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## LIMITED DESIGN INVESTIGATION WORK PLAN (LDI Work Plan)

**NATIONAL GRID**  
**Former Tidewater Facility**  
**Pawtucket, Rhode Island**  
RIDEM FILE NO. SR-26-0934 A  
(Formerly RIDEM Case No. 95-022)

June 26, 2017  
File No. 05.0043654.00



**PREPARED FOR:**  
RIDEM  
Providence, Rhode Island

**GZA GeoEnvironmental, Inc.**  
530 Broadway | Providence, RI 02909  
401-421-41405848

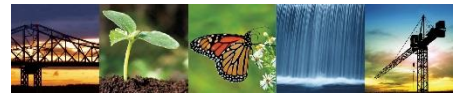
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MANAGEMENT

530 Broadway  
Providence, RI 02909  
T: 401.421.4140  
F: 401.751.8613  
www.gza.com



Via E-Mail and U.S. Mail

June 26, 2017  
GZA File No. 05.0043654.00

Mr. Joseph Martella  
Rhode Island Department of Environmental Management (RIDEM)  
Office of Waste Management  
235 Promenade Street  
Providence, Rhode Island 02908

Re: Limited Design Investigation (LDI) Work Plan  
Former Tidewater Facility  
Pawtucket, Rhode Island  
RIDEM File No. SR-26-0934 A  
Formerly RIDEM Case No. 95-022

Dear Mr. Martella:

On behalf of the Narragansett Electric Company d/b/a National Grid (National Grid), GZA GeoEnvironmental, Inc. (GZA) is pleased to present to the Rhode Island Department of Environmental Management (RIDEM) the attached Limited Design Investigation Work Plan (LDI Work Plan) for the above referenced Site. This LDI Work Plan describes proposed explorations designed to supplement existing data and facilitate preparation of the Remedial Action Work Plan (RAWP).

Please feel free to contact either of the undersigned or Jesse Edmands of National Grid at 781-907-3682 should you have any questions.

Very truly yours,  
GZA GEOENVIRONMENTAL, INC.

Sophia Narkiewicz, P.E.  
Assistant Project Manager

Todd R. Greene, P.E.  
Senior Consultant

James J. Clark, P.E.  
Senior Principal

Attachment: *LDI Work Plan*

cc: Jesse Edmands, National Grid



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## 1.0 INTRODUCTION

On behalf of The Narragansett Electric Company, d/b/a National Grid (National Grid), GZA GeoEnvironmental Inc. (GZA) has prepared this *Limited Design Investigation Work Plan (LDI Work Plan)* describing additional investigation activities to be performed at the former Tidewater facility located at the terminus of Tidewater and Merry Streets in Pawtucket, Rhode Island (refer to Figure 1 for the Site *Locus Plan*). This property is herein referred to as the Site. As described further herein, these additional investigations are designed to supplement existing data to facilitate the design of the Site remedy and the development of a *Remedial Action Work Plan (RAWP)*.

This *LDI Work Plan* is subject to the Limitations presented in Appendix A and is subject to modification if subsequent information is developed by GZA or any other party.

The Site is located on the west side of the Seekonk River and is bound to the west by residential properties, to the south and southwest by the Francis J. Varieur School and Max Read Athletic Field, and to the north by undeveloped property owned by the City of Pawtucket. It encompasses approximately 23 acres and was the location of the former Tidewater Manufactured Gas Plant (MGP) and the Pawtucket No. 1 Power Station. The Site is currently largely vacant with the exception of an active natural gas regulating station, an active switching station and electric substation, and two transmission towers owned and operated by National Grid.

As indicated on the attached Figure 2, *Proposed Exploration Location Plan – North Fill Area and Former Gas Plant Area* and Figure 3, *Proposed Exploration Location Plan – Former Power Plant Area and South Fill Area*, the Site has been subdivided into the following four areas based on their geographic location, past use and/or past occupants:

- North Fill Area (NFA);
- Former Gas Plant Area (FGPA);
- Former Power Plant Area (FPPA); and
- South Fill Area (SFA).

For details regarding existing and historic Site conditions, including Site plans, previous Site investigations, hydrogeologic setting and observed impacts, please refer to historic reports which are available on the Tidewater website ([tidewatersite.com](http://tidewatersite.com)) and on file at the Rhode Island Department of Environmental Protection (RIDEM).

On May 25, 2017, RIDEM issued a Program Letter indicating the investigation phase of the project is complete and presenting the following proposed remedial alternative for the Site:

- Limited source removal from three (3) areas (the former tank UGGT-1, raceway structures and an area of crystallized naphthalene);
- Installation of an approximately 1,400 foot long subsurface barrier wall with integral Non Aqueous Phase Liquid (NAPL) containment wells along the downgradient riverfront area of the Site;
- Construction of permeable and impermeable engineered caps;
- Routine NAPL gauging and recovery;
- Routine groundwater quality monitoring; and
- Recording an Environmental Land Usage Restriction (ELUR) on the property deeds restricting certain activities and ensuring the engineered cap and containment wall are maintained. The ELUR will include a Soil Management Plan (SMP) which will address potential future activities that disturb Site soils and groundwater.



The investigation work described herein is designed to supplement existing data and facilitate the design of the proposed Site remedy and development of the *Remedial Action Work Plan* (RAWP).

This LDI Work Plan is organized as follows:

- Section 1.0 contains this introduction;
- Section 2.0 describes the limited design investigation data gaps to be investigated;
- Section 3.0 presents the proposed scope of this study; and
- Section 4.0 presents the anticipated implementation sequence and schedule.

## 2.0 LDI DATA GAP IDENTIFICATION

The limited design investigation data gaps listed below were identified during a review of existing data. The scope of work presented in Section 3.0 has been designed to specifically address these limited design investigation data gaps.

- **Subsurface Barrier Wall Alignment Investigation:** Additional subsurface investigations along the proposed barrier wall alignment are necessary to further evaluate the potential presence of below grade obstructions (*e.g.*, wood piers, concrete foundations, *etc.*) that could potentially impede wall installation/construction. These investigations will also provide additional information relative to subsurface strata, including the depth to the underlying glacial till.
- **Bulkhead Area Investigation:** Additional subsurface investigations along sections of the existing bulkhead will be performed to evaluate subsurface conditions and the potential presence of below grade obstructions (*e.g.*, wood piers, concrete foundations, *etc.*).
- **Evaluation of Engineered Cap Types:** Additional investigations in the form of test pits, surface and subsurface soil sampling and analysis will be performed in certain areas of the Site to facilitate further evaluation of appropriate engineered cap types. These investigations will be designed to determine the extent of impermeable versus permeable capping and the quality of surficial soils in areas of the Site where placement of alternative capping types may be necessary due to existing tree cover, slopes, *etc.*
- **Further Characterization of Former Raceway:** Additional test pit investigations will be performed along the former raceway (proposed area of source removal) to further characterize and locate the extent of this historic feature.
- **Concrete and Surface Soil Investigation - Former Transformer Area:** Investigations will be performed in a small area in a western area of the Site which was historically used as an electrical substation prior to the existing substation being constructed. Concrete and surface soil samples will be collected and analyzed for polychlorinated biphenyls (PCBs) consistent with the requirements of Toxic Substances Control Act (TSCA) 40 CFR 761.265 (Subpart N).
- **Additional Soil Sampling for Volatile Compounds:** Soil samples will be collected and analyzed to further evaluate the applicability of RIDEM's *Air Pollution Control Regulation No. 9 – Air Pollution Control Permits* for the proposed remedy.

## 3.0 SCOPE OF WORK

The limited design investigation program for the Site will consist of the completion of soil borings, test pits, surface soil sampling and concrete sampling designed to address data gaps described in Section 2.0.



The following tables were prepared to present the proposed exploration locations, including the general location and rationale and planned analytical testing:

- Table 1 – *Proposed Explorations – Test Boring Locations;*
- Table 2 – *Proposed Explorations – Test Pit Locations;*
- Table 3 – *Proposed Explorations – Surface Soil Sample Locations;* and
- Table 4 – *Proposed Explorations – Former Transformer Area.*

The following figures were prepared to present the proposed exploration locations:

- Figure 2 – *Proposed Exploration Location Plan – North Fill Area and Former Gas Plant Area;*
- Figure 3 – *Proposed Exploration Location Plan – Former Power Plant Area and South Fill Area;* and
- Figure 4 – *Proposed Exploration Location Plan – Former Transformer Area.*

Please note, exploration locations may require adjustment based on field conditions and the results of utility clearance. Consistent with previous explorations, explorations will be logged and characterized consistent with the attached Soil/Waste Characterization Protocol for Former Manufactured Gas Plants (Appendix B). Fieldwork associated with this exploration program will be performed in accordance with a Site Specific Health and Safety Plan (HASP) that GZA will prepare for the project.

The following sections summarize scope of this LDI *Work Plan*.

### 3.1 PUBLIC NOTICE

Consistent with the October 2013 *Public Involvement Plan (PIP)* and Section 7.07 of the Remediation Regulations, National Grid will provide notice to the public prior to performance of these investigation activities. This notice will be in the form of written communication which will be distributed to the mailing list established for the Tidewater Site at least 14 (days) prior to performance of the work.

