

February 7, 2014  
File No. 05.0043654.00

**Via E-Mail and U.S. Mail**



530 Broadway  
Providence  
Rhode Island  
02909  
401-421-4140  
FAX 401-751-8613  
<http://www.gza.com>

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

Re: Supplemental Site Investigation Work Plan  
Limited Soil and Groundwater Sampling and Analysis  
Former Tidewater Facility  
Pawtucket, Rhode Island

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 *Supplemental Site Investigation Work Plan (SSIWP)* for your review. This *SSIWP* describes proposed soil and groundwater investigation activities to assess localized benzene soil gas levels within the natural gas regulator station fence line.

Please feel free to contact either of the undersigned or Michele Leone at 781-907-3651 should you have any questions.

Very truly yours,

GZA GEOENVIRONMENTAL, INC.

A handwritten signature in blue ink, appearing to read 'Margaret S. Kilpatrick'.

Margaret S. Kilpatrick, P.E.  
Senior Project Manager

A handwritten signature in blue ink, appearing to read 'James J. Clark'.

James J. Clark, P.E.  
Principal

MSK/JJC:tja

Attachment: *SSIWP*

cc: Barbara Morin, RIDEM  
Michele Leone, National Grid

## 1.00 INTRODUCTION



On behalf of The Narragansett Electric Company, d/b/a National Grid (National Grid), GZA GeoEnvironmental Inc. (GZA) has prepared this *Supplemental Site Investigation Work Plan (SSIWP) Addendum* 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 address a data gap identified during the soil gas testing performed at the Site between July and August 2013.

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. A *Site Investigation Data Report (SIDR)* was submitted to Rhode Island Department of Environmental Management (RIDEM) in January of 2011. This SIDR was prepared consistent with applicable sections of Rule 7.00 of the RIDEM Rules and Regulations for the Investigation and Remediation of Hazardous Material Releases (Remediation Regulations–DEM-DSR-01-93). A *Remedial Alternative Evaluation* was performed and submitted to RIDEM on July 29, 2011. This evaluation, combined with the January 2011 SIDR fulfilled the requirements of Sections 7.03, 7.04, and 7.05 of the Remediation Regulations for a *Site Investigation Report (SIR)*.

As indicated above, the investigation tasks described herein are designed to fill a data gap identified as a result of our 2013 soil gas investigations. These soil gas investigations, conducted in response to community requests, were performed consistent with the May 2013 *SSIWP* submitted to RIDEM. The results of the soil gas investigation activities were submitted to RIDEM in October 2013 in a *Site Investigation Report (SIR) Addendum*. This report recommended the completion of soil and groundwater investigation activities to assess localized benzene soil gas levels within the natural gas regulator station fence line.

The Site has been subdivided into four areas based on their geographic location, past use and/or past occupants. The identified data gaps addressed in this *SSIWP Addendum* pertain to an area south of the natural gas regulating station in the Former Gas Plant Area (FGPA) and the Former Power Plant Area (FPPA) only. Figures 2A and Figures 2B, *Existing Exploration Locations* and Figure 3, *Proposed Exploration Locations*, present the location and configuration of the work area.



This *SSIWP Addendum* is organized as follows:

- Section 1.00 contains this introduction;
- Section 2.00 describes the data gap to be investigated;
- Section 3.00 presents the proposed scope of this study; and
- Section 4.00 describes the anticipated schedule.

For details regarding existing and historic Site conditions, including Site plans, previous Site investigations, hydrogeologic setting and observed impacts, please refer to the January 2011 *SIDR* and the October 2013 *SIR Addendum* which are available on the Tidewater website ([www.tidewatersite.com](http://www.tidewatersite.com)).

## 2.00 DATA GAP IDENTIFICATION

Between July and August 2013, GZA completed soil gas sampling and testing at the Site consistent with the May 2013 *SSIWP* that National Grid submitted to RIDEM. As described in the October 2013 *SIR Addendum* submitted to RIDEM in October 2013, the purpose of the testing was to measure the quality of soil gas at interior Site locations and along the Site's western boundary in order to assess the quality of soil gas at the Tidewater Site and near neighboring properties. The results indicated that potential migration of impacted soil gas from the Tidewater Site does not pose a risk to the neighboring properties and structures. As described in the *SIR Addendum*, the observations made during the soil gas investigation program and the analytical testing results do not alter the conclusions presented in the *SIR* prepared for the Site.

The results of the interior soil gas testing were consistent with previous soil and groundwater testing at the Site, with the exception of concentrations of benzene detected in the shallow soil gas sample identified as SG-105S, collected at a depth of 5 feet below ground surface (bgs). As shown on Figure 3, SG-105 is located proximate to the perimeter of the Site, near the natural gas regulating station and is located at least 120 feet from an occupied building. At this location, benzene was detected at a concentration of 1,700  $\mu\text{g}/\text{m}^3$ . This concentration is below the Connecticut Department of Energy and Environmental Protection (CTDEEP) residential criteria and above both the New Jersey Department of Environmental Protection (NJDEP) residential and industrial/commercial screening levels and the Massachusetts Department of Environmental Protection (MADEP) residential and industrial/commercial screening levels<sup>1</sup>. The concentration of benzene detected in the deeper (collected at 11 feet bgs) soil gas sample from SG-105D were well below regulatory screening levels or criteria. To confirm that soil gas was not migrating from SG-105S toward the neighboring buildings, another probe (SG-114S) was installed. As shown on Figure 3, SG-114S is located approximately 75 feet to the south of SG-105S and at least 70 feet from an occupied building. The concentrations detected in the

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<sup>1</sup> RIDEM has not defined any soil gas screening levels or criteria to evaluate the potential for vapor intrusion. For the purpose of the 2013 soil gas investigation, soil gas results were compared to criteria and/or screening values for nearby states, specifically to soil gas criteria published by the CTDEEP and to soil gas screening levels published by the NJDEP and the MADEP. For further details, please refer to GZA's October 2013 Soil Gas *SIR Addendum*.

sample collected from 5 feet bgs at location SG-114S were well below regulatory screening levels and criteria from nearby states. The isolated nature of the benzene concentration detected in SG-105S suggests a localized source.



