



**SUPPLEMENTAL SITE INVESTIGATION  
WORK PLAN (SSIWP)  
FORMER TIDEWATER FACILITY  
PAWTUCKET, RHODE ISLAND  
RIDEM Case No. 95-022**

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

**ON BEHALF OF:**  
National Grid  
Waltham, Massachusetts

**PREPARED BY:**  
GZA GeoEnvironmental, Inc.  
Providence, Rhode Island

November 2009  
File No. 43654.00

November 23, 2009  
File No. 05.0043654.00



Mr. Joseph Martella  
RI Department of Environmental Management  
235 Promenade Street  
Providence, Rhode Island 02908

Re: *Supplemental Site Investigation Work Plan (SWIPP)*  
Former Tidewater Facility  
Pawtucket, Rhode Island  
RIDEM Case No. 95-022

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Dear Mr. Martella:


On behalf of our client, The Narragansett Electric Company d/b/a National Grid (National Grid), GZA GeoEnvironmental Inc. (GZA) is pleased to provide the attached *Supplemental Site Investigation Work Plan (SSIWP)* for the Former Tidewater Facility located in Pawtucket, Rhode Island (Site).

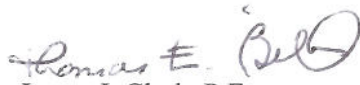
We intend on starting the exploration program in mid to late December 2009. Should you have any questions or comments, please feel free to contact us at (401) 421-4140, or via e-mail at [margaret.kilpatrick@gza.com](mailto:margaret.kilpatrick@gza.com).

Very truly yours,

GZA GEOENVIRONMENTAL, INC.

  
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MSK/JJC:tja

Attached: Report

Cc: Michele Leone, National Grid  
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## 1.0 INTRODUCTION



On behalf of The Narragansett Electric Company, dba National Grid (National Grid), GZA GeoEnvironmental Inc. (GZA) has prepared this *Supplemental Site Investigation Work Plan (SSIWP)* describing additional investigation activities to be performed at the former Tidewater Site 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. 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. The Site encompasses approximately 27 acres and was the location of the former Tidewater Manufactured Gas Plant (MGP) and the former Pawtucket No. 1 Power Station. The Site is currently largely vacant with the exception of an active natural gas regulating station and the use of portions of the former power plant area as an active switching station and electric substation.

The investigation tasks described herein were developed to fill certain data gaps identified during a review of historic Site investigation studies. The results of these proposed explorations, combined with previous studies will be used to develop a *Site Investigation Report (SIR)* for this Site. This SIR will be prepared consistent with applicable sections of Rule 7.00 of the Rhode Island Department of Environmental Management's (RIDEM) Rules and Regulations for the Investigation and Remediation of Hazardous Material Releases (Remediation Regulations–DEM-DSR-01-93, as amended and will include an assessment of remedial action alternatives. National Grid is in the process of finalizing a Site Data Report which summarizes the prior historic Site data and intends on submitting this report to RIDEM during the first quarter of 2010.

For the purpose of the investigations proposed herein, the Site has been subdivided into four areas based on their geographic location, past use and/or past occupants. Figure 2, *Existing Conditions Plan*, presents the location and configuration of the following areas:

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

Review of historical Site plans reveal that the Site (or specific areas of the Site) has been developed since at least 1884. These plans also indicate that specific past Site uses and occupants have been generally restricted to these area designations. Figures 3 and 4, *Historic Feature Plans* have been developed to illustrate the location of historic Site features/structures and past Site occupants on the North Fill Area and Former Gas Plant Area (Figure 3), and Former Power Plant Area and South Fill Area (Figure 4).



This *SSIWP* is organized as follows:

- Section 1.00 contains this introduction;
- Section 2.00 presents a summary of existing Site conditions;
- Section 3.00 describes primary existing data gaps; and
- Section 4.00 presents the proposed scope of this study.

## **2.00 EXISTING SITE CONDITIONS**

The following provides a brief review of previous Site investigations.

### **2.10 PRIOR INVESTIGATIONS**

Several phases of environmental investigations have been performed at the Site on behalf of National Grid and prior owners. These investigations were initiated in the mid to late 1980s. The most significant exploration programs were performed in 1996 by Atlantic Environmental Services and in 2006 by VHB. Figures 5 and 6 present the *Existing Exploration Plans* for the North Fill Area and Former Gas Plant Area, and the Former Power Plant Area and South Fill Area, respectively. With the exception of work conducted by Metcalf & Eddy in 1991, the primary focus of prior investigations was Site-wide environmental conditions (and in some cases off-Site conditions). Metcalf & Eddy's work was associated with the closure of underground storage tanks on the Former Power Plant Area of the Site (see M&E MW-1 to MW-5 on Figure 6, *Existing Exploration Location Plan*). Certain of the investigations, including GZA 1986 and Atlantic Environmental Services 1996, also included the performance of test pits specifically at the locations of former MGP and fuel oil storage structures.