### 3.2 CRMC PERMITTING

A portion of the proposed limited design investigation scope is located within 200-feet of the coastal feature, and as such, is subject to the jurisdiction of the Coastal Resource Management Council (CRMC). GZA will prepare a CRMC permit application package associated with completion of the proposed exploration program. Due to the relatively non-invasive nature of the work, we have assumed that completion of the proposed subsurface exploration program will fall under a “Finding of No Significant Impact” (FONSI). All work will be performed consistent with CRMC requirements.

### 3.3 SITE RECONNAISSANCE

Prior to performing the investigations, GZA will conduct Site reconnaissance to coordinate DigSafe® clearance, and to visually evaluate access restrictions. GZA will also coordinate with National Grid to evaluate the locations of the proposed explorations with the layout of known utilities and other possible historical features. As noted, certain of the exploration locations may be modified due to the presence of underground utilities or other Site features.

### 3.4 SOIL BORING INSTALLATIONS

Thirteen (13) test borings (GZ BW-501 to GZ BW-513) will be performed along the alignment of the proposed barrier wall to further evaluate the potential presence of below grade obstructions (*e.g.*, wood piers, concrete foundations, *etc.*) that



could potentially impede wall installation/construction (see Figures 2 and 3). These investigations will also provide additional information relative to subsurface strata, including the depth to the underlying glacial till. As indicated on Figures 2 and 3, an additional seven (7) test borings (GZ BK-501 to GZ BK-507) are proposed along the existing bulkhead to evaluate subsurface conditions and the potential presence of below grade obstructions (*e.g.*, wood piers, concrete foundations, *etc.*).

Test borings will be performed via rotosonic drilling techniques with collection of continuous cores (to identify potential obstructions and observed subsurface strata), standard drive and wash cased drilling techniques with collection of continuous samples (to support geotechnical design of the proposed barrier wall), or via geoprobe drilling techniques with continuous sampling sleeves (where there are access restrictions). We anticipate that borings will extend to depths ranging from approximately 25 to 50 feet below existing grade; however, actual depths will be dependent on subsurface conditions encountered during the advancement of the borings.

A GZA field engineer will be on the Site to record boring activities, collect samples for field screening and characterization, and complete boring logs at each location. Soil samples will be collected during the advancement of the borings in approximately 2-foot increments. The recovered soil from each sample interval will be logged using the modified Burmeister and the protocol in Appendix B, field-screened for presence of total volatile organic compounds (TVOCs) with a photo-ionization detector (PID), and evaluated for the presence of staining and odors. GZA will also perform photo-documentation of each soil sampling interval. Refer to Soil/Waste Characterization Protocol For Former Manufactured Gas Plants provided in Appendix B. The logs will also include soil density measurements as determined by the Standard Penetration Test (SPT). SPTs will be performed in general conformance with ASTM D-1586, to assist in defining the subsurface soil conditions, relative density of soil, and obtain soil samples. The SPT consists of driving a 1-3/8 inch inside diameter standard split spoon sampler at least 18 inches with a 140-pound hammer dropping from a height of 30 inches. The standard penetration value, often referred to as the "N" value, is the number of blows required to drive the sampler from 6 to 18 inches of penetration. Shelby tubes may be pushed in borings to obtain relatively undisturbed soil samples of compressible soil for strength testing.

Up to one soil sample may be submitted for analytical testing from each boring. Soil samples will be selected based on the field conditions encountered. Each soil sample will be submitted for analysis of volatile organic compounds (VOCs) via EPA SW-846 Method 5035A/8260B and naphthalene via EPA SW-846 Method 3550B/8270D. In addition, GZA will collect and submit Quality Control/Quality Assurance (QA/QC) samples consisting of duplicates (one (1) duplicate sample for every twenty (20) samples) and trip blanks for VOCs (one (1) trip blank per cooler).

Select soil samples may be collected and submitted for geotechnical laboratory analysis to support geotechnical design of the proposed barrier wall, generally including but not limited to water content (per ASTM D2216), organic content (ASTM D2974), particle size testing (ASTM D6913), hydrometer testing (ASTM D422), Atterberg Limits (ASTM D4318), torvane testing (ASTM H4212), organic content (ASTM D2974), resistivity testing (ASTM G187), pH (ASTM D4972), sulfate (ASTM C1580), chloride (D1411) and Consolidated Isotropic Undrained (CIU) triaxial tests (ASTM D4767-4). We currently estimate a total of six (6) water content tests, twelve (12) organic tests, twenty-five (25) grain size analyses, six (6) Atterberg limits, six (6) torvane tests, twelve (12) resistivity, pH, chloride and sulfate tests and three (3) CIU triaxial tests will be analyzed.

The down-hole drilling tools will be steam-cleaned between each exploration location within a designated decontamination pad located on the Site. In addition, samplers will be decontaminated between each sample interval with a minimum of potable water and Alconox® detergent.





Soil cuttings and wash water (i.e., decontamination water) generated during drilling will be field-screened for TVOCs with a PID and then placed in 55-gallon drums for subsequent characterization and off-Site disposal at a licensed off-Site facility pre-approved by National Grid.

### 3.5 TEST PITTING

Twenty-three (23) test pits (GZ TP-501 to GZ TP-523) will be performed to facilitate further evaluation of appropriate engineered cap types and locate additional sections of the former raceway piping. Proposed exploration locations are shown on the attached Figure 2, *Proposed Exploration Location Plan – North Fill Area and Former Gas Plant Area* and Figure 3 – *Proposed Exploration Location Plan – Former Power Plant Area and South Fill Area*, with sampling rationale and proposed analytical testing presented in Table 2 – *Proposed Explorations – Test Pit Locations*. As described above, prior to completing the test pits, GZA will perform Site reconnaissance to coordinate DigSafe clearance, and to visually evaluate access restrictions. Certain of the locations may change due to the presence of underground utilities and other Site specific factors.

The test pits have been positioned to supplement the existing data and available information regarding former Site features. To evaluate subsurface conditions, the test pits will be completed using a rubber-tired backhoe to a depth of approximately 13 feet below grade, or as subsurface conditions allow. For those locations where extensive underground utilities may be present, the test pits may be initially advanced using a vector truck.

GZA personnel will document the test pit explorations, visually evaluating and classifying soil conditions in the field. Based on the observed subsurface conditions, soil samples will be collected at those locations and depths indicative of impacts based on visual and olfactory observations as deemed necessary. All soil samples will be field screened for TVOCs using a handheld PID. Refer to Soil/Waste Characterization Protocol For Former Manufactured Gas Plants provided in Appendix B.

Surficial samples (0 to 2 feet bgs) and up to one (1) additional soil sample will be submitted for analytical testing from each test pit. Soil samples will be selected based on the field conditions encountered. No samples from below the water table will be submitted for analytical testing. Each soil sample will be analyzed for VOCs via EPA SW-846 Method 5035A/8260B, poly-aromatic hydrocarbons (PAHs) via EPA SW-846 Method 3550B/8270D, Priority Pollutant Metals (PP-13 metals) via EPA SW-846 Method 6010/7000s, Total cyanide via EPA SW-846 Method 9010B, and total petroleum hydrocarbons (TPH) via EPA SW-846 Method 8100M. In addition, GZA will collect and submit QA/QC samples consisting of duplicates (one (1) duplicate sample for every twenty (20) samples) and trip blanks for VOCs (one (1) trip blank per cooler).

The excavated soils will be temporarily staged on polyethylene sheeting directly adjacent to each test pit. Upon completion, the excavated material will be used to backfill each test pit in systematic one-foot thick lifts, approximately consistent with the depths of origin, and compacted with the bucket of the excavation equipment.

The excavation equipment will be steam-cleaned between each location and prior to demobilization within a designated decontamination pad located on the Site. All wash water (i.e., decontamination water) generated during test pitting will be field-screened for TVOCs with a PID and then placed in 55-gallon drums for subsequent characterization and off-Site disposal at a licensed off-Site facility pre-approved by National Grid.

### 3.6 SURFACE SOIL SAMPLING

Sixty-three (63) additional shallow surface soil (0 to 2 feet bgs) samples (GZ-SS-501 to GZ-SS-563) will be collected to facilitate further evaluation of appropriate engineered cap types. These investigations will be designed to determine the



quality of surficial soils in areas of the Site where placement of alternative capping types may be necessary due to existing tree cover, slopes, etc. Proposed exploration locations are shown on the attached Figure 2, *Proposed Exploration Location Plan – North Fill Area and Former Gas Plant Area* and Figure 3 – *Proposed Exploration Location Plan – Former Power Plant Area and South Fill Area*, with sampling rationale and proposed analytical testing presented in Table 3 – *Proposed Explorations – Surface Soil Sample Locations*. The surface soil samples will be collected using a hand-auger or shovel from the upper 2 feet of soil (0-2 feet). The hand-auger sampler will be decontaminated between each sampling location using a mixture of deionized (DI) water and Alconox, followed by a rinsing with clean deionized water.

GZA personnel will document each surface soil sample, visually evaluating and classifying soil conditions in the field. All soil samples will be field screened for total volatile organic compounds (TVOCs) using a handheld photoionization detector (PID). Refer to Soil/Waste Characterization Protocol For Former Manufactured Gas Plants provided in Appendix B.

Each soil sample will be analyzed for VOCs via EPA SW-846 Method 5035A/8260B, PAHs via EPA SW-846 Method 3550B/8270D, PP-13 Metals via EPA SW-846 Method 6010/7000s, Total cyanide via EPA SW-846 Method 9010B, and TPH via EPA SW-846 Method 8100M. In addition, GZA will collect and submit QA/QC samples consisting of duplicates (one (1) duplicate sample for every twenty (20) samples) and trip blank for VOCs (one (1) trip blank per cooler).