Historical records of the area directly surrounding SG-105 indicate that the configuration of Merry Street was formerly directly parallel with the natural gas regulating building, suggesting that SG-105 is located in an area that was once part of Merry Street. In addition, these records indicate that the surrounding area may have been used for residential purposes until the natural gas regulating building was constructed in the mid-1950s.

As recommended in our October 2013 *SIR Addendum* and as described below, additional soil and groundwater sampling will be performed to further evaluate the detection of benzene in soil gas at SG-105S. This information will be used to assess the source of the benzene detected in soil gas, as well as extent of the impacts in that area. The results of this investigation will supplement the SIR (January 2011 SIDR and July 2011 Remedial Alternative Evaluation) for the Tidewater Site.

### **3.00 PROPOSED SCOPE OF WORK**

GZA proposes to perform a supplemental subsurface investigation program consisting of the completion of soil borings and installation of groundwater monitoring wells designed to address the data gap identified in Section 2.00. Proposed exploration locations are shown on the attached Figure 3. Please note that based on field conditions and the results of utility clearance, the exact locations of the proposed explorations are subject to modification. Consistent with the SIDR, in areas where significant visual impacts have been identified or are observed, analytical testing will be limited. (Refer to the Soil/Waste Characterization Protocol For Former Manufactured Gas Plants provided in Appendix A). Fieldwork associated with the subsurface exploration program will be completed in accordance with the *Health and Safety Plan* (HASP) prepared for the project.

The following summarizes the work scope included in this *SSIWP Addendum*.

#### *Abutter Notification*

In accordance with Section 7.07A of the Remediation Regulations and the October 2013 *Public Involvement Plan (PIP)* for the Tidewater Site, GZA will provide notifications to the abutting property owners and tenants, including those additional interested parties on the Tidewater mailing list, to let them know that National Grid will be performing environmental investigations at the Site. Please note that all proposed explorations will be performed on National Grid property. The notification will be provided in English, Spanish, and Portuguese and will be sent to the Tidewater email list.



### Soil Borings and Monitoring Well Installation

GZA proposes to perform four additional test borings (designated TB-400 to TB-403) to be completed at the locations shown on Figure 3. Prior to performing the borings, GZA will conduct Site reconnaissance to coordinate DigSafe® clearance, and to visually evaluate access restrictions. As indicated previously, some of the boring locations may be modified due to the presence of underground utilities or other Site features. As described previously, the intent of these borings is to further evaluate the nature of the elevated benzene concentrations detected in the soil gas sample collected at SG-105S.

The upper 6 feet of each exploration will be cleared for the presence of utilities utilizing a combination of an air knife and vacuum excavation. The test borings will be installed utilizing a Geoprobe® rig. Based on our understanding of subsurface conditions, soil boring depths are anticipated to be approximately 25 to 30 feet below ground surface. We anticipate that this drilling program will require up to two days to complete. A GZA geologist or engineer will be present during drilling to classify soil conditions and prepare boring logs. The down-hole drilling tools will be steam-cleaned between each exploration location within a designated decontamination pad located on Site.

Soil samples will be selected for analysis based on the field conditions encountered. Up to two samples will be submitted for analysis from each boring location. Each soil sample submitted will be analyzed for volatile organic compounds (VOCs) via EPA Method 8260B. No samples from below the water table will be submitted for analytical testing. In addition, GZA will collect and submit one set of Quality Control/Quality Assurance (QA/QC) samples consisting of a duplicate sample set.

Two borings will be completed as monitoring wells (TB-400/MW-400 and TB-400/MW-401) to evaluate groundwater quality in the area. The monitoring wells will be constructed of 2-inch diameter PVC well screen and solid PVC riser pipe. The 10-slot well screen will be set to span from the bottom of the boring to within approximately 1 foot of grade. Filter sand will be backfilled around the well screen and a 6-inch thick bentonite seal will be placed round the solid riser pipe. Depending on the location of the well, each well will be completed with a concrete surficial seal with a flush-mounted road box or steel riser to protect the wells.

Soil cuttings and wash water (i.e., decontamination water) generated during drilling will be field-screened for total volatile VOCs (TVOCs) with a hand held photoionization detector (PID) and then placed in 55-gallon drums for subsequent characterization and off-site disposal at an appropriate facility.

### Groundwater Sampling and Analysis

Upon installation, the wells will be developed to remove fines introduced during the drilling process. The wells will be developed by surge block and pumping until the water is visibly clear or until pumped for a minimum of 10 well volumes.



Groundwater samples will be collected from each well a minimum of 72 hours after development. Prior to sampling, the following parameters will be assessed at each well: depth to groundwater, depth to well bottom, and depth to NAPL, if present.

Groundwater sampling will be performed in accordance with the US EPA's January 10, 2010 Low Stress (low flow) Purging and Sampling Procedure. As part of this sampling methodology, well stabilization will be determined through the measurement of specific water quality parameters (pH, temperature, specific conductance, dissolved oxygen, oxidation reduction potential, and turbidity) during the purging process. Purging will continue until these parameters have stabilized. Groundwater samples will be analyzed for VOCs via EPA Method 8260B. In addition, GZA will collect and submit one set of QA/QC samples consisting of a duplicate and a VOC trip blank.