As summarized below, subsurface investigations conducted to date have involved the advancement of test pits and soil borings (including Geoprobos), the collection and analysis of surficial and subsurface soil samples, the installation of groundwater monitoring wells, and the collection and analysis of groundwater samples. Additionally, certain of these investigations included the collection and analysis of sediment and surface water samples from the Seekonk River, including the July 2008 study performed by Anchor QEA, LLC and Arcadis. This study was summarized in a report prepared by Anchor QEA, entitled "Tidewater Sediment Data Report, Former Tidewater Facility" which was submitted to RIDEM in June 2009.

### **2.20 SITE HYDROGEOLOGIC SETTING**

Site topography generally slopes from west to east towards the tidally-influenced Seekonk River. The maximum elevation change from west to east is approximately 25 to 30 feet. Based on observations made during previous subsurface explorations, Site stratigraphy generally consists of fill materials underlain by stratified gravel, sand, silt and clay, underlain by glacial till and bedrock. The thickness of these fill materials have been



observed to range from approximately 2.5 feet in the northwestern portion of the Site to over 25 feet in the South Fill Area. The native materials encountered in the northwestern portion of the Site were consistent with estuarine deposits, while the materials encountered beneath the fills across the remainder of the Site consisted of glacial outwash and marine deposits. The estuarine, glacial outwash and marine deposits are underlain by glacial till and bedrock.

Approximately 5 feet of glacial till overlying the bedrock was encountered at elevation  $\pm 8$  feet NGVD29 near the northwestern property boundary. The elevation of the top of the glacial till is inferred to generally slope from west to east as the estuarine and outwash deposits thicken. The top of the glacial till was encountered at approximately elevation -27 feet NGVD29 proximate to the Seekonk River. With the exception of the central portion of the Former Gas Plant Area, the top of the bedrock surface also slopes from west to east towards the Seekonk River. The bedrock surface was encountered at approximately elevation 5 feet NGVD29 along the northwestern portion of the Site and at -30 feet NGVD29 proximate to the Seekonk River. Shallow bedrock, approximately 5 feet below grade, and a bedrock outcrop were observed in the Former Gas Plant Area proximate to the former location of the No. 1 Tar/Oil Tank.

Site groundwater elevations are tidally influenced and have been observed to fluctuate approximately 5 feet between mean low and high water. Observed groundwater elevations have ranged from approximately 13 feet NGVD29 (near the northwestern portion of the Site) down to 0 feet NGVD29 proximate to the Seekonk River. In general, groundwater is encountered within the fill materials across the Former Power Plant and South Fill Areas where the fill thicknesses are more significant and within the underlying native materials in the Gas Plant and North Fill Areas.

### 2.30 OBSERVED IMPACTS

The following sections present more detailed hydrogeologic information for each of the four Site areas and also include descriptions of environmental impacts observed to date. Locations of previous investigations are shown on Figures 5 and 6.

#### *North Fill Area*

Investigations performed in the North Fill Area included nine test pits (GZA TP-1, GZA TP-2; AES TP-16; VHB TP-206, TP-207, TP-208, TP-210, TP-212, and TP-213) and eight borings (VHB MW-204, MW-205 and MW-206; AES MW-5/TB-14, TB-15, TB-16, TB-17, and MW-7/TB-20). Test pit depths ranged from approximately 4 to 11 feet below grade and the borings ranged in depth from approximately 13 to 30 feet below grade.

The northwestern portion of the North Fill Area slopes significantly from west to east (approximate elevation 35 feet NGVD29 to 10 feet NGVD29). The remaining areas slope more gently to approximately 5 feet NGVD29 proximate to the Seekonk River bank. Prior to 1902 there existed a relatively large water inlet on the eastern side of the North Fill Area. This approximately 30,000 square foot area was filled sometime between 1890 and



1902 according to historic Sanborn mapping. The approximate extent of this former inlet area is shown on Figure 3. Consistent with the topography and the historic presence of the former water inlet, observed fill thicknesses were limited to approximately 0 to 3 feet along the northern and western portions of this area and thickened to 4 to 8.5 feet towards the east and south. The most significant thickness of fill materials (8.5 feet, 10 feet, and 16 feet, respectively) were encountered at TP-16 and TB-17, which were located proximate to the former inlet. The fill materials encountered in the North Fill area were generally consistent with the former use of this area as a coal yard. With the exception of TB-17, fills observed in this area consisted of sandy materials mixed with varying percentages of relatively inert materials such as coal ash, coal dust, brick, slag, and wood. Small tar globules and tar odors were noted on the boring log for TB-17 at a depth of 14 to 16 feet. This boring is located within the former water inlet area. White crystals were observed at TB-16 at 6 to 7 feet below ground surface (bgs) and a sample collected from 0-2 feet bgs at SS-42 (proximate to TB-17) exhibited elevated levels of certain PAHs. In addition, an elevated detection of lead was observed in a surficial sample collected at VHB-400.