Water generated during sampler decontamination will be field-screened for total VOCs with a PID and then placed in 55-gallon drums for subsequent characterization and off-Site disposal at a licensed facility pre-approved by National Grid.

### 3.7 FORMER TRANSFORMER AREA – SURFACE SOIL AND CONCRETE SAMPLING

A small portion of the Former Power Plant Area (FPPA) was historically used as an electrical substation and contained transformers prior to the construction of the existing substation. As part of this *LDI Work Plan*, GZA will collect soil and concrete samples in this area and analyze the samples for PCBs consistent with the requirements of TSCA 40 CFR 761.265 (Subpart N). Proposed exploration locations are shown on the attached Figure 4 – *Proposed Exploration Location Plan – Former Transformer Area*, with sampling rationale and proposed analytical testing presented in Table 4 – *Proposed Explorations – Former Transformer Area*.

#### 3.7.1 Surface Soil Samples

Six (6) shallow soil samples (GZ-SS-FT-501 to GZ-SS-FT-506) will be collected around the perimeter of the former transformer yard. At each of the locations shown on Figure 4, soil samples will be collected from 0 to 3 inches, 9 to 12 inches and 21 to 24 inches below the ground surface using a stainless steel hand auger. The 0 to 3 inch sample from each proposed exploration will be submitted for PCB analysis via EPA Method 8082A using manual Soxhlet extraction per EPA Method 3540. The deeper sampling intervals from the proposed locations will be placed on hold pending the results of the initial samples. If PCBs are detected at concentrations above 1 mg/kg in any of the initial samples, the deeper sampling intervals will be analyzed.

The stainless steel hand augers will be decontaminated between sampling intervals. All decontamination rinse waters and fluids will be collected, containerized, and disposed off-Site at an appropriate facility. In addition, GZA will collect and analyze the following QA/QC samples: one blind duplicate sample to evaluate the reproducibility of the analytical results and potential matrix interferences and one field blank sample to evaluate field decontamination procedures. The duplicate sample will be collected from a homogenized mixture of soil from the 0 to 3-inch sampling interval from one of the samples. The field blank sample will be collected by pouring distilled water through the decontaminated hand auger and collecting and analyzing the rinsate.



### 3.7.2 Concrete Samples

At least one concrete sample will be collected from each of the equipment pads (the sample will be collected from any areas of observed staining on the pads), as depicted on Figure 4. Each concrete pad will be sampled consistent with the 2011 EPA Region I Standard Operating Procedure for Sampling Concrete in the Field. GZA will utilize an impact hammer drill, dedicated 0.75-inch masonry drill bits, and dedicated disposable sampling trays to collect approximately 20 grams of porous materials from the sampling surface to 0.5-inches below grade. Each concrete sample will be submitted for PCB analysis via EPA Method 8082A using manual Soxhlet extraction per EPA Method 3540. In addition, GZA will collect and analyze one blind duplicate sample to evaluate the reproducibility of the analytical results and potential matrix interferences. The duplicate sample will be collected from one of the concrete samples.

### 3.8 ENVIRONMENTAL MONITORING AND HEALTH AND SAFETY PROCEDURES

GZA will prepare a Site specific HASP for this exploration work that addresses the applicable requirements of 29 CFR 1910.120 and 1926.65 to cover field activities performed as part of this investigation program. These procedures will be followed to be protective of worker safety as well as safety to nearby receptors. Prior to exploration operations, an exclusion zone will be set-up around the drilling rig and/or test pit operation to limit access to the work area. This exclusion zone will be maintained and modified as needed during the proposed work activities. Spoils from the drilling activities will be immediately containerized within labeled and sealed 55-gallon drums for future off-Site transport and disposal. It is the intent to backfill each test pit with the spoils upon completion. During intrusive operations, GZA personnel will also collect periodic TVOC readings of worker breathing zone and work zone perimeter (i.e., 50 feet from the drill rig or test pit operation). For worker breathing zone, the TVOC action limit will be set at 5 ppmv. In the event that this level is exceeded, work will immediately stop, the project team will evaluate the conditions based on the project specific health and safety requirements, and necessary adjustments will be made until the activity is deemed safe to continue.

Perimeter real time air quality monitoring will be performed using hand held instruments consistent with the first-tier monitoring described in the April 2011 *Air Quality Monitoring Plan (AQMP)* and the Site Specific HASP. This monitoring will include TVOCs and dust at the work zone perimeter. TVOCs will be monitored using a hand held photoionization detector equipped with a 10.6 eV lamp. Particulate dust will be monitored using a DustTrak. The work zone perimeter action limit for TVOCs and dust will be set at 0.1 ppmv and 150  $\mu\text{g}/\text{m}^3$ , respectively, which are consistent with the Site perimeter action limits established in the AQMP. Consistent with other recent investigation and remediation activities, this air monitoring data will be posted to the Tidewater website ([www.tidewatersite.com](http://www.tidewatersite.com)) and the bulletin boards at the end of Tidewater Street and Bowles Court on a weekly basis.

### 3.9 REPORT PREPARATION

Results of the limited design investigations described herein will be documented in the Remedial Action Work Plan (RAWP) for the Tidewater Site.

## 4.0 **PLANNED SCHEDULE / SEQUENCE**

We currently anticipate that the work described herein will be performed in two phases. The first phase, surface soil and concrete sampling, is planned for late summer 2017. The second phase, test borings and test pits, is planned for the fall of 2017.



## **TABLES**

**Table 1 Proposed Explorations - Test Boring Locations**

LDI Work Plan

Former Tidewater Facility

Pawtucket, Rhode Island

Proposed Explorations	Site Area	Type of Exploration	Method of Installation	Expected Depth of Exploration	General Location / Purpose	Environmental Analytical Testing Proposed	Depth of Analytical Testing
GZ-BW-501	FGPA	Boring	Rotosonic	5 feet into Till (45 feet bgs)	Barrier Wall Evaluation / Air Emissions Evaluation	VOCs 8260B and Naphthalene 8270D	Up to one sample (most field observed impacted sample)
GZ-BW-502	FGPA	Boring	Rotosonic	5 feet into Till (45 feet bgs)	Barrier Wall Evaluation / Air Emissions Evaluation	VOCs 8260B and Naphthalene 8270D	Up to one sample (most field observed impacted sample)
GZ-BW-503	FGPA	Boring	Rotosonic	5 feet into Till (45 feet bgs)	Barrier Wall Evaluation / Air Emissions Evaluation	VOCs 8260B and Naphthalene 8270D	Up to one sample (most field observed impacted sample)
GZ-BW-504	FGPA	Boring	Rotosonic	5 feet into Till (45 feet bgs)	Barrier Wall Evaluation / Air Emissions Evaluation	VOCs 8260B and Naphthalene 8270D	Up to one sample (most field observed impacted sample)
GZ-BW-505	FGPA	Boring	Cased - Wash and Drive	5 feet into Till (45 feet bgs)	Barrier Wall Evaluation / Air Emissions Evaluation	VOCs 8260B and Naphthalene 8270D	Up to one sample (most field observed impacted sample)
GZ-BW-506	FPPA	Boring	Rotosonic	5 feet into Till (50 feet bgs)	Barrier Wall Evaluation / Air Emissions Evaluation	VOCs 8260B and Naphthalene 8270D	Up to one sample (most field observed impacted sample)
GZ-BW-507	FPPA	Boring	Rotosonic	5 feet into Till (50 feet bgs)	Barrier Wall Evaluation / Air Emissions Evaluation	VOCs 8260B and Naphthalene 8270D	Up to one sample (most field observed impacted sample)
GZ-BW-508	FPPA	Boring	Rotosonic	5 feet into Till (50 feet bgs)	Barrier Wall Evaluation / Air Emissions Evaluation	VOCs 8260B and Naphthalene 8270D	Up to one sample (most field observed impacted sample)
GZ-BW-509	FPPA	Boring	Rotosonic	5 feet into Till (50 feet bgs)	Barrier Wall Evaluation / Air Emissions Evaluation	VOCs 8260B and Naphthalene 8270D	Up to one sample (most field observed impacted sample)
GZ-BW-510	FPPA	Boring	Cased - Wash and Drive	5 feet into Till (50 feet bgs)	Barrier Wall Evaluation / Air Emissions Evaluation	VOCs 8260B and Naphthalene 8270D	Up to one sample (most field observed impacted sample)
GZ-BW-511	FPPA	Boring	Rotosonic	5 feet into Till (50 feet bgs)	Barrier Wall Evaluation / Air Emissions Evaluation	VOCs 8260B and Naphthalene 8270D	Up to one sample (most field observed impacted sample)
GZ-BW-512	SFA	Boring	Geoprobe	5 feet into Till (25 feet bgs)	Barrier Wall Evaluation / Air Emissions Evaluation	VOCs 8260B and Naphthalene 8270D	Up to one sample (most field observed impacted sample)
GZ-BW-513	SFA	Boring	Geoprobe	5 feet into Till (25 feet bgs)	Barrier Wall Evaluation / Air Emissions Evaluation	VOCs 8260B and Naphthalene 8270D	Up to one sample (most field observed impacted sample)
GZ-BK-501	NFA	Boring	Rotosonic	5 feet into Till (35 feet bgs)	Bulkhead Evaluation / Air Emissions Evaluation	VOCs 8260B and Naphthalene 8270D	Up to one sample (most field observed impacted sample)
GZ-BK-502	NFA	Boring	Rotosonic	5 feet into Till (35 feet bgs)	Bulkhead Evaluation / Air Emissions Evaluation	VOCs 8260B and Naphthalene 8270D	Up to one sample (most field observed impacted sample)
GZ-BK-503	NFA	Boring	Rotosonic	5 feet into Till (35 feet bgs)	Bulkhead Evaluation / Air Emissions Evaluation	VOCs 8260B and Naphthalene 8270D	Up to one sample (most field observed impacted sample)
GZ-BK-504	FGPA	Boring	Rotosonic	5 feet into Till (35 feet bgs)	Bulkhead Evaluation / Air Emissions Evaluation	VOCs 8260B and Naphthalene 8270D	Up to one sample (most field observed impacted sample)
GZ-BK-505	FGPA	Boring	Rotosonic	5 feet into Till (40 feet bgs)	Bulkhead Evaluation / Air Emissions Evaluation	VOCs 8260B and Naphthalene 8270D	Up to one sample (most field observed impacted sample)
GZ-BK-506	FPPA	Boring	Cased - Wash and Drive	5 feet into Till (50 feet bgs)	Bulkhead Evaluation / Air Emissions Evaluation	VOCs 8260B and Naphthalene 8270D	Up to one sample (most field observed impacted sample)
GZ-BK-507	FPPA	Boring	Rotosonic	5 feet into Till (50 feet bgs)	Bulkhead Evaluation / Air Emissions Evaluation	VOCs 8260B and Naphthalene 8270D	Up to one sample (most field observed impacted sample)