#### *Environmental Monitoring and Health and Safety Procedures*

The vibratory direct push installation technique significantly limits subsurface disturbance during probe installation. Unlike other drilling techniques, direct push does not produce excess soils because the probe is pushed into the ground with no augering. Given this limited subsurface disturbance and the expected short duration of work, the likelihood of dust and VOC generation above background levels is extremely limited; therefore, adherence to all the provisions outlined in the April 2011 Air Quality Monitoring Program (AQMP) is not warranted for this work. Specifically, real time monitoring for benzene and the second tier time integrated air quality sampling and analysis described in the AQMP are not warranted and will not be performed as part of this field work unless unexpected conditions are observed. Real time air quality monitoring will be performed using hand held instruments generally consistent with the first tier monitoring described in the AQMP and our *Site Specific Health and Safety Plan (HASP)*. This monitoring will include TVOCs and dust in both the worker breathing zone and work zone perimeter. TVOCs will be monitored using a hand held PID 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. The air monitoring data will be posted to the bulletin boards at the end Tidewater Street and Bowles Court by the Monday following the work. In addition, the air monitoring data will be posted to the Tidewater website ([www.tidewatersite.com](http://www.tidewatersite.com)) by the Monday following the work.

#### *Report Preparation*

Results of the investigations described herein will be documented in an addendum to the SIR and submitted to RIDEM. In addition, National Grid will prepare and submit an updated fact sheet to present the results of the investigation activities. Similar to the abutter notification, the updated fact sheets will be disseminated to those on the mailing/emailing list in English, Spanish and Portuguese. National Grid is committed to keeping neighbors, the nearby schools, parents and other stakeholders informed about the activities at the Tidewater Site.

## 4.00 SCHEDULE

We currently anticipate the scope of work presented in Section 3.00 will be performed consistent with the following milestone schedule. Please note, this implementation schedule is subject to modification based on weather.

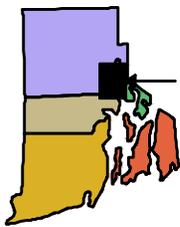
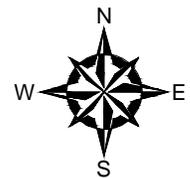
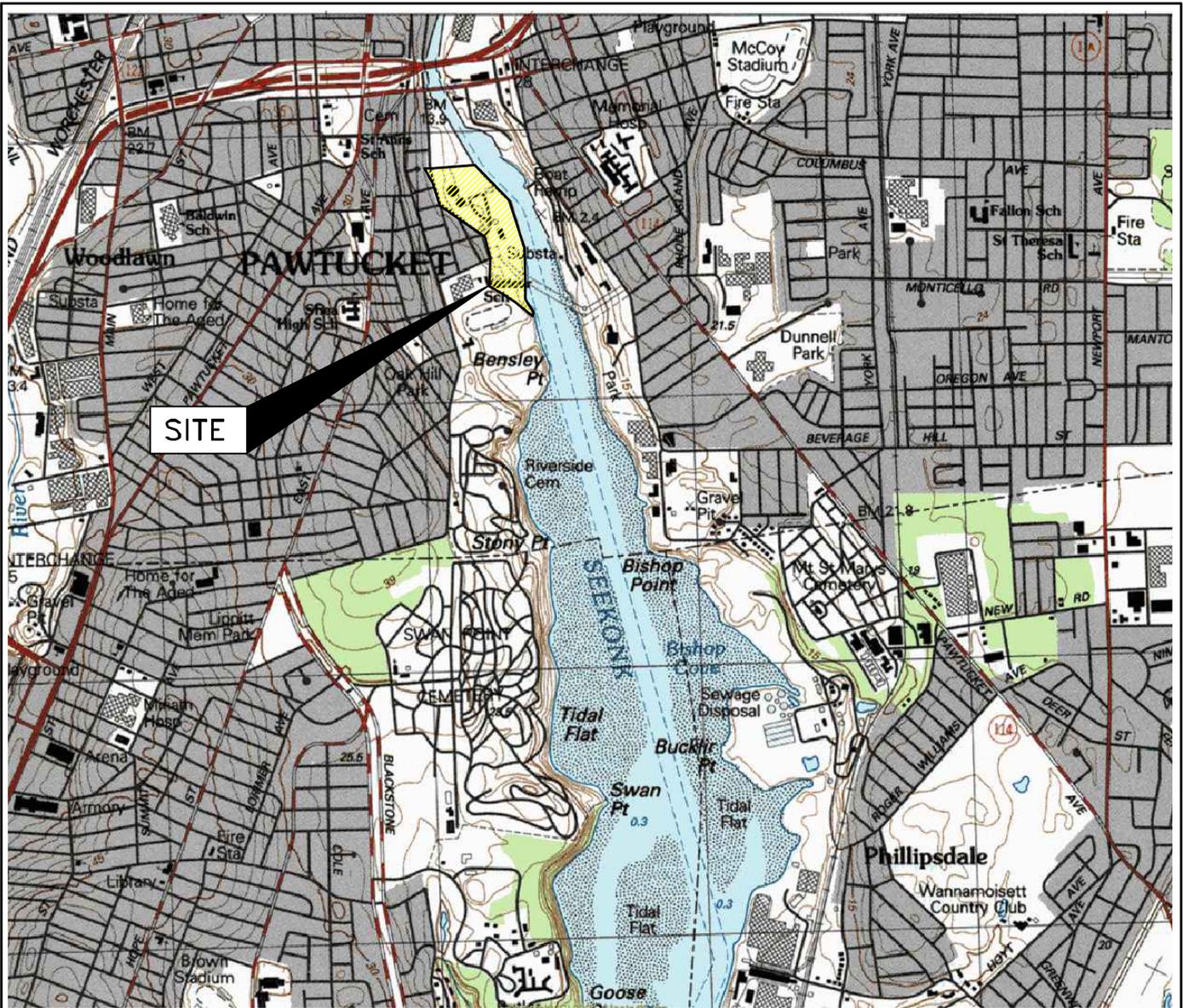