The native materials underlying the fill in this area are characterized as estuarine deposits generally consisting of light olive brown sands, silts and clays. As indicated previously, the groundwater table is generally observed within these deposits. An approximately 1 to 2 foot layer of silt with varying percentages of clay was observed in the majority of the borings performed in this area of the Site. This unit likely acts as a semi-confining unit and may be serving to limit vertical migration of contaminants. The materials beneath this semi-confining unit generally consist of fine to coarse sands with varying percentages of silt, gravel, and clay. These native estuarine deposits ranged in thickness from approximately 10 to 25 feet from the west to east and generally grade from finer to coarser sands with increasing depth. Two borings in the North Fill Area were advanced through these native sands into the underlying glacial till/weathered bedrock, MW-5/TB-14 and MW-7/TB-20; both of which are located on the far western portion of this area north of the No. 8 Gas Holder. This till unit was observed to be approximately 5 feet thick in this area of the Site.

#### *Former Gas Plant Area*

Investigations performed in the Former Gas Plant Area included 44 test pits (GZA TP-3 through TP-11; AES TP-8 through TP-15 and TPs 8A, 8B, 9A, 10A and 11A, VHB TP-201 through TP-205, TP-209, TP-211, TP-214, TP-215, TP-217, TP-217A, TP-218, TP-219, TP-220, TP-221, TP-222, TP-223, TP-224, TP-225, and TP-226) and 10 borings (AES TB-11, MW-3/TB-12 and MW-4/TB-13; VHB MW-201 through MW-203, and MW-207 through MW-210). Test pit depths ranged from approximately 4 to 13 feet below grade and the borings ranged in depth from approximately 14 to 40 feet below grade.

Similar to the North Fill Area, on the far western side of the property (i.e., western side of the No. 7 and 8 Gas Holders) the ground surface slopes most significantly from west to east. Just east of the gas holders, elevations slope downward from west to east from approximately 20 NGVD29 to 10 NGVD29 near the central portion of this area;



proximate to an existing retaining wall. As described further below, a relatively large bedrock outcrop is visible just west of this retaining wall in the central portion of the Former Gas Plant Area. East of this retaining wall, the ground surface slopes more gradually from west to east towards the Seekonk River.

Observed fill thicknesses across this area ranged from none observed to over 12 feet. In general, the thickness of fills was limited to less than 2 to 3 feet across the western and southern portions of the Former Gas Plant Area. The most significant observations of fill materials were noted in the exploration conducted in the central and eastern areas of the Former Gas Plant Area. Fill thicknesses ranging from approximately 6 to 12 feet were observed in explorations conducted on the far eastern portion of this area proximate to the Seekonk River. The fill materials encountered in this area included granular materials mixed with brick, slag, coal, and concrete.

Several subsurface foundations of former MGP structures (brick and concrete construction) were observed in the central, southern and eastern portion of the Former Gas Plant Area. Figure 3 shows the approximate locations of these former MGP structures/tanks. With the exception of the existing Gas Holder structures (Nos. 7 and 8), all former MGP structures and tanks have been razed. Several explorations performed in the vicinity of these former MGP features exhibited tar saturated soils, solidified tar, staining, and tar globules. The most significant of these impacts were observed in the southern portion of this area, proximate to TP-8, 8A, 8B (within and adjacent to a former Gas Holder No. 4) and the eastern portion of this area extending from the retaining structure/outcrop eastward towards the Seekonk River. At boring MW-4/TB-13, which is located proximate to the bank of the Seekonk River, these tar impacts were observed at a depth starting at 10 to 12 feet and extending to approximately 36 feet (through the outwash deposits).

While the majority of the explorations conducted in the Former Gas Plant Area were focused on the fill materials within and surrounding the former MGP structures, seven borings were extended through the underlying materials (TB-11, MW-3/TB-12, MW-4/TB-13, and MW-207 through MW-210). The native materials underlying the fill in the Former Gas Plant Area are consistent with glacial outwash and marine deposits. The elevation of the top of the groundwater surface is typically observed within these glacial outwash and marine deposits. These deposits are underlain by glacial till and bedrock. In general, the thickness of the outwash and marine deposits thicken from west to east. On the western portion of this area, these deposits are generally observed to range in thickness from 10 to 15 feet. On the east side of this area, proximate to the Seekonk River, these materials thicken to approximately 40 feet. As indicated previously, there exists a bedrock outcrop in the central portion of the Former Gas Plant Area, therefore the thickness of the outwash deposits are irregular in this area of the Site. The presence of this outcrop likely promoted the geologic placement of the estuarine deposits and the semi-confining unit observed in the North Fill Area. This semi-confining unit is also observed on the northern portion of the Former Gas Plant Area but does not appear to extend northward beyond the outcrop area.