**Table 2 Proposed Explorations - Test Pit Locations**

LDI Work Plan

Former Tidewater Facility

Pawtucket, Rhode Island

Proposed Explorations	Site Area	Type of Exploration	Method of Installation	Expected Depth of Exploration	General Location / Purpose	Environmental Analytical Testing Proposed	Depth of Analytical Testing
GZ-TP-501	NFA	Test Pit	Rubber Tired Backhoe	13 feet bgs or refusal	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
					Air Emissions Evaluation		Up to one additional sample (most field observed impacted sample)
GZ-TP-502	NFA	Test Pit	Rubber Tired Backhoe	13 feet bgs or refusal	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
					Air Emissions Evaluation		Up to one additional sample (most field observed impacted sample)
GZ-TP-503	NFA	Test Pit	Rubber Tired Backhoe	13 feet bgs or refusal	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
					Air Emissions Evaluation		Up to one additional sample (most field observed impacted sample)
GZ-TP-504	NFA	Test Pit	Rubber Tired Backhoe	13 feet bgs or refusal	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
					Air Emissions Evaluation		Up to one additional sample (most field observed impacted sample)
GZ-TP-505	NFA	Test Pit	Rubber Tired Backhoe	13 feet bgs or refusal	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
					Air Emissions Evaluation		Up to one additional sample (most field observed impacted sample)
GZ-TP-506	FGPA	Test Pit	Rubber Tired Backhoe	13 feet bgs or refusal	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
					Air Emissions Evaluation		Up to one additional sample (most field observed impacted sample)
GZ-TP-507	FGPA	Test Pit	Rubber Tired Backhoe	13 feet bgs or refusal	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
					Air Emissions Evaluation		Up to one additional sample (most field observed impacted sample)
GZ-TP-508	FGPA	Test Pit	Rubber Tired Backhoe	13 feet bgs or refusal	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
					Air Emissions Evaluation		Up to one additional sample (most field observed impacted sample)
GZ-TP-509	FGPA	Test Pit	Rubber Tired Backhoe	13 feet bgs or refusal	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
					Air Emissions Evaluation		Up to one additional sample (most field observed impacted sample)
GZ-TP-510	FGPA	Test Pit	Rubber Tired Backhoe	13 feet bgs or refusal	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
					Air Emissions Evaluation		Up to one additional sample (most field observed impacted sample)
GZ-TP-511	FGPA	Test Pit	Rubber Tired Backhoe	13 feet bgs or refusal	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
					Air Emissions Evaluation		Up to one additional sample (most field observed impacted sample)
GZ-TP-512	FGPA	Test Pit	Rubber Tired Backhoe	13 feet bgs or refusal	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
					Air Emissions Evaluation		Up to one additional sample (most field observed impacted sample)

**Table 2 Proposed Explorations - Test Pit Locations**

LDI Work Plan

Former Tidewater Facility

Pawtucket, Rhode Island

Proposed Explorations	Site Area	Type of Exploration	Method of Installation	Expected Depth of Exploration	General Location / Purpose	Environmental Analytical Testing Proposed	Depth of Analytical Testing
GZ-TP-513	FGPA	Test Pit	Rubber Tired Backhoe	13 feet bgs or refusal	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
					Air Emissions Evaluation		Up to one additional sample (most field observed impacted sample)
GZ-TP-514	FGPA	Test Pit	Rubber Tired Backhoe	13 feet bgs or refusal	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
					Air Emissions Evaluation		Up to one additional sample (most field observed impacted sample)
GZ-TP-515	FGPA	Test Pit	Rubber Tired Backhoe	13 feet bgs or refusal	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
					Air Emissions Evaluation		Up to one additional sample (most field observed impacted sample)
GZ-TP-516	FGPA	Test Pit	Rubber Tired Backhoe	Depth of Former Raceway / Piping (5 feet bgs)	Former Raceway Piping	None	None
GZ-TP-517	FGPA	Test Pit	Rubber Tired Backhoe	Depth of Former Raceway / Piping (5 feet bgs)	Former Raceway Piping	None	None
GZ-TP-518	FPPA	Test Pit	Rubber Tired Backhoe	Depth of Former Raceway / Piping (5 feet bgs)	Former Raceway Piping	None	None
GZ-TP-519	FPPA	Test Pit	Rubber Tired Backhoe	Depth of Former Raceway / Piping (5 feet bgs)	Former Raceway Piping	None	None
GZ-TP-520	FPPA	Test Pit	Rubber Tired Backhoe	Depth of Former Raceway / Piping (5 feet bgs)	Former Raceway Piping	None	None
GZ-TP-521	FPPA	Test Pit	Rubber Tired Backhoe	Depth of Former Raceway / Piping (5 feet bgs)	Former Raceway Piping	None	None
GZ-TP-522	FPPA	Test Pit	Rubber Tired Backhoe	Depth of Former Raceway / Piping (5 feet bgs)	Former Raceway Piping	None	None
GZ-TP-523	FPPA	Test Pit	Rubber Tired Backhoe	Depth of Former Raceway / Piping (5 feet bgs)	Former Raceway Piping	None	None

**Table 3 Proposed Explorations - Surface Soil Sample Locations**

LDI Work Plan

Former Tidewater Facility  
Pawtucket, Rhode Island

Proposed Explorations	Site Area	Type of Exploration	Method of Installation	Expected Depth of Exploration	General Location / Purpose	Environmental Analytical Testing Proposed	Depth of Analytical Testing
GZ-SS-501	NFA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-502	NFA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-503	NFA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-504	FGPA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-505	FGPA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-506	FGPA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-507	FGPA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-508	FPPA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-509	FPPA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-510	FPPA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-511	FPPA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-512	FPPA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-513	FPPA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-514	FPPA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-515	FPPA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-516	FPPA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-517	FPPA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-518	FPPA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-519	FPPA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-520	FPPA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-521	FPPA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-522	FPPA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-523	FPPA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-524	FPPA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs



**Table 3 Proposed Explorations - Surface Soil Sample Locations**

LDI Work Plan

Former Tidewater Facility  
Pawtucket, Rhode Island

Proposed Explorations	Site Area	Type of Exploration	Method of Installation	Expected Depth of Exploration	General Location / Purpose	Environmental Analytical Testing Proposed	Depth of Analytical Testing
GZ-SS-525	FPPA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-526	FPPA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-527	FPPA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-528	FPPA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-529	FPPA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-530	FPPA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-531	FPPA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-532	FPPA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-533	FPPA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-534	FPPA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-535	SFA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-536	SFA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-537	SFA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-538	SFA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-539	SFA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-540	SFA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-541	SFA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-542	SFA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-543	SFA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-544	SFA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-545	SFA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-546	SFA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-547	SFA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-548	SFA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs

**Table 3 Proposed Explorations - Surface Soil Sample Locations**

LDI Work Plan

Former Tidewater Facility

Pawtucket, Rhode Island

Proposed Explorations	Site Area	Type of Exploration	Method of Installation	Expected Depth of Exploration	General Location / Purpose	Environmental Analytical Testing Proposed	Depth of Analytical Testing
GZ-SS-549	SFA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-550	SFA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-551	SFA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-552	SFA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-553	SFA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-554	SFA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-555	SFA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-556	SFA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-557	SFA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-558	SFA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-559	FPPA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-560	FPPA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-561	FPPA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-562	FPPA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs
GZ-SS-563	FPPA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Cap Modification / Air Emissions Evaluation	VOCs 8260B, PAHs 8270D, PP13 Metals 6010/6020/7471, TCN 9010B, TPH 8100M	0-2 feet bgs

