/A*

   k. Property Lines *Depicted on Figures 2A through 2C in Appendix C*

9. § 1.8.3(A)(9) of this Part - Include a general characterization of the property surrounding the area including, but not limited to:

   a. Location and distance to any surface water bodies within 500 ft of the site. *Section 1.4*

b. Location and distance to any Environmentally Sensitive Areas within 500 ft. of the site. *Section 1.4*

c. Actual sources of potable water for all properties immediately abutting the site. *Section 1.4*

d. Location and distance to all public water supplies, which have been active within the previous 2 years and within one mile of the site. *Section 1.4*

e. Determination as to whether the Release impacts any off-site area utilized for residential or industrial/commercial property or both. *Section 3.5*

f. Determination of the underlying groundwater classification and if the classification is GB, the distance to the nearest GA area. *Section 1.4*

10. § 1.8.3(A)(10) of this Part - Include classifications of surface and ground water at and surrounding the site that could be impacted by a Release. *Section 1.4*

11. § 1.8.3(A)(11) of this Part - Include a description of the contamination from the Release, including:

a. Free liquids on the surface *N/A*

b. LNAPL and DNAPL *N/A*

c. Concentrations of Hazardous Substances which can be shown to present an actual or potential threat to human health and any concentrations in excess of any of the remedial objectives; (reference § 1.13 of this Part). *Section 3.5*

d. Impact to Environmentally Sensitive Areas *N/A*

e. Contamination of man-made structures *N/A*

f. Odors or stained soil *N/A*

g. Stressed vegetation *N/A*

h. Presence of excavated or stockpiled material and an estimate of its total volume *N/A*

i. Environmental sampling locations, procedures and copies of the results of any analytical testing at the site

Locations – Figures 2 through 4
Procedures – Section 2.0
Results – Tables 1 through 3 and Appendix F

j. List of Hazardous Substances at the site
Section 3.4 and Tables 1 through 3

k. Discuss if the contamination falls outside of the jurisdiction of the Remediation Regulations, including but not limited to USTs, UICs, and wetlands. *N/A*

12. § 1.8.3(A)(12) of this Part - Include the concentration gradients of Hazardous Substances throughout the site for each media impacted by the Release. *N/A – Results represent isolated detections. No gradients are evident.*

13. § 1.8.3(A)(13) of this Part - Include the methodology and results of any investigation conducted to determine background concentrations of Hazardous Substances identified at the Contaminated-Site (see § 1.13 of this Part). *Section 3.5*

14. § 1.8.3(A)(14) of this Part. Include a listing and evaluation of the site-specific hydrogeological properties which could influence the migration of Hazardous Substances throughout and away from the site, including but not limited to, where appropriate:

a. Depth to GW *Section 1.4*

b. Presence and effects of both the natural and man-made barriers to and conduits for contaminant migration. *N/A – Impacts to groundwater have not been identified nor are they expected to be generated by the releases identified.*

c. Characterization of bedrock *N/A*

d. Groundwater contours, flow rates and gradients throughout the site. *N/A – Groundwater was not characterized as part of this investigation.*

15. § 1.8.3(A)(15) of this Part - Include a characterization of the topography, surface water and run-off flow patterns, including the flooding potential, of the site.

A topographic map is provided as Figure 1. A detailed stormwater report is being submitted separately to RIDEM in support of Stormwater Construction and Freshwater Wetlands Permit submittals

16. § 1.8.3(A)(16) of this Part - Include the potential for Hazardous Substances from the site to volatilize and any and all potential impacts of the volatilization to structures within the site. *N/A – No volatile substances have been identified on site.*

17. § 1.8.3(A)(17) of this Part - Include the potential for entrainment of Hazardous Substances from the site by wind or erosion actions. *N/A – Impacts are subsurface. Dust control will be an element of the soil management plan.*

18. § 1.8.3(A)(18) of this Part - Include detailed protocols for all fate and transport models used in the Site Investigation. *N/A*

19. § 1.8.3(A)(19) of this Part - Include a complete list of all samples taken, the location of all samples, parameters tested for and analytical methods used during the Site Investigation. (Be sure to include the samples locations and analytical results on a site figure).
Sections 2.1 through 2.4 discuss the samples, methods and analytes. Results are provided in Tables 1 through 3.