Descriptions of subsurface conditions in the Former Gas Plant Area indicate the presence of residual to product levels of MGP materials. Stained and saturated soils are described commonly in the exploration logs and coal tar/naphthalene odors are indicated from slight to very strong. Odors are described as coal tar-like, fuel/petroleum-like, naphthalene-like, and sulfur-like; with coal tar/tar-like being the most prevalent. PID readings (where recorded) ranged from non-detect to approximately 1,000 ppm. Descriptive visual indications of MGP-related impacts included stains, sheens (on soil and groundwater), tars, saturated soils, blobs, MGP wastes, and NAPL. In some cases, specific waste type descriptions were provided such as “wood chips,” “bluish-green colored,” and “iron oxide.”

#### *Former Power Plant Area*

Investigations performed in the Former Power Plant Area to date included 26 test pits (VHB TP-101, TP-102, TP-103, TP-106, TP-108, TP-111, TP-112, TP-113, TP-114, TP-116, ; Weston TP-1, TP-2, TP-3A, TP-3B, TP-4 through TP-9; AES TP-3 through TP-7 and TP-3A) and 17 borings (AES MW-6/TB-8, TB-9, TB-10; VHB MW-101 through MW-105, MW-109, VHB-300, VHB-301 and VHB-302; M&E MW-1 through MW-5). Test pit depths ranged from approximately 4 to 14 feet below grade and the borings ranged in depth from approximately 6 to 26 feet below grade.

The topography in the Former Power Plant Area slopes very steeply from west to east from the western property boundary (approximately 40 NVGD29) to the access driveway (Merry Street), which is at approximately 20 NVGD29. The area of the former Power Plant is relatively flat with the exception of a berm which surrounds the location of the former No. 1 and 2 oil tanks. The eastern portion of this area of the Site slopes gently from west to east towards the Seekonk River.

Observed thicknesses of fill materials generally ranged from 1 to 15 feet across this area, and the groundwater table was encountered within these fill materials across this portion of the Site. The most significant thicknesses of fill were encountered in the southeastern and southern portions (adjacent to the South Fill Area). Fill materials observed across this area of the Site generally consist of granular materials mixed with varying percentages of slag, ash, coal and other miscellaneous debris. Fuel oil impacts were observed within these fills in the areas east of the former No. 1 and 2 oil tanks. In addition, fuel oil impacts were observed in the area of the former 20,000 gallon USTs (northeastern corner of Former Power Plant Area). Other significant observations included blue/green staining in the shallow fills adjacent to the access road south of the substation. Oily soils with petroleum-like odor and the observation of tar blobs were noted in TP-3A located adjacent to the former fuel oil Tank No. 3 located in the far southwestern corner of the Former Power Plant Area. In addition, the presence of wood chips, asbestos-like material and tar was noted in W-BVE-TP-9 along the Former Power Plant Area southwestern property line, immediately north of former fuel oil Tank No. 3.



The explorations performed in this area of the Site to date have been primarily focused on the upper fill materials. Similar to the Gas Plant Area, materials encountered beneath the fills consisted of stratified fine to coarse sands with varying percentages of silts and cobbles. Based on explorations performed on adjacent Site areas, the thickness of these fluvial deposits are inferred to range from approximately 10 to 15 feet on the western portion and thicken to approximately 40 feet proximate to the Seekonk River.

Conditions described in the Former Power Plant Area differ somewhat from those in the Former Gas Plant Area. Consistent with historic use, observed impacts appear to be primarily related to former petroleum storage. Odors are reported as fuel/oil-like, naphthalene-like and sulfur-like. PID readings ranged from non-detect to 2,200 ppm. Evidence of MGP-related impacts were also documented in certain areas which included ferric cyanide staining, wood chips and iron oxide materials located primarily in the shallow fill materials adjacent to the access road south of the substation and the oily petroleum-like tar materials observed adjacent to former fuel oil Tank No. 3 (described above).

#### *South Fill Area*

Investigations performed in the South Fill Area have included nine test pits (VHB TP-109, TP-110; AES TP-1, TP-2; Weston TP-10 through TP-14) and six borings (AES TB-2, TB-4, TB-5, MW-1/TB-6, TB-106; VHB B-107/MW-107). Test pit depths ranged from approximately 6 to 14 feet below grade and the borings ranged in depth from approximately 20 to 26 feet below grade.

The ground surface across the South Fill Area slopes significantly from approximately 40 NVGD near the western property line down to 5 NVGD near the bank of the Seekonk River. The most severe portions of this slope occur along the western property boundary (adjacent to the Max Read Field) and the far eastern portion of the area adjacent to the Seekonk River. Two washout areas exist on the South Fill Area of the Site, previously identified as the north and south washout areas, shown on Figure 4. These washouts were apparently the results of surface water flows and deteriorated drainage structures. The area identified as the north washout is far less significant in lateral extent and depth when compared to the south washout area. GZA, on behalf of National Grid, submitted a Short Term Response Action Plan (STRAP) to RIDEM describing planned remedial measures designed to stabilize the southern washout area. Certain coordination activities and approvals with both the City of Pawtucket and the Coastal Resource Management Council (CRMC) are required prior to the performance of this work.