**Table 4 Proposed Explorations - Former Transformer Area**

LDI Work Plan  
Former Tidewater Facility  
Pawtucket, Rhode Island

Proposed Explorations	Site Area	Type of Exploration	Method of Installation	Expected Depth of Exploration	General Location / Purpose	Environmental Analytical Testing Proposed	Depth of Analytical Testing
GZ-SS-FT-501	FPPA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Former Transformer Area	PCBS 8082A with manual soxhlet extraction 3540	0-3 inches, hold remainder of increments (9-12 inches and 21-24 inches)
GZ-SS-FT-502	FPPA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Former Transformer Area	PCBS 8082A with manual soxhlet extraction 3541	0-3 inches, hold remainder of increments (9-12 inches and 21-24 inches)
GZ-SS-FT-503	FPPA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Former Transformer Area	PCBS 8082A with manual soxhlet extraction 3542	0-3 inches, hold remainder of increments (9-12 inches and 21-24 inches)
GZ-SS-FT-504	FPPA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Former Transformer Area	PCBS 8082A with manual soxhlet extraction 3543	0-3 inches, hold remainder of increments (9-12 inches and 21-24 inches)
GZ-SS-FT-505	FPPA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Former Transformer Area	PCBS 8082A with manual soxhlet extraction 3544	0-3 inches, hold remainder of increments (9-12 inches and 21-24 inches)
GZ-SS-FT-506	FPPA	Surface Soil Sample	Hand Auger / Shovel	2 feet bgs	Former Transformer Area	PCBS 8082A with manual soxhlet extraction 3545	0-3 inches, hold remainder of increments (9-12 inches and 21-24 inches)
GZ-CS-501	FPPA	Concrete Sample	Hammer Drill	1/2-inch	Former Transformer Area	PCBS 8082A with manual soxhlet extraction 3545	0-1/2 inch
GZ-CS-502	FPPA	Concrete Sample	Hammer Drill	1/2-inch	Former Transformer Area	PCBS 8082A with manual soxhlet extraction 3546	0-1/2 inch
GZ-CS-503	FPPA	Concrete Sample	Hammer Drill	1/2-inch	Former Transformer Area	PCBS 8082A with manual soxhlet extraction 3547	0-1/2 inch
GZ-CS-504	FPPA	Concrete Sample	Hammer Drill	1/2-inch	Former Transformer Area	PCBS 8082A with manual soxhlet extraction 3548	0-1/2 inch
GZ-CS-505	FPPA	Concrete Sample	Hammer Drill	1/2-inch	Former Transformer Area	PCBS 8082A with manual soxhlet extraction 3549	0-1/2 inch
GZ-CS-506	FPPA	Concrete Sample	Hammer Drill	1/2-inch	Former Transformer Area	PCBS 8082A with manual soxhlet extraction 3550	0-1/2 inch
GZ-CS-507	FPPA	Concrete Sample	Hammer Drill	1/2-inch	Former Transformer Area	PCBS 8082A with manual soxhlet extraction 3551	0-1/2 inch
GZ-CS-508	FPPA	Concrete Sample	Hammer Drill	1/2-inch	Former Transformer Area	PCBS 8082A with manual soxhlet extraction 3552	0-1/2 inch



## FIGURES

# LIMITED DESIGN INVESTIGATION (LDI) WORK PLAN FORMER TIDEWATER FACILITY PAWTUCKET, RHODE ISLAND

## JUNE 2017

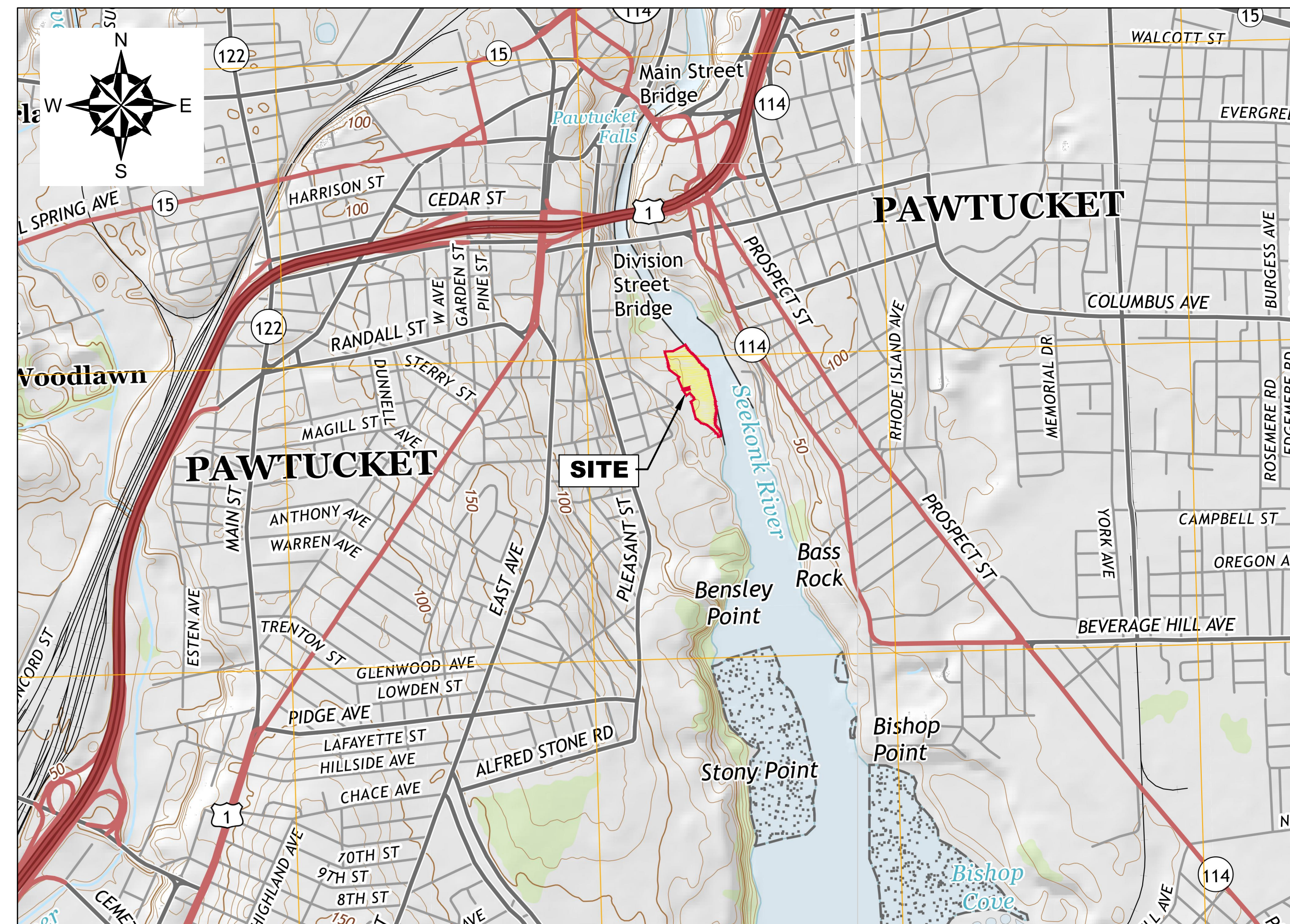
PREPARED FOR:

**nationalgrid**

PREPARED BY:



**GZA**  
GeoEnvironmental, Inc.  
Engineers and Scientists  
530 Broadway  
Providence, Rhode Island 02909



**PROJECT LOCUS MAP**

SOURCE: USGSSTORE.GOV



INDEX OF DRAWINGS	
SHEET #	SHEET TITLE
1	COVER SHEET AND SITE LOCUS PLAN
2	PROPOSED EXPLORATION LOCATION PLAN - NORTH FILL AREA AND FORMER GAS PLANT AREA
3	PROPOSED EXPLORATION LOCATION PLAN - FORMER POWER PLANT AREA AND SOUTH FILL AREA
4	PROPOSED EXPLORATION LOCATION PLAN - FORMER TRANSFORMER AREA

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**PROPOSED SAMPLE LEGEND:**

- PROPOSED BULKHEAD BORING
- PROPOSED BARRIER WALL BORING
- PROPOSED SURFACE SOIL SAMPLE LOCATION
- PROPOSED TEST PIT

**GENERAL NOTES:**

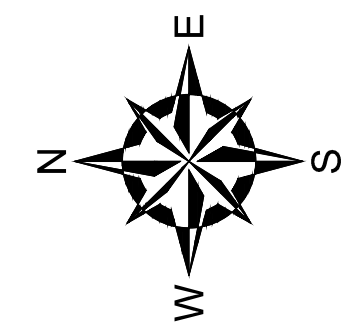
- 1) BASE MAP DEVELOPED FROM THE FOLLOWING:
  - ELECTRONIC CAD FILE "AERO1408\_PROJECT.DWG" TITLED DIGITAL PHOTOGRAMMETRIC MAPPING FOR TIDEWATER, DATED JUNE 27, 2016, ORIGINAL SCALE 1" = 40', CREATED BY AEROTECH CORP. FOR GZA.
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- 2) HORIZONTAL DATUM IS BASED ON NAD 1983 FROM BASE MAPPING PROVIDED BY AEROTECH CORP.
- 3) VERTICAL DATUM IS BASED ON NAVD 1988 FROM BASE MAPPING PROVIDED BY AEROTECH CORP.
- 4) ON-SITE INVESTIGATIONS AND SURVEYS BY GZA PERSONNEL DURING VARIOUS SITE VISITS BETWEEN 2016 AND 2017.
- 5) SITE BOUNDARIES ARE APPROXIMATE.