20. § 1.8.3(A)(20) of this Part - Include construction plans and development procedures for all monitoring wells. Well construction shall be consistent with the requirements of the Groundwater Quality Rules, Part 150-05-3 of this Title. *N/A*

21. § 1.8.3(A)(21) of this Part - Include procedures for the handling, storage and disposal of wastes derived from and during the investigation. *N/A – Due to an absence of apparent impacts, material generated during the drilling program were returned to the location of generation. Residuals will be managed as part of subsurface construction in these areas.*

22. § 1.8.3(A)(22) of this Part - Include a quality assurance and quality control evaluation summary report for sample handling and analytical procedures, including, but not limited to, chain-of-custody procedures and sample preservation techniques. *Section 3.4 and Appendix F.*

23. § 1.8.3(A)(23) of this Part - Include any other site-specific factor, that the Director believes, is necessary to make an accurate decision as to the appropriate Remedial Action to be taken at the site. *Section 3.5*

24. § 1.8.4 of this Part - Include Remedial Alternatives. The Site Investigation Report shall contain a minimum of 2 remedial alternatives other than no action/natural attenuation alternative, unless this requirement is waived by the Department. It should be clear which of these alternatives is most preferable. All alternatives shall be supported by relevant data contained in the Site Investigation Report and consistent with the current and reasonably foreseeable land usage, and documentation of the following: *Section 3.5*

    a. Compliance with § 1.9 of this Part;

    b. Technical feasibility of the preferred remedial alternative;

    c. Compliance with federal, state and local laws or other public concerns; and

    d. The ability of the Performing Party to perform the preferred remedial alternative.

25. § 1.8.5 of this Part - The Site Investigation Report and all associated progress reports shall include the following statements signed by an authorized representative of the party specified:

    a. A statement signed by an authorized representative of the Person who prepared the Site Investigation Report certifying the completeness and accuracy of the information contained in that report to the best of their knowledge; and

    b. A statement signed by the Performing Party responsible for the submittal of the Site Investigation Report certifying that the report is a complete and accurate representation of the site and the Release and contains all known facts surrounding the Release to the best of their knowledge.

    The above are provided in Appendix G.

26. § 1.8.6 of this Part - If the Site Investigation is not complete, include a schedule for the submission of periodic progress reports on the status of the investigation and interim reports on any milestones achieved in the project.
N/A

27. § 1.8.7 of this Part - Be prepared to implement public notice requirements per §§ 1.8.7 and 1.8.9 of this Part when the Department deems the Site Investigation Report to be complete.

Appendix G
Certifications

Environmental Professional Statement

Patrick Haskell of AECOM is the environmental professional (EP) for this Site Investigation Report. Mr. Haskell's EP statement is below.

I declare that, to the best of my professional knowledge and belief, I meet the definition of an EP as defined in Section 312.10 of Chapter 40 of the Code of Federal Regulations (40 CFR 312.10) and that I have the specific qualifications based on education, training, and experience to assess a site of the nature, history, and setting of the project site. I have directed and performed this investigation in accordance with industry standards, and the investigation is accurate to the best of my knowledge. As noted in Section 3.5, additional investigation activities will be performed in limited areas in October 2022 to complete the investigation, and results of those activities will be transmitted to RIDEM.

Patrick Haskell, AECOM

11-22-2022
Date

Performing Party's Statement

The Rhode Island Department of Transportation (RIDOT) is the Performing Party for this Site Investigation Report. Paul Schofield is RIDOT's project manager for this project. Mr. Schofield's Performing Party statement is below.

I declare that, to the best of my professional knowledge and belief, that this Site Investigation Report is accurate and contains all the known facts surrounding the contamination identified at the Project Site.

Paul Schofield, RIDOT

11/16/2022
Date

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