Evidence of fill were observed in all the test pits and boring performed in this area with the exception of TB-2 which is located proximate to the fence line separating the South Fill Area from the Max Read Field. Observed fill thicknesses ranged from approximately 5 feet to greater than 20 feet. The natural groundwater table was encountered within these fill materials in this area of the Site. In general, these fills were granular materials mixed with varying percentages of coal ash, slag, brick, clinker, hardened tar and coke. Some tar staining and evidence of separate phase product in the form of “blobs” were observed in the fills observed in TP-2, MW-1/TB-6, W-BVE-TP-11,



W-BVE-TP-12 and W-BVE-TP-14, both located between the north and south washout areas. Other notable observations included blue staining at W-BVE-TP-13 and W-BVE-TP-10 (both located on the northern side of this area) and visual observations of hardened tar on the face of the south washout area.

Impacts from MGP residuals are evident throughout major portions of the South Fill Area. Numerous test pit logs report “MGP wastes throughout.” Staining, sheens, tars, and NAPL are reported. Odors are described as tar-like, naphthalene-like and oil-like.

### *Seekonk River Sediment Sampling*

Anchor QEA, LLC (Anchor QEA) and ARCADIS conducted a sediment sampling investigation in the Seekonk River adjacent to the former Tidewater Facility in the summer of 2008. The sediment sampling investigation was intended to evaluate potential impacts to Seekonk River environmental conditions that may be associated with the Site. This work was conducted consistent with a RIDEM-approved Sediment Investigation Work Plan developed by ARCADIS in 2008. To evaluate the potential impacts associated with the Site and other potential contaminant sources to the Seekonk River sediments in the Site vicinity, TG&B Marine Services, Inc. of Falmouth, Massachusetts collected 49 sediment cores from July 8, 2008 to July 16, 2008. A total of 48 sediment samples were collected from the sediment cores (which ranged in length from 1 to 14 feet) and submitted for physical and chemical analyses, including polycyclic aromatic hydrocarbons (PAHs), total petroleum hydrocarbons (TPHs), 13 priority pollutant metals, volatile organic compounds (VOCs), physiologically available cyanide (PACN), and TOC. ARCADIS personnel observed the sampling, processed the sediment cores for sampling, and logged the cores.

Results of the sampling are presented in the “Tidewater Sediment Data Report, Former Tidewater Facility” prepared by Anchor QEA. This report was submitted to RIDEM in June 2009. In general, the field investigation findings did not indicate significant impacts to river sediments from the former MGP. Anchor stated that when compared in their experience to other New England properties that were formerly occupied by MGPs, the concentration and extent of organic compounds (PAHs and VOCs) in sediment was generally lower in magnitude (i.e., for PAH and VOC concentration) and occupied a smaller area in the river.

## **3.00 DATA GAP ANALYSIS**

The following data gaps were identified during a review of existing Site data and observations made during previous investigation programs. The scope of work presented in Section 4.00 has been designed to specifically address these data gaps. It should be noted that for the South Fill Area, we believe that there currently exists sufficient data based on the previous investigations performed at the Site to support remedy selection for this area. Therefore the proposed investigation focuses primarily on addressing the data gaps related to groundwater in this Site area.



### North Fill Area

- Tar globules were identified in boring TB-17 at a depth of 16 feet bgs, located within the former inlet area. Further investigation is proposed to evaluate the extent of these impacts;
- White crystals were identified in boring TB-16 (6 to 7 ft bgs), located proximate to the northern side of the former inlet area. Further investigation is proposed to evaluate the extent of these residual materials;
- Elevated levels (relative to other surficial soil samples) of certain PAHs were detected in a surficial sample (SS-42) located proximate to TB-17. Further investigation is warranted to evaluate the extent of these surficial PAH impacts;
- An elevated detection of lead was observed in a surficial sample collected at VHB-400. This sample was collected on the adjacent City of Pawtucket property and is therefore unlikely associated with former Site activities, further investigations are warranted to assess on-site impact;
- Two additional groundwater monitoring wells (to be installed as multi-level monitoring couplets) between existing wells MW-203 and MW-204 will be installed to further evaluate groundwater quality; and
- Additional investigations to assess visually impacted soils at the following locations: GZA TP-2 and TB-17.