<u>Task</u>	<u>Anticipated Completion Date</u>
Abutter Notification	February 21, 2014
Soil Borings/Monitoring Well Installations	March 10, 2014
Groundwater Sampling	March 17, 2014
Receipt of Analytical Testing	March 31, 2014
Report Preparation/Submittal to RIDEM	May 2, 2014

J:\ENV\43654.msk\Reports\Work Plan\Addendum 3 SSIWP\43654 SSIWP Addendum FINAL 2-7-14.docx

## **FIGURES**

© 2013 - GZA GeoEnvironmental, Inc. GZA-J:\ENV\43654.msk\CADD\GZA DWGS\43654 LOCUS PLAN.dwg [1] January 10, 2014 - 12:17pm scott.burton



QUADRANGLE LOCATION

SOURCE:

**BASE MAP FROM THE FOLLOWING USGS QUADRANGLE MAP:  
PROVIDENCE, RHODE ISLAND (1987)**

DIGITAL TOPOGRAPHIC MAPS PROVIDED BY MAPTECH. INC.

CONTOUR ELEVATIONS REFERENCE NGVD 29,  
CONTOURS ARE SHOWN IN METERS AT 3 METER INTERVALS

UNLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF GZA GEOENVIRONMENTAL, INC. (GZA). THE INFORMATION SHOWN ON THE DRAWING IS SOLELY FOR USE BY GZA'S CLIENT OR THE CLIENT'S DESIGNATED REPRESENTATIVE FOR THE SPECIFIC PROJECT AND LOCATION IDENTIFIED ON THE DRAWING. THE DRAWING SHALL NOT BE TRANSFERRED, REUSED, COPIED, OR ALTERED IN ANY MANNER FOR USE AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF GZA. ANY TRANSFER, REUSE, OR MODIFICATION TO THE DRAWING BY THE CLIENT OR OTHERS, WITHOUT THE PRIOR WRITTEN EXPRESS CONSENT OF GZA, WILL BE AT THE USER'S SOLE RISK AND WITHOUT ANY RISK OR LIABILITY TO GZA.

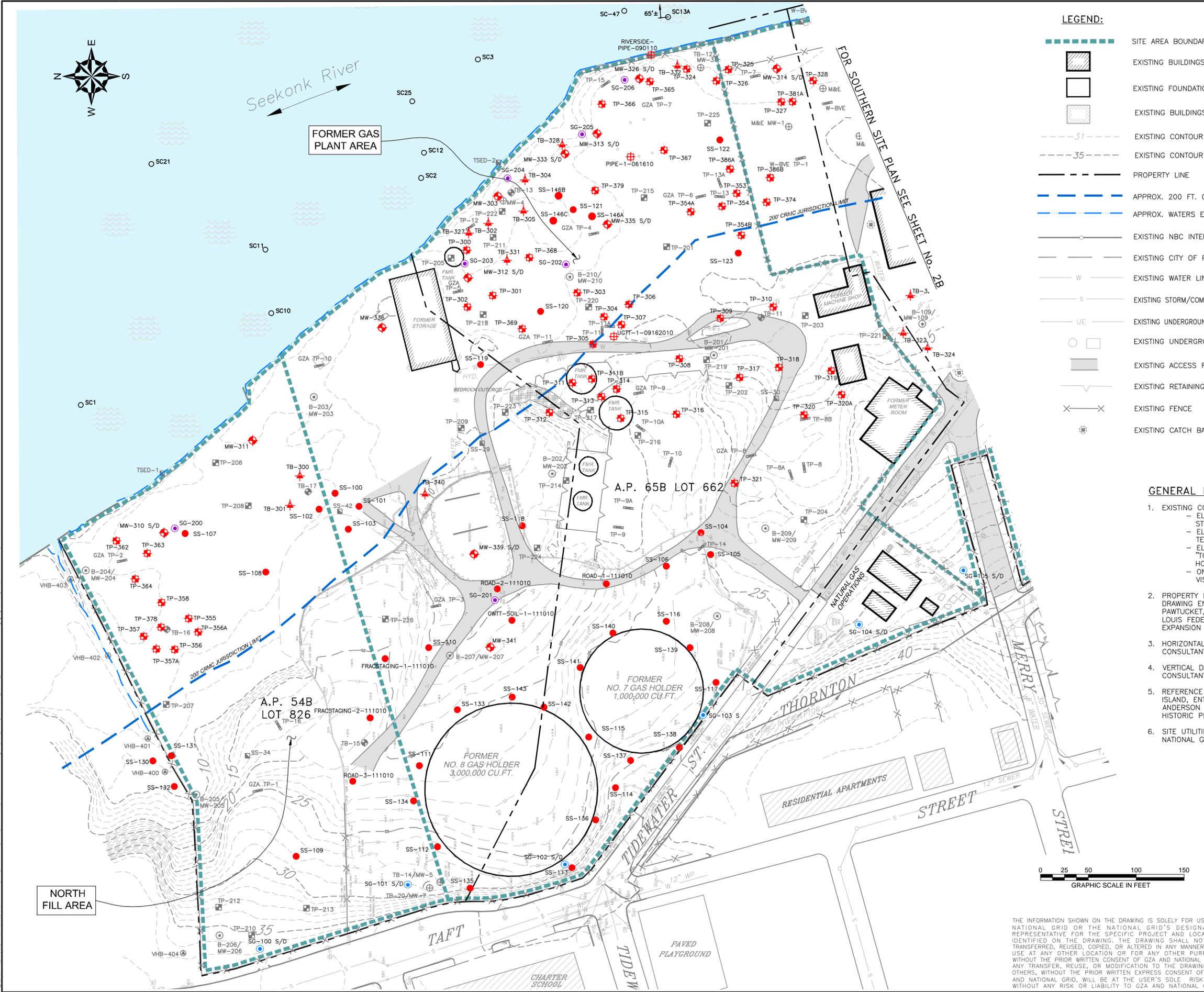
TIDEWATER FACILITY  
PAWTUCKET, RHODE ISLAND