**LEGEND:**

- EXISTING CONTOUR (MAJOR 5-FOOT INTERVAL)
- EXISTING CONTOUR (MINOR 1-FOOT INTERVAL)
- 200 FOOT CRMC SETBACK
- EXISTING PAVEMENT
- EASEMENT AREA
- PROPERTY LINE
- EDGE OF WATER
- EXISTING FENCE
- SITE BOUNDARY
- SITE AREA BOUNDARIES
- PROPOSED CONTAINMENT WALL
- CATCH BASIN
- MANHOLE
- UTILITY POLE
- LIGHT POLE
- LIGHT POST
- HYDRANT
- PROPOSED SOURCE REMOVAL AREAS

**SAMPLE LEGEND**

- SS-9 ATLANTIC SURFACE SOIL SAMPLE LOCATION
- TSED-6 ATLANTIC SEDIMENT SAMPLE LOCATION
- W-BVE SS-3 WESTON/BLACKSTONE VALLEY ELECTRIC SEDIMENT SAMPLE LOCATION
- RDEM SS-3 RIDEM SURFACE SOIL SAMPLE LOCATION
- B-109/MW-109 MONITORING WELL/BORING (VHB) SURVEYED
- TP-3A ATLANTIC TEST PIT LOCATION
- W-BVE WESTON/BLACKSTONE VALLEY ELECTRIC TEST PIT LOCATION
- GZA TP-8 GZAVALLEY GAS TEST PIT LOCATION
- TB-15 ATLANTIC SOIL BORING LOCATION
- MW-3 ATLANTIC MONITORING WELL LOCATION
- M&E MW-1 METCALF & EDDY MONITORING WELL LOCATION
- VHB-400 VHB SURFACE SOIL SAMPLE LOCATION NON-SURVEYED
- TP-204 VHB TEST PIT (2006)
- GZ-01 GZA TEST PIT (2009)
- TB-300 GZA TEST BORING LOCATION (2010-2011)
- MW-320 S/D GZA MONITORING WELL LOCATION (2010-2011)
- TP-306 GZA TEST PIT LOCATION (2010)
- SS-100 GZA SURFACE SOIL SAMPLE LOCATION (2010)
- SC31 ARCADIS SEDIMENT SAMPLE LOCATION (2008)
- PIPE-1-061610 GZA RESIDUAL MATERIAL SAMPLE (2010)
- SG-200 INTERIOR SOIL GAS SAMPLING LOCATION
- SG-100 PERIMETER SOIL GAS SAMPLING LOCATION
- TB-400 GZA BORING LOCATION (2014)
- MW-400 GZA MONITORING WELL LOCATION (2014)



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**LIMITED DESIGN INVESTIGATION (LDI) WORK PLAN  
FORMER TIDEWATER FACILITY  
PAWTUCKET, RHODE ISLAND**

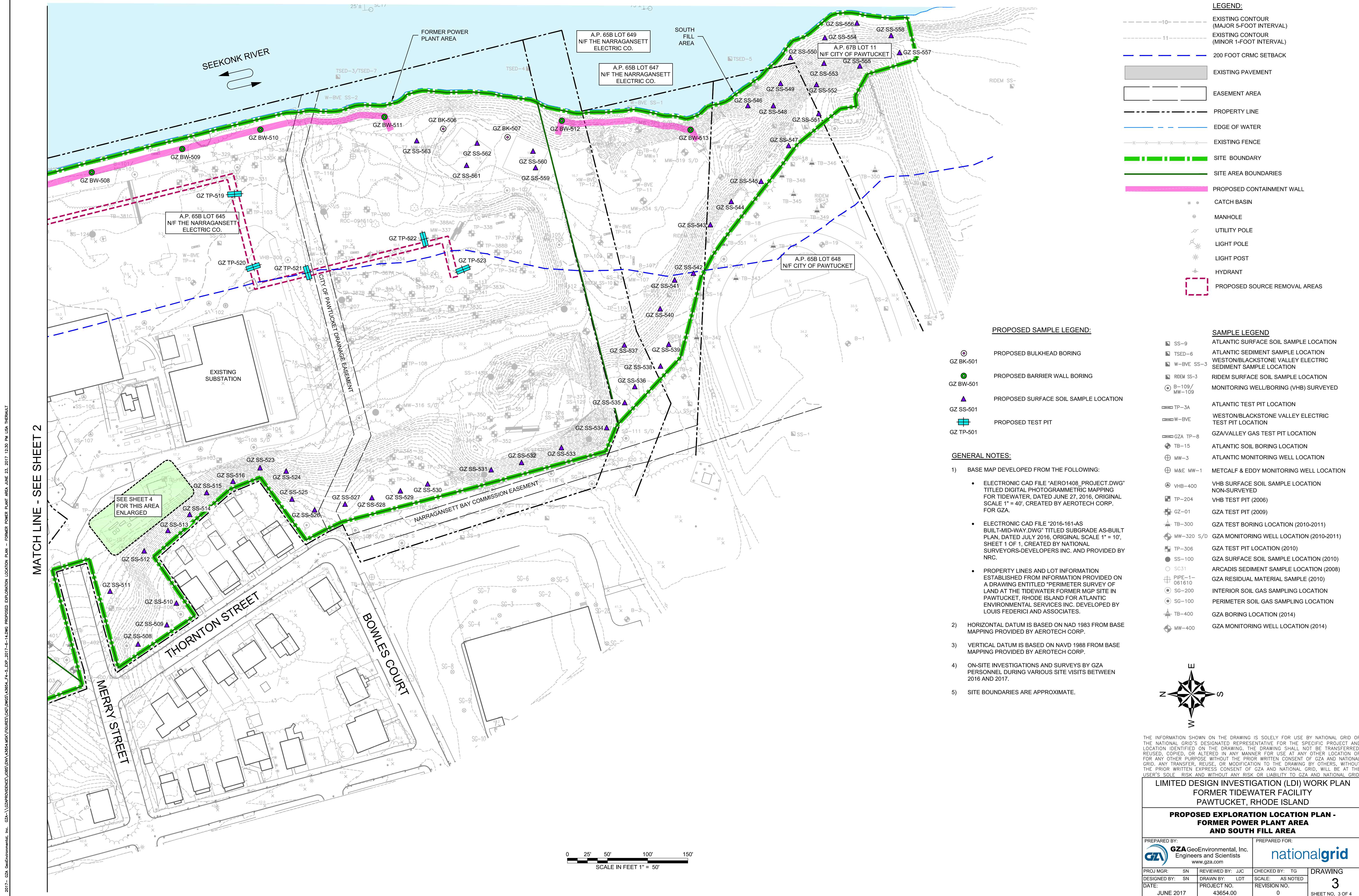
**PROPOSED EXPLORATION LOCATION PLAN -  
NORTH FILL AREA AND FORMER GAS PLANT AREA**

PREPARED BY: GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com		PREPARED FOR: nationalgrid	
PROJ MGR: SN	REVIEWED BY: JJC	CHECKED BY: TG	DRAWING
DESIGNED BY: SN	DRAWN BY: LDT	SCALE: AS NOTED	2
DATE: JUNE 2017	PROJECT NO. 43654.00	REVISION NO. 0	SHEET NO. 2 OF 4

2017 - GZA GeoEnvironmental, Inc. GZA-\\GZAPROJ\DESIGN\PAWTUCKET\LDI\GZA\DWG\PROPOSED\_EXPLOATION\_LOCATION\_PLAN - NORTH\_FILL\_AREA\_AND\_FORMER\_GAS\_PLANT\_AREA.dwg, PLOT DATE: 6/23/2017 12:22 PM LGA THERIAULT

MATCH LINE - SEE SHEET 3





**LEGEND:**

---10---	EXISTING CONTOUR (MAJOR 5-FOOT INTERVAL)
---11---	EXISTING CONTOUR (MINOR 1-FOOT INTERVAL)
---	200 FOOT CRMC SETBACK
█	EXISTING PAVEMENT
□	EASEMENT AREA
---	PROPERTY LINE
---	EDGE OF WATER
---	EXISTING FENCE
---	SITE BOUNDARY
---	SITE AREA BOUNDARIES
█	PROPOSED CONTAINMENT WALL
○	CATCH BASIN
○	MANHOLE
○	UTILITY POLE
○	LIGHT POLE
○	LIGHT POST
○	HYDRANT
---	PROPOSED SOURCE REMOVAL AREAS