### Former Gas Plant Area

- Investigations (combination of test pits/trenches and borings) at former MGP features not previously investigated: A total of 32 separate structures were identified based on review of historic Site plans in this Site area. Of these, 12 have been subject to some degree of assessment. Observed conditions varied from no apparent impacts (or no structure) to the presence of MGP wastes in structures and soil, and apparent impacts to groundwater. Although environmental sampling and testing was not performed consistently during these previous structure investigations, the presence of the observed residual waste material represents an Upper Concentration Limit (UCL) condition under the Remediation Regulations. The following features have not been investigated,
  - Tar Tanks 2, 3, and 5
  - Naphthalene Scrubber and Tower
  - Tar Extractor
  - 4 of 5 Iron Purifying Tanks
  - All Former Above Ground Oil Tanks
  - Tar Dehydration Tank
  - Drip Oil Tanks
  - Gasholders Nos. 7 and 8
- Additional investigations to assess subsurface soil conditions in the footprint of the Purifier House;



- “Tanks” located near the intersection of the former Thornton and current Merry Street;
- Additional investigations to evaluate extent of VOC impacts at TP-11, TP-12, TP-13, TB-13/MW-4, and TP-222;
- Two additional groundwater monitoring wells (to be installed as multi-level monitoring couplets) along the Seekonk River to further evaluate groundwater quality and for the presence of DNAPL;
- Extent of NAPL at the following locations: TB-12/MW-3 (LNAPL), TB-13/MW-4 (LNAPL/DNAPL) and MW-210 (LNAPL); and
- Additional investigations to assess visually impacted soils at the following locations: TB-11, TB-12, TB-13, TP-8B, and TP-218; and
- Additional investigations to assess analytical exceedances of the RIDEM Method 1 Soil UCL at the following locations:
  - GZA-TP-5: pyrene (11,950 ppm) and naphthalene (12,900 ppm)
  - TP-14 S-1: naphthalene (19,000 ppm)
  - TP-13 3-4’: naphthalene (18,700 ppm)
  - TP-222 2-3’: TPH (60,000 ppm)

#### Former Power Plant Area

- Additional investigations in the area of tar observations in the vicinity of former oil tank No. 3 (TP-3 and TP-3A);
- Additional investigations in the vicinity of former oil Tanks 1 and 2;
- Further assessment of the elevated benzene levels detected in soil at TB-9;
- Installation of a groundwater monitoring well in the vicinity of TB-9 to evaluate the presence of LNAPL;
- Installation of a groundwater monitoring well downgradient of M&E MW-5 to evaluate the presence of LNAPL;
- Installation of two groundwater monitoring wells along the access road adjacent to former oil Tank No. 3 to further evaluate groundwater quality;
- Assess three areas of “buried oil sludge” identified on a historic plan prepared by AES. The actual presence of these materials have not been verified;
- Extent of NAPL at the following locations: M&E MW-2 (LNAPL) and M&E MW-5 (LNAPL); and
- Additional investigations to assess visually impacted soils at the following locations: B-109/MW-109, TP-3A, TP- 4, TP-111, MW-103, TP-2, TP-5, TP-6, TP-7, TP-8, TP-9.

### South Fill Area



- Installation of two groundwater monitoring wells (to be installed as multi-level monitoring couplets) well in area of well MW-1 to provide lateral coverage of the DNAPL historically observed at MW-1. Additional wells may be added in the SFA portion of the Site based on drill rig access (please refer to tentative well locations on Figure 8).

It should be noted that the intent of the proposed additional Site wide surficial soil samples is to further characterize shallow materials across the Site. Results of the proposed shallow surface soil sampling and analysis, along with the existing historic surface soil data, will be used by GZA to complete a Site-specific human health risk assessment (Imminent Hazard Evaluation) for surface soils at the Site. The intent is to present the results of this assessment as part of the SIR.

## **4.00 PROPOSED SCOPE OF WORK**

The principal constituents of concern identified at the Site are total petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAHs), metals (primarily arsenic and lead), in addition to the presence of NAPL (LNAPL and DNAPL). GZA proposes to undertake a subsurface investigation program consisting of the completion of test pits, soil borings/monitoring wells and shallow surface soil samples. As described previously, this investigation program has been specifically designed to address the data gaps identified in Section 3.00. The data generated during this program will be combined with previous investigation data to prepare a comprehensive SIR for this Site.

In areas where significant visual impacts have been identified or are observed (i.e., certain areas of the Former Gas Plant Area and the South Fill Area), analytical testing will be limited. Visual and olfactory observations will be used as the primary investigation tool in these areas. Exceptions to this approach will include impacted groundwater, certain surface soils, and areas where further evaluation of UCL soil exceedances and specific contaminant impacts (i.e., isolated VOC concentrations) are identified. Please note that based on field conditions and the results of utility clearance, the exact locations of the proposed explorations are subject to modification.

The following summarizes the work scope developed to address the data gaps identified in Section 3.00 above. Proposed exploration locations are shown on the attached Figures 7 and 8. Fieldwork associated with the subsurface exploration program will be completed in accordance with a Health and Safety Plan (HASP) prepared for the project.



### Comprehensive Utility Plan

Under this task, GZA will perform a review of available information for the Site relative to the presence and location of utilities and easements. This work will be completed as part of the DigSafe clearance and will be used to further refine the locations of proposed explorations. A comprehensive utility plan will be developed based on our review of available information under this task.