PREPARED BY:  
 GZA GeoEnvironmental, Inc.  
Engineers and Scientists  
www.gza.com

PREPARED FOR:  
NATIONAL GRID

LOCUS PLAN

PROJ MGR: MSK	REVIEWED BY: MSK	CHECKED BY: JJC	FIGURE <b>1</b> SHEET NO. 1 OF 5
DESIGNED BY: SDN	DRAWN BY: CRD	SCALE: AS NOTED	
DATE: 2014	PROJECT NO. 43654.20	REVISION NO. 0	



**LEGEND:**

- SITE AREA BOUNDARIES
- EXISTING BUILDINGS ON-SITE
- EXISTING FOUNDATION/PAD ON-SITE
- EXISTING BUILDINGS/STRUCTURES OFF-SITE
- EXISTING CONTOUR (MINOR 1 FOOT INTERVAL)
- EXISTING CONTOUR (MAJOR 5 FOOT INTERVAL)
- PROPERTY LINE
- APPROX. 200 FT. CRMC JURISDICTION LIMIT
- APPROX. WATERS EDGE
- EXISTING NBC INTERCEPTOR SANITARY SEWER
- EXISTING CITY OF PAWTUCKET STORM DRAIN
- EXISTING WATER LINE
- EXISTING STORM/COMBINED SAN. SEWER OVERFLOW
- EXISTING UNDERGROUND ELECTRIC CABLE IN CONDUIT
- EXISTING UNDERGROUND ELECTRIC MH/STRUCTURE
- EXISTING ACCESS ROAD
- EXISTING RETAINING WALLS
- EXISTING FENCE
- EXISTING CATCH BASIN LOCATIONS

**SAMPLE LEGEND**

- SS-9 ATLANTIC SURFACE SOIL SAMPLE LOCATION
- TSED-6 ATLANTIC SEDIMENT SAMPLE LOCATION
- W-BVE SS-9 WESTON/BLACKSTONE VALLEY ELECTRIC SEDIMENT SAMPLE LOCATION
- RIDEM 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 GZA/VALLEY 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)
- MW-320 S/D GZA MONITORING WELL LOCATION (2010)
- 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)
- TB-300 GZA TEST BORING LOCATION (2011)
- SG-200 PERIMETER SOIL GAS SAMPLING LOCATION
- SG-100 INTERIOR SOIL GAS SAMPLING LOCATION