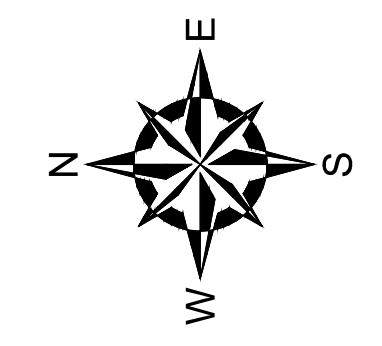
**PROPOSED SAMPLE LEGEND:**

○	PROPOSED BULKHEAD BORING
○	PROPOSED BARRIER WALL BORING
▲	PROPOSED SURFACE SOIL SAMPLE LOCATION
□	PROPOSED TEST PIT

**SAMPLE LEGEND**

○	ATLANTIC SURFACE SOIL SAMPLE LOCATION
○	ATLANTIC SEDIMENT SAMPLE LOCATION
○	WESTON/BLACKSTONE VALLEY ELECTRIC SEDIMENT SAMPLE LOCATION
○	RIDEM SURFACE SOIL SAMPLE LOCATION
○	MONITORING WELL/BORING (VHB) SURVEYED
○	ATLANTIC TEST PIT LOCATION
○	WESTON/BLACKSTONE VALLEY ELECTRIC TEST PIT LOCATION
○	ATLANTIC SOIL BORING LOCATION
○	ATLANTIC MONITORING WELL LOCATION
○	M&E MW-1 METCALF & EDDY MONITORING WELL LOCATION
○	VHB SURFACE SOIL SAMPLE LOCATION NON-SURVEYED
○	VHB TEST PIT (2006)
○	GZA TEST PIT (2009)
○	GZA TEST BORING LOCATION (2010-2011)
○	GZA MONITORING WELL LOCATION (2010-2011)
○	GZA TEST PIT LOCATION (2010)
○	GZA SURFACE SOIL SAMPLE LOCATION (2010)
○	ARCADIS SEDIMENT SAMPLE LOCATION (2008)
○	GZA RESIDUAL MATERIAL SAMPLE (2010)
○	INTERIOR SOIL GAS SAMPLING LOCATION
○	PERIMETER SOIL GAS SAMPLING LOCATION
○	GZA BORING LOCATION (2014)
○	GZA MONITORING WELL LOCATION (2014)

- GENERAL NOTES:**
- BASE MAP DEVELOPED FROM THE FOLLOWING:
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**LIMITED DESIGN INVESTIGATION (LDI) WORK PLAN  
FORMER TIDEWATER FACILITY  
PAWTUCKET, RHODE ISLAND**

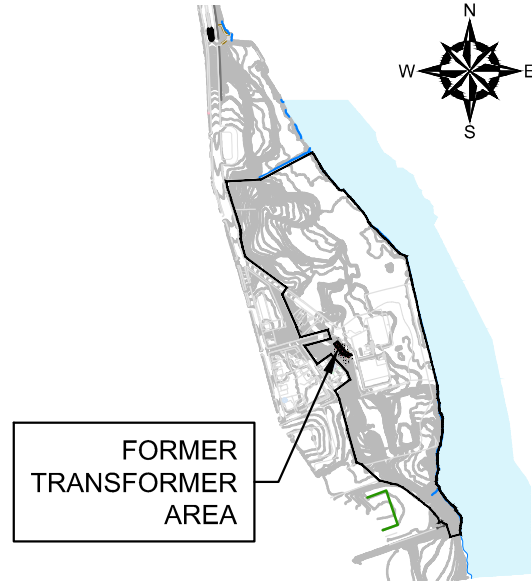
**PROPOSED EXPLORATION LOCATION PLAN -  
FORMER POWER PLANT AREA  
AND SOUTH FILL AREA**

PREPARED BY: <b>GZA</b> GeoEnvironmental, Inc. Engineers and Scientists www.gza.com		PREPARED FOR: <b>nationalgrid</b>	
PROJ MGR: SN	DESIGNED BY: SN	REVIEWED BY: JJC	CHECKED BY: TG
DATE: JUNE 2017	PROJECT NO.: 43654.00	DRAWN BY: LDT	SCALE: AS NOTED
		REVISION NO.: 0	DRAWING NO.: 3
			SHEET NO. 3 OF 4

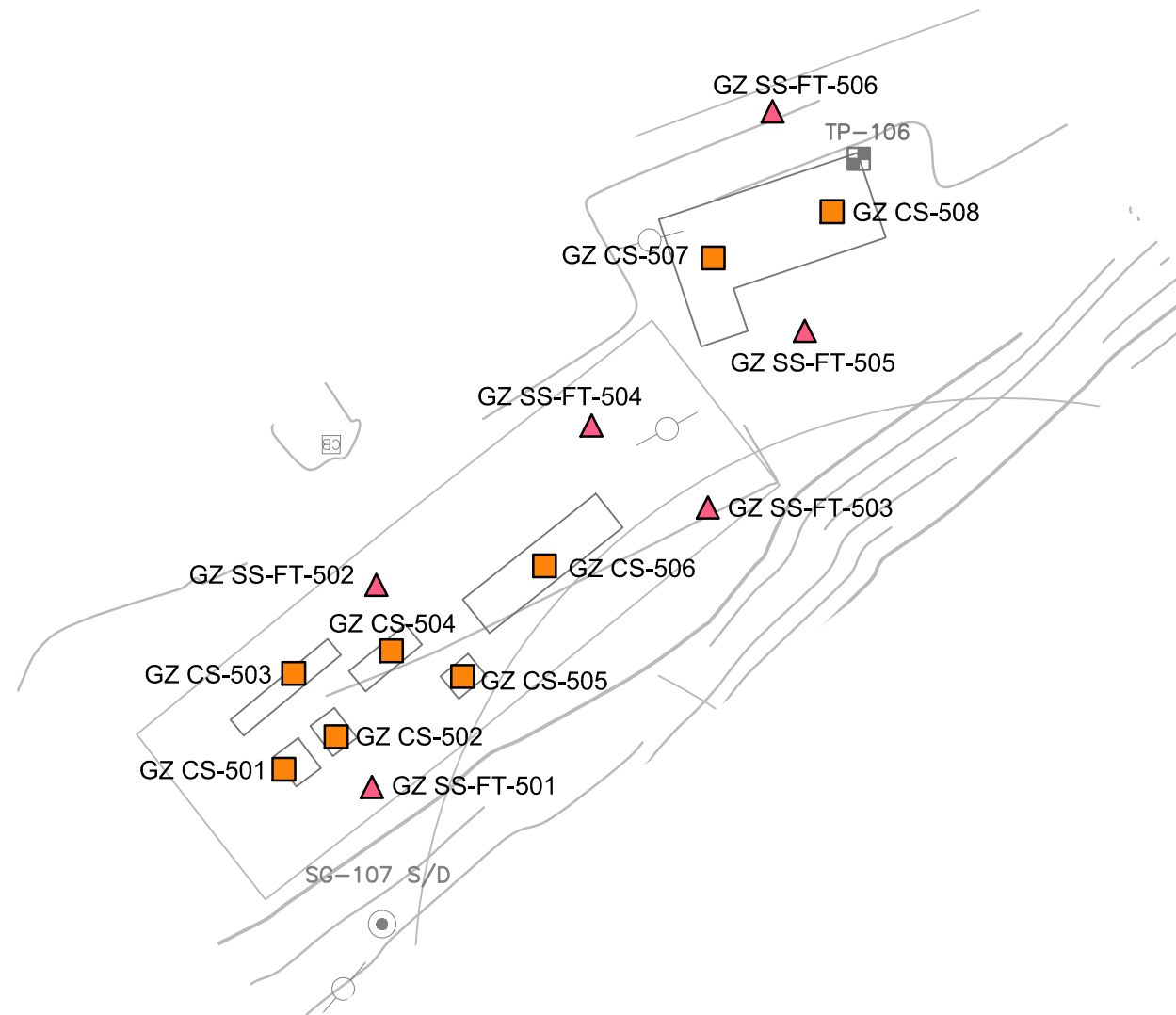


MATCH LINE - SEE SHEET 2

2017 - GZA, GeoEnvironmental, Inc. GZA-1\ZAPPROVAL\DESIGN\DWG\43654\LDI\WORK PLAN - FORMER POWER PLANT AREA June 23, 2017 12:30 PM LISA THERIAULT

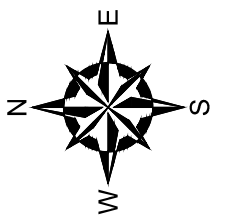


**KEY PLAN:**  
SCALE: 1"=1000'



**PROPOSED SAMPLE LEGEND:**

- PROPOSED CONCRETE SAMPLE LOCATION
- GZ CS-501
- ▲ PROPOSED SURFACE SOIL SAMPLE LOCATION
- GZ SS-FT-501



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LIMITED DESIGN INVESTIGATION (LDI) WORK PLAN FORMER TIDEWATER FACILITY PAWTUCKET, RHODE ISLAND			
<b>PROPOSED EXPLORATION LOCATION PLAN -                  FORMER TRANSFORMER AREA</b>			
PREPARED BY: <b>GZA</b> GeoEnvironmental, Inc. Engineers and Scientists www.gza.com		PREPARED FOR: 	
PROJ MGR: SN	REVIEWED BY: JJC	CHECKED BY: TG	DRAWING <b>4</b> SHEET NO. 4 OF 4
DESIGNED BY: SN	DRAWN BY: LDT	SCALE: AS NOTED	
DATE: JUNE 2017	PROJECT NO. 43564.00	REVISION NO. 0	





**APPENDIX A**  
LIMITATIONS



## USE OF REPORT

1. GZA GeoEnvironmental, Inc. (GZA) prepared this Limited Design Investigation Work Plan (LDI Work Plan) (herein identified as the report) on behalf of, and for the exclusive use of our Client, National Grid for the stated purpose(s) and location(s) identified in the LDI Work Plan. Use of this report, in whole or in part, at other locations, or for other purposes, may lead to inappropriate conclusions; and we do not accept any responsibility for the consequences of such use(s). Further, reliance by any party not expressly identified in the agreement, for any use, without our prior written permission, shall be at that party's sole risk, and without any liability to GZA.