### Site Survey

As part of this task, GZA will locate in the field the approximate location of the historic Site features for which explorations are proposed and complete an inventory of surface conditions (i.e., vegetation cover, surface staining/visual evidence of contamination). Using this information and the results of the utility research described above, GZA will locate the proposed explorations identified on Figures 7 and 8, making modifications to their location(s) as necessary based on utility information and field access conditions.

### CRMC Permitting

The majority of the proposed investigation falls within 200-feet of the coastal feature, and as such, is subject to the jurisdiction of the Coastal Resource Management Council (CRMC). Under this task, 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).

### Test Pit Explorations

GZA proposes to complete approximately 66 additional test pit locations (to be identified as TP-300 to TP-365) at the locations shown on Figures 7 and 8. 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. Table 1 summarizes the proposed test pit locations according to Site area, as well as the general location and rationale for the exploration locations.

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 up to 10 feet below grade, or as subsurface conditions allow. For those locations where extensive underground utilities may be present, the test pits will be initially advanced using a vector truck. In areas where the proposed test pits are located in close proximity to one another, trenches may be advanced as opposed to individual test pits to better assess subsurface soil conditions



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 for visual and olfactory evaluation. 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 A).

As previously noted, the primary purpose of the test pit work is to further assess the nature and extent of visual evidence of impacts. As presented in Table 1, soil samples will be collected at select test pit locations and submitted for analysis testing to further assess specific contaminant exceedances (primarily VOCs) and exceedances of the RIDEM Method 1 UCL criteria. It is anticipated that at least one soil sample from each test pit location will be selected for laboratory analysis. The soil samples may be analyzed for VOCs using EPA Method 8260, TPH using EPA Method 8100M, PAHs using EPA Method 8270, total cyanide and EPA 13 Priority Pollutant Metals.

The soil samples will be collected in glass jars and will be kept cool during shipment under chain-of-custody documentation to GZA's Environmental Chemistry Laboratory.

#### *Soil Boring and Monitoring Well Installations*

GZA proposes to install 26 additional test borings (to be identified as TB-301 to TB-325) at the locations shown on Figures 7 and 8. In thirteen (13) of the boring locations, GZA proposes to install monitoring wells. Completion of three of the proposed well locations in the NFA will be dependent upon drill rig accessibility. Prior to installing the borings and/or wells, GZA will perform Site reconnaissance to coordinate DigSafe clearance, and to visually evaluate access restrictions. Some of the locations may change due to the presence of underground utilities. The rationale for the exploration locations are described in the attached Table 2. Depending on utility clearance, we may vacuum excavate the first few feet of some of the explorations.

The test borings will be installed utilizing either a truck-mounted drill rig using hollow stem augers (HSA) or a Geoprobe rig (in areas where there are access restrictions). Based on our understanding of subsurface conditions, soil boring depths are anticipated to be approximately 20 to 25 feet below ground surface, with the exception of the multi-level well monitoring wells. At these locations, we anticipate that the borings will extend to the depths of the till layer, or approximately 35 to 40 feet bgs. The drilling tools will be steam-cleaned between each monitoring well location. A GZA geologist or engineer will be present during drilling to classify soil conditions, oversee well installations and prepare boring/well installation logs.

The monitoring wells will be constructed of 2-inch diameter PVC well screen and solid PVC riser pipe (for the wells installed with HSA) or 1-inch diameter PVC for the geoprobe locations. 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. A concrete surficial seal with a flush-mounted road box will be installed to protect the wells.

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

Soil samples will be obtained during the drilling of the monitoring wells and the test borings at approximately 2-foot intervals with a split-spoon sampler using Standard Penetration Test techniques. Select soil samples will be collected in glass jars and will be kept cool during shipment under chain-of-custody documentation to GZA's Environmental Chemistry Laboratory.

Soil samples will be screened in the field for total VOCs using a PID. As presented in Table 2 and summarized below, it is anticipated that the following soil samples will be submitted for analytical testing:

<b>Proposed Test Boring Location</b>	<b>Proposed Sample Depth</b>	<b>Proposed Analytical Testing</b>
TB-302	Upper 5 feet – TPH 5 to 15 ft - VOCs	TPH via EPA Method 8100M and VOCs via EPA Method 8260
TB-303	Upper 5 feet – TPH 5 to 15 ft - VOCs	TPH via EPA Method 8100M and VOCs via EPA Method 8260
TB-304	Upper 5 feet – TPH 5 to 15 ft - VOCs	TPH via EPA Method 8100M and VOCs via EPA Method 8260
TB-305	Upper 5 feet – TPH 5 to 15 ft - VOCs	TPH via EPA Method 8100M and VOCs via EPA Method 8260
TB-307	20 to 25 feet bgs	VOCs via EPA Method 8260
TB-308	20 to 25 feet bgs	VOCs via EPA Method 8260
TB-309	20 to 25 feet bgs	VOCs via EPA Method 8260
TB-314/MW-314	20 to 25 feet bgs	VOCs via EPA Method 8260
TB-312/MW-312	Upper 5 feet	PAHs (pyrene and naphthalene) via EPA Method 8270C