**GENERAL NOTES:**

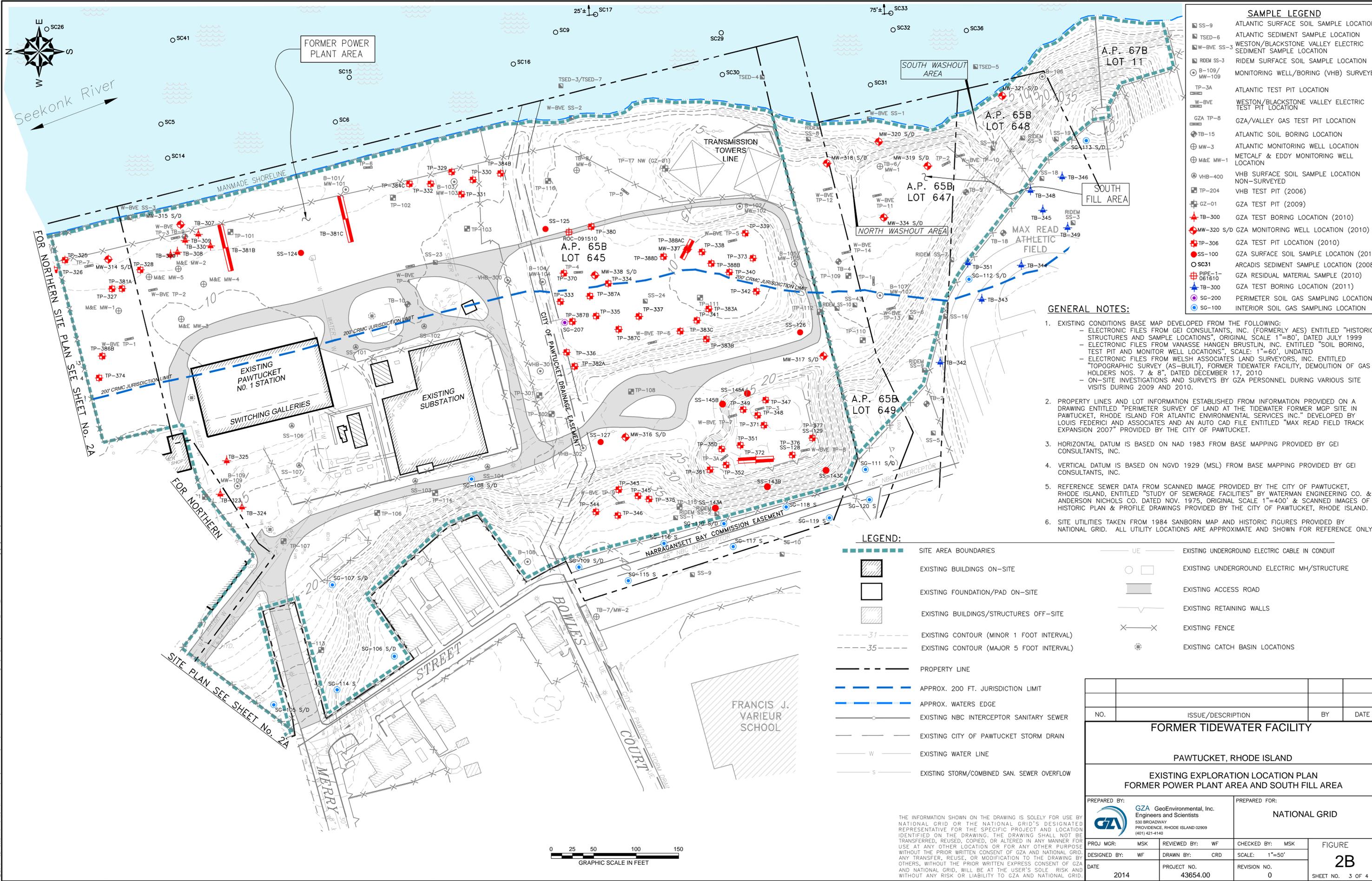
1. EXISTING CONDITIONS BASE MAP DEVELOPED FROM THE FOLLOWING:
  - ELECTRONIC FILES FROM GEI CONSULTANTS, INC. (FORMERLY AES) ENTITLED "HISTORIC STRUCTURES AND SAMPLE LOCATIONS", ORIGINAL SCALE 1"=80', DATED JULY 1999
  - ELECTRONIC FILES FROM VANASSE HANGEN BRUSTLIN, INC. ENTITLED "SOIL BORING, TEST PIT AND MONITOR WELL LOCATIONS", SCALE: 1"=60', UNDATED
  - ELECTRONIC FILES FROM WELSH ASSOCIATES LAND SURVEYORS, INC. ENTITLED "TOPOGRAPHIC SURVEY (AS-BUILT), FORMER TIDEWATER FACILITY, DEMOLITION OF GAS HOLDERS NOS. 7 & 8", DATED DECEMBER 17, 2010
  - ON-SITE INVESTIGATIONS AND SURVEYS BY GZA PERSONNEL DURING VARIOUS SITE VISITS DURING 2009 AND 2010.
2. PROPERTY LINES AND LOT INFORMATION ESTABLISHED FROM INFORMATION PROVIDED ON A DRAWING ENTITLED "PERIMETER SURVEY OF LAND AT THE TIDEWATER FORMER MGP SITE IN PAWTUCKET, RHODE ISLAND FOR ATLANTIC ENVIRONMENTAL SERVICES INC." DEVELOPED BY LOUIS FEDERICI AND ASSOCIATES AND AN AUTO CAD FILE ENTITLED "MAX READ FIELD TRACK EXPANSION 2007" PROVIDED BY THE CITY OF PAWTUCKET.
3. HORIZONTAL DATUM IS BASED ON NAD 1983 FROM BASE MAPPING PROVIDED BY GEI CONSULTANTS, INC.
4. VERTICAL DATUM IS BASED ON NGVD 1929 (MSL) FROM BASE MAPPING PROVIDED BY GEI CONSULTANTS, INC.
5. REFERENCE SEWER DATA FROM SCANNED IMAGE PROVIDED BY THE CITY OF PAWTUCKET, RHODE ISLAND, ENTITLED "STUDY OF SEWERAGE FACILITIES" BY WATERMAN ENGINEERING CO. & ANDERSON NICHOLS CO. DATED NOV. 1975, ORIGINAL SCALE 1"=400' & SCANNED IMAGES OF HISTORIC PLAN & PROFILE DRAWINGS PROVIDED BY THE CITY OF PAWTUCKET, RHODE ISLAND.
6. SITE UTILITIES TAKEN FROM 1984 SANBORN MAP AND HISTORIC FIGURES PROVIDED BY NATIONAL GRID. ALL UTILITY LOCATIONS ARE APPROXIMATE AND SHOWN FOR REFERENCE ONLY.



THE INFORMATION SHOWN ON THE DRAWING IS SOLELY FOR USE BY NATIONAL GRID OR THE NATIONAL GRID'S DESIGNATED REPRESENTATIVE FOR THE SPECIFIC PROJECT AND LOCATION IDENTIFIED ON THE DRAWING. THE DRAWING SHALL NOT BE TRANSFERRED, REUSED, COPIED, OR ALTERED IN ANY MANNER FOR USE AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF GZA AND NATIONAL GRID. ANY TRANSFER, REUSE, OR MODIFICATION TO THE DRAWING BY OTHERS, WITHOUT THE PRIOR WRITTEN EXPRESS CONSENT OF GZA AND NATIONAL GRID, WILL BE AT THE USER'S SOLE RISK AND WITHOUT ANY RISK OR LIABILITY TO GZA AND NATIONAL GRID.

NO.	ISSUE/DESCRIPTION	BY	DATE
<b>FORMER TIDEWATER FACILITY</b>			
PAWTUCKET, RHODE ISLAND			
EXISTING EXPLORATION LOCATION PLAN NORTH FILL AREA AND FORMER GAS PLANT AREA			
PREPARED BY:		PREPARED FOR:	
<b>GZA GeoEnvironmental, Inc.</b> Engineers and Scientists 530 BROADWAY PROVIDENCE, RHODE ISLAND 02909 (401) 421-4140		<b>NATIONAL GRID</b>	
PROJ MGR:	MSK	REVIEWED BY:	WF
DESIGNED BY:	WF	DRAWN BY:	CRD
DATE:	2014	CHECKED BY:	MSK
		SCALE:	1"=50'
		REVISION NO.:	0
		PROJECT NO.:	43654.00
		FIGURE	<b>2A</b>
		SHEET NO.	2 OF 4