## STANDARD OF CARE

2. GZA's findings and conclusions are based on the work conducted as part of the Scope of Services set forth in the Proposal for Services and/or Report and reflect our professional judgment. These findings and conclusions must be considered not as scientific or engineering certainties, but rather as our professional opinions concerning the limited data gathered during the course of our work. Conditions other than described in this report may be found at the subject location(s).
3. GZA's services were performed using the degree of skill and care ordinarily exercised by qualified professionals performing the same type of services, at the same time, under similar conditions, at the same or a similar property. No warranty, expressed or implied, is made. Specifically, GZA does not and cannot represent that the Site contains no hazardous material, oil, or other latent condition beyond that observed by GZA during its study. Additionally, GZA makes no warranty that any response action or recommended action will achieve all of its objectives or that the findings of this study will be upheld by a local, state or federal agency.
4. In conducting our work, GZA relied upon certain information made available by public agencies, National Grid and/or others. GZA did not attempt to independently verify the accuracy or completeness of that information. Inconsistencies in this information which we have noted, if any, are discussed in the Report.

## SUBSURFACE CONDITIONS

5. The generalized soil profile(s) provided in our Report are based on widely-spaced subsurface explorations and are intended only to convey trends in subsurface conditions. The boundaries between strata are approximate and idealized, and were based on our assessment of subsurface conditions. The composition of strata, and the transitions between strata, may be more variable and more complex than indicated. For more specific information on soil conditions at a specific location refer to the exploration logs. The nature and extent of variations between these explorations may not become evident until further exploration or construction. If variations or other latent conditions then become evident, it will be necessary to reevaluate the conclusions and recommendations of this report.
6. Water level readings have been made, as described in this Report, in and monitoring wells at the specified times and under the stated conditions. These data have been reviewed and interpretations have been made in this report. Fluctuations in the level of the groundwater however occur due to temporal or spatial variations in areal recharge rates, soil heterogeneities, the presence of subsurface utilities, and/or natural or artificially induced perturbations. The observed water table may be other than indicated in the Report.

## COMPLIANCE WITH CODES AND REGULATIONS

7. We used reasonable care in identifying and interpreting applicable codes and regulations necessary to execute our scope of work. These codes and regulations are subject to various, and possibly contradictory, interpretations. Interpretations and compliance with codes and regulations by other parties is beyond our control.



## SCREENING AND ANALYTICAL TESTING

8. GZA collected environmental samples at the locations identified in the Report. These samples were analyzed for the specific parameters identified in the report. Additional constituents, for which analyses were not conducted, may be present in soil, groundwater, surface water, sediment and/or air. Future Site activities and uses may result in a requirement for additional testing.
9. Our interpretation of field screening and laboratory data is presented in the Report. Unless otherwise noted, we relied upon the laboratory's QA/QC program to validate these data.
10. Variations in the types and concentrations of contaminants observed at a given location or time may occur due to release mechanisms, disposal practices, changes in flow paths, and/or the influence of various physical, chemical, biological or radiological processes. Subsequently observed concentrations may be other than indicated in the Report.

## INTERPRETATION OF DATA

11. Our opinions are based on available information as described in the Report, and on our professional judgment. Additional observations made over time, and/or space, may not support the opinions provided in the Report.

## ADDITIONAL INFORMATION

12. In the event that the National Grid or others authorized to use this report obtain additional information on environmental or hazardous waste issues at the Site not contained in this report, such information shall be brought to GZA's attention forthwith. GZA will evaluate such information and, on the basis of this evaluation, may modify the conclusions stated in this report.

## ADDITIONAL SERVICES

13. GZA recommends that we be retained to provide services during any future investigations, design, implementation activities, construction, and/or property development/ redevelopment at the Site. This will allow us the opportunity to: i) observe conditions and compliance with our design concepts and opinions; ii) allow for changes in the event that conditions are other than anticipated; iii) provide modifications to our design; and iv) assess the consequences of changes in technologies and/or regulations.



## **APPENDIX B**

### **SOIL/WASTE CHARACTERIZATION PROTOCOL FOR FORMER MANUFACTURED GAS PLANTS**



**nationalgrid**

## **SOIL/WASTE CHARACTERIZATION PROTOCOL FOR FORMER MANUFACTURED GAS PLANT (MGP) SITES NATIONAL GRID**

GZA GeoEnvironmental, Inc. (GZA) has adopted this protocol to standardize the characterization of contaminated media and the stratigraphy at MGP sites. Consistent documentation of observed impacts and characterization data is a critical element in the development of remedial strategies. GZA's adherence to the protocols described herein will facilitate the development of consistent documentation and reporting associated with our investigation of National Grid MGP sites.

### **SOIL SAMPLE DESCRIPTIONS**

It is important that descriptive qualifiers are consistently used to characterize the degree and nature of observed impacts. The following presents examples of descriptive qualifiers that will be used when logging soil borings.

### **SOIL LOGGING**

- All soils are to be logged using the modified Burmister Soil Classification
- PID or FID used to screen all soil samples (consistent with the Jar Headspace Method) –all readings will be recorded and included on the logs, not just the highest.
- Moisture terms: Dry, Moist and Wet.
- Color terms - use geotechnical color charts - colors may be combined: e.g., red-brown.
- Log will include: Moisture, Color, grain sizes (lower case), **DOMINANT GRAIN SIZE (CAPS)**, sorting, cohesive or non-cohesive, plasticity of cohesive soils, density description, blow counts ("N" values), water level, PID readings and environmental/depositional/geologic descriptions.
- Representativeness - Soil logs will include particular notes if the field representative believes that there is a possibility the soil sample being described is not representative of the interval sampled.

- Logs will include descriptive notes on observations of waste materials, separate phase product, etc., consistent with the nomenclature described below.
- All samples will be photographed which will be noted on the boring logs.
- Boring log formats will be consistent for all National Grid projects.

## **PHOTOGRAPHIC EVIDENCE**

Field personnel will be prepared to record photographs of evidence of contamination during all investigation events. In addition, clean samples will also be photographed to document areas of no observed impact. The photographic evidence will serve to support the written descriptions of contamination as described herein. A log of the photograph will be maintained, which clearly identifies sample location, date of sample collection, exploration identification and sample identification. The recording of photographs will also be recorded on the boring logs.

## **DESCRIPTION OF CONTAMINANTS**

The following describes the terms to be used when describing observations of impact at National Grid MGP sites. These terms will be used consistently on the boring logs, report text, tables and figures.

**Sheen** - iridescent petroleum-like sheen. Not to be used to describe a "bacterial sheen" that can be distinguished by its tendency to break up on the water surface at angles whereas petroleum sheen will be continuous and will not break up. A field test for sheen is to put a soil or pre-purge groundwater sample in a jar of water and shake the sample (jar shake test), then observe and record the presence/absence of sheen on the surface of the water in the jar.

**Stained** - used with color (i.e., black or brown stained) to indicate that the soil matrix is stained a color other than the natural (non-impacted) color.

**Coated** - soil grains are coated with tar/free product - there is not sufficient free phase material present to saturate the pore spaces.

**Blebs** - observed discrete sphericals of tar/free product - but for the most part the soil matrix was not visibly contaminated or saturated. Typically this is residual product.

**Saturated** - the entirety of the pore space of a sample is saturated with the tar/free product. Care should be taken to ensure that what is being observed is not water saturating the pore spaces if this term is used. Depending on viscosity, tar/free phase saturated materials may freely drain from a soil sample.

**Oil** - Used to characterize free and/or residual product that exhibits a distinct fuel oil or diesel fuel like odor; distinctly different from MGP-related odors/impacts.

**Tar** - Used to describe free and/or residual product that exhibits a distinct "coal tar" type odor (e.g., naphthalene-like odor). Weathered tars may not exhibit an odor and are identified on a visual basis. Colors of product can be brown, black, reddish-brown, or gold.

**Solid Tar** - Used to describe product that is solid or semi-solid phase. The magnitude of the observed solid tar should be described (e.g., discrete granules or a solid layer).

**Purifier Wastes**- Purifier wastes are commonly identified by their distinctive blue/green color. Other colors may be present including indigo (deep blue) or brown/rust. Typically purifier waste materials contain wood chips, oyster or clam shells or granular material. The waste material may have a distinctive sulfur-like odor when freshly exposed to air.

**Coal Ash /Clinker** - Odorless, grey or black in color. Clinker may exhibit glazing.

### **Olfactory Descriptors**

Use terms such as "tar-like odor" or "naphthalene-like odor" (i.e., mothball-like) or "fuel oil-like odor" that provide a qualitative description (opinion) as to the possible source of the odor. Use modifiers such as "strong," "moderate," and "faint" to indicate the relative intensity of the odor.

### **DNAPL/LNAPL**

A jar shake test may be performed to identify and determine whether observed tar/free-phase product is either denser or lighter than water. In addition, MGP residues can include both light and dense phases - this test can help determine if both light and dense phase materials are present at a particular location.

### **Viscosity of Free-Phase Product**

If free-phase product/tar is present, a qualitative description of viscosity will be made, such as:

- Highly viscous (e.g., taffy-like)
- Viscous (e.g. No.6 fuel oil or bunker crude like)
- Low viscosity (e.g. No.2 fuel oil like)

## **GROUNDWATER SAMPLING OBSERVATIONS**

Any observations of sheen, blebs, free-phase product/tar, staining or coating of the sampling equipment, odor, etc., that are made during sampling of groundwater are to be included in the groundwater sample collection log.



GZA GeoEnvironmental, Inc.