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SAMPLE LEGEND	
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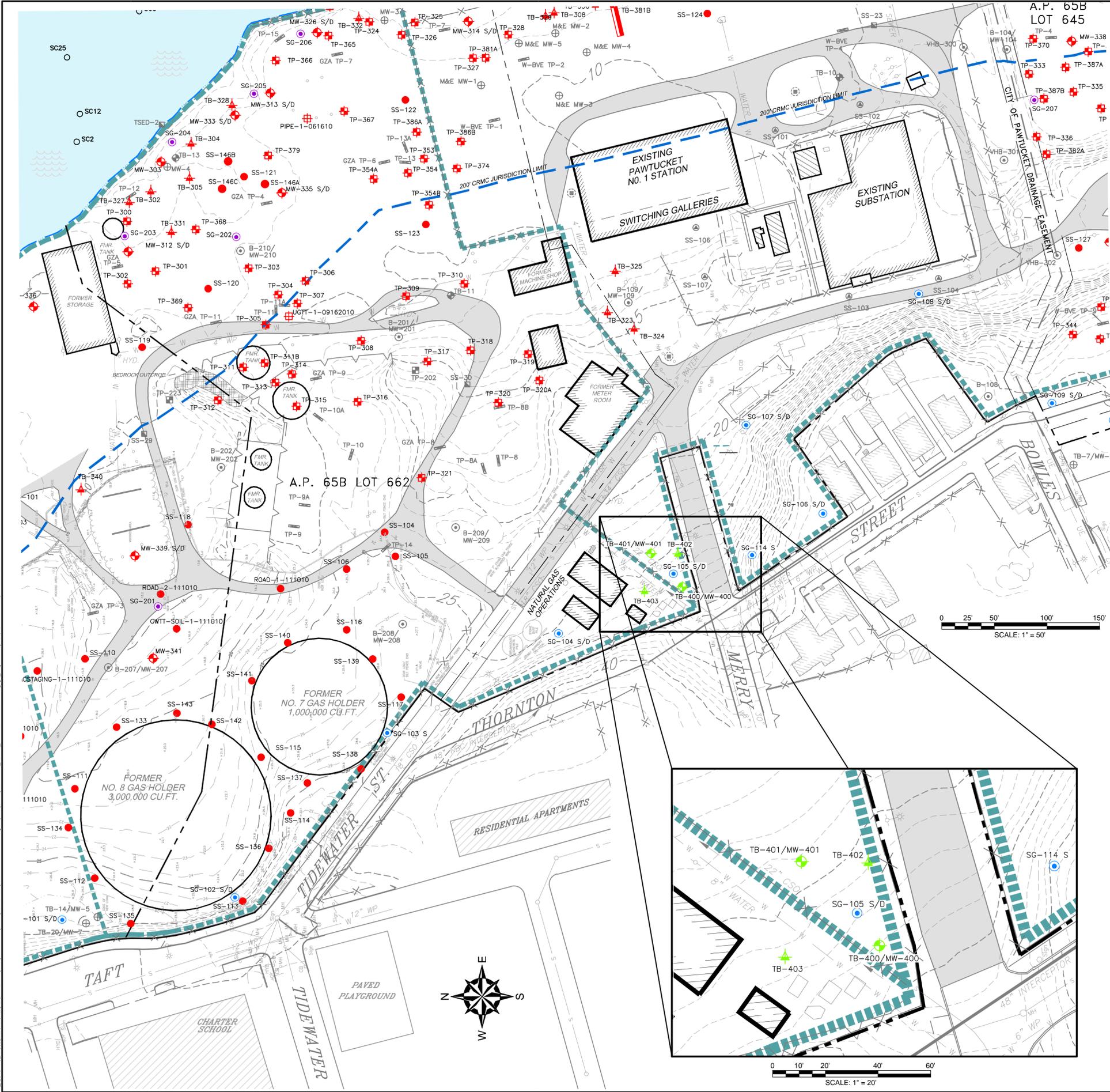
LEGEND:	
[Dashed Green Line]	SITE AREA BOUNDARIES
[Hatched Box]	EXISTING BUILDINGS ON-SITE
[White Box]	EXISTING FOUNDATION/PAD ON-SITE
[Hatched Box]	EXISTING BUILDINGS/STRUCTURES OFF-SITE
[Dashed Line]	EXISTING CONTOUR (MINOR 1 FOOT INTERVAL)
[Dashed Line]	EXISTING CONTOUR (MAJOR 5 FOOT INTERVAL)
[Solid Line]	PROPERTY LINE
[Dashed Blue Line]	APPROX. 200 FT. JURISDICTION LIMIT
[Dashed Blue Line]	APPROX. WATERS EDGE
[Line with Circle]	EXISTING NBC INTERCEPTOR SANITARY SEWER
[Line with X]	EXISTING CITY OF PAWTUCKET STORM DRAIN
[Line with W]	EXISTING WATER LINE
[Line with S]	EXISTING STORM/COMBINED SAN. SEWER OVERFLOW
[Line with U]	EXISTING UNDERGROUND ELECTRIC CABLE IN CONDUIT
[Circle]	EXISTING UNDERGROUND ELECTRIC MH/STRUCTURE
[Line]	EXISTING ACCESS ROAD
[Line]	EXISTING RETAINING WALLS
[Line with X]	EXISTING FENCE
[Circle]	EXISTING CATCH BASIN LOCATIONS

NO.	ISSUE/DESCRIPTION	BY	DATE
<b>FORMER TIDEWATER FACILITY</b>			
PAWTUCKET, RHODE ISLAND			
EXISTING EXPLORATION LOCATION PLAN FORMER POWER PLANT AREA AND SOUTH FILL AREA			
PREPARED BY:	GZA GeoEnvironmental, Inc. Engineers and Scientists 530 BROADWAY PROVIDENCE, RHODE ISLAND 02909 (401) 421-4140		PREPARED FOR:
		NATIONAL GRID	
PROJ MGR:	MSK	REVIEWED BY:	WF
DESIGNED BY:	WF	DRAWN BY:	CRD
DATE:	2014	CHECKED BY:	MSK
	PROJECT NO.	SCALE:	1"=50'
	43654.00	REVISION NO.	0
			FIGURE <b>2B</b>
			SHEET NO. 3 OF 4

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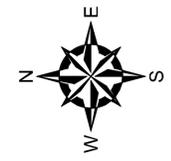
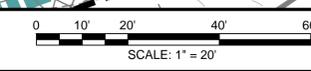
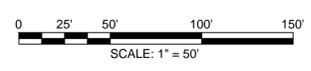
**LEGEND:**

- SITE AREA BOUNDARIES
- EXISTING BUILDINGS ON-SITE
- EXISTING FOUNDATION/PAD ON-SITE
- EXISTING BUILDINGS/STRUCTURES OFF-SITE
- EXISTING CONTOUR (MINOR 1 FOOT INTERVAL)
- EXISTING CONTOUR (MAJOR 5 FOOT INTERVAL)
- PROPERTY LINE
- APPROX. 200 FT. CRMC JURISDICTION LIMIT
- APPROX. WATERS EDGE
- EXISTING NBC INTERCEPTOR SANITARY SEWER
- EXISTING CITY OF PAWTUCKET STORM DRAIN
- EXISTING WATER LINE
- EXISTING STORM/COMBINED SAN. SEWER OVERFLOW
- EXISTING UNDERGROUND ELECTRIC CABLE IN CONDUIT
- EXISTING UNDERGROUND ELECTRIC MH/STRUCTURE
- EXISTING ACCESS ROAD
- EXISTING RETAINING WALLS
- EXISTING FENCE
- EXISTING CATCH BASIN LOCATIONS

**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
- RIDEM 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 GZA/VALLEY 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)
- MW-320 S/D GZA MONITORING WELL LOCATION (2010)
- 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)
- TB-300 GZA TEST BORING LOCATION (2011)
- SG-200 PERIMETER SOIL GAS SAMPLING LOCATION
- SG-100 INTERIOR SOIL GAS SAMPLING LOCATION
- TB-402 PROPOSED BORING LOCATION
- TB-400/MW-400 PROPOSED MONITORING WELL LOCATION

- GENERAL NOTES:**
- EXISTING CONDITIONS BASE MAP DEVELOPED FROM THE FOLLOWING:
    - ELECTRONIC FILES FROM GEI CONSULTANTS, INC. (FORMERLY AES) ENTITLED "HISTORIC STRUCTURES AND SAMPLE LOCATIONS", ORIGINAL SCALE 1"=80", DATED JULY 1999
    - ELECTRONIC FILES FROM VANASSE HANGEN BRUSTLIN, INC. ENTITLED "SOIL BORING, TEST PIT AND MONITOR WELL LOCATIONS", SCALE: 1"=60", UNDATED
    - ELECTRONIC FILES FROM WELSH ASSOCIATES LAND SURVEYORS, INC. ENTITLED "TOPOGRAPHIC SURVEY (AS-BUILT), FORMER TIDEWATER FACILITY, DEMOLITION OF GAS HOLDERS NOS. 7 & 8", DATED DECEMBER 17, 2010
    - ON-SITE INVESTIGATIONS AND SURVEYS BY GZA PERSONNEL DURING VARIOUS SITE VISITS DURING 2009 AND 2010.
  - PROPERTY LINES AND LOT INFORMATION ESTABLISHED FROM INFORMATION PROVIDED ON A DRAWING ENTITLED "PERIMETER SURVEY OF LAND AT THE TIDEWATER FORMER MGP SITE IN PAWTUCKET, RHODE ISLAND FOR ATLANTIC ENVIRONMENTAL SERVICES INC." DEVELOPED BY LOUIS FEDERICI AND ASSOCIATES AND AN AUTO CAD FILE ENTITLED "MAX READ FIELD TRACK EXPANSION 2007" PROVIDED BY THE CITY OF PAWTUCKET.
  - HORIZONTAL DATUM IS BASED ON NAD 1983 FROM BASE MAPPING PROVIDED BY GEI CONSULTANTS, INC.
  - VERTICAL DATUM IS BASED ON NGVD 1929 (MSL) FROM BASE MAPPING PROVIDED BY GEI CONSULTANTS, INC.
  - REFERENCE SEWER DATA FROM SCANNED IMAGE PROVIDED BY THE CITY OF PAWTUCKET, RHODE ISLAND, ENTITLED "STUDY OF SEWERAGE FACILITIES" BY WATERMAN ENGINEERING CO. & ANDERSON NICHOLS CO. DATED NOV. 1975, ORIGINAL SCALE 1"=400' & SCANNED IMAGES OF HISTORIC PLAN & PROFILE DRAWINGS PROVIDED BY THE CITY OF PAWTUCKET, RHODE ISLAND.
  - SITE UTILITIES TAKEN FROM 1984 SANBORN MAP AND HISTORIC FIGURES PROVIDED BY NATIONAL GRID. ALL UTILITY LOCATIONS ARE APPROXIMATE AND SHOWN FOR REFERENCE ONLY.



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NO.	ISSUE/DESCRIPTION	BY	DATE
<b>FORMER TIDEWATER FACILITY</b>			
PAWTUCKET, RHODE ISLAND			
<b>PROPOSED EXPLORATION LOCATION PLAN</b>			
PREPARED BY:		PREPARED FOR:	
GZA GeoEnvironmental, Inc. Engineers and Scientists 530 BROADWAY PROVIDENCE, RHODE ISLAND 02909 (401) 421-4140		NATIONAL GRID	
PROJ MGR:	MSK	REVIEWED BY:	WF
DESIGNED BY:	WF	DRAWN BY:	CRD
DATE:	2014	CHECKED BY:	MSK
		SCALE:	AS NOTED
		REVISION NO.:	0
		PROJECT NO.:	43654.00
		FIGURE	<b>3</b>
		SHEET NO.	4 OF 4

**APPENDIX A**

**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.