In addition, it is anticipated that up to 1 soil sample per boring will be selected for laboratory analysis. The soil samples may be analyzed for VOCs using EPA Method 8260, TPH using EPA Method 8100M, PAHs using EPA Method 8270, total cyanide and EPA 13 Priority Pollutant Metals. The soil samples will be collected in glass jars and will be kept cool during shipment under chain-of-custody documentation to GZA's Environmental Chemistry Laboratory.

*Surface Soil Sampling and Testing*

GZA proposes to collect 33 additional shallow surface soil samples at the locations presented on Figures 7 and 8 to supplement the existing soil analytical data and facilitate the evaluation of potential risks associated with near surface impacts. The rationale for the surface soil locations is described in the attached Table 3. The surface soil samples will be



collected using a hand-auger from the upper 1 foot of soil (0-1 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.

Samples will be submitted to GZA's Environmental Chemistry Laboratory for the following analytical testing: TPH via EPA Method 8100M, PAHs via EPA Method 8270C and select metals (arsenic, lead, cyanide [including total and PAC]). Surface soil samples collected from areas proximate to the existing gas holders will also be submitted for polychlorinated biphenyls (PCBs) via EPA Method 8082. Using the historic and proposed sampling results, GZA will complete a site-specific human health risk assessment (Imminent Hazard Evaluation) for surface soils at the Site.

#### Groundwater Sampling and Analysis

On April 23, and June 18, 2009, GZA conducted reconnaissance of the Site for the purpose of locating, tagging and measuring the depth to groundwater and the presence/thickness of NAPL in accessible monitoring wells. The condition of the wells was also recorded. Each of the existing wells was accessed. These data are compiled in Table 4 (Existing Groundwater Monitoring Well Summary). Well measurement could not be made at two locations; MW-3/ME (Former Power Plant Area) was found to be destroyed and MW-5/TB-14 (North Fill Area) was found to be dry.

Our data indicate that of the 28 previously installed wells, five provided evidence of NAPL. Specifically, three wells in the Former Gas Plant Area (MW-3, MW-210 and MW-2/TB-12) provided evidence of 0.02' (1/4-inch), 0.05' ( $\pm$ 1/2-inch) and 0.02' ( $\pm$ 1/4-inch) of LNAPL, respectively. In the Former Power Plant Area, 0.44 feet ( $\pm$ 5-inches) of LNAPL was measured in well MW-5/ME. DNAPL at a thickness of 0.88' ( $\pm$ 10-inches) was measured in well MW-1/TB-6 in the South Fill Area. It is also noted that apparent DNAPL was observed on the probe when recovered from well MW-4/TB-13 (Former Gas Plant Area).

Groundwater samples will be collected from the 13 newly installed monitoring wells and from 26 existing wells (MW-1/TB-6, MW-3/TB-12, MW-5/TB-14, MW-4/TB-13, MW-6/TB-8, MW-7/TB-20, MW-101/TB-101, MW-102, MW-103, MW-104, MW-105, MW-107, TB-109/MW-109, MW-201, MW-202, MW-203, MW-204, MW-205, MW-206, MW-207, MW-208, MW-209, MW-210, ME-MW-1, ME-MW-2, ME-MW-4 and ME-MW-5).

GZA will sample each of the 37 wells using the US EPA's July 30, 1996 *Low Stress (low flow) Purging and Sampling Procedure*. As part of that sampling methodology, well stabilization will be determined through the measurement of specific water quality parameters recorded during the purging process. Prior to sampling the wells will be inspected for the presence of NAPL using an electronic oil/water interface probe. After the wells are sampled, a bailer will be installed to confirm the oil/water interface probe readings in the wells in which the presence of LNAPL and DNAPL was indicated.



Special care will be taken to assure that NAPL is not introduced into the sample. Well purging will include the visual evaluation of the presence/absence of NAPL in the purge water. Purge water will be placed in labeled containers, and subsequently disposed of at an appropriate, National Grid-approved, off-Site facility.

The groundwater water samples will be collected in laboratory provided containers, placed in an ice-filled cooler and delivered under chain-of-custody documentation to GZA's Environmental Chemistry Laboratory.

Groundwater samples will be analyzed for volatile organic compounds (Method 8260b), total petroleum hydrocarbons (Method 8100M), polycyclic aromatic hydrocarbons (Method 8270), dissolved/free cyanide (EPA Method 9010) and total cyanide (EPA Method 9010).

Should NAPL be present in the monitoring wells, it will be removed and the recovery rate documented. Based on the results of the groundwater testing program, the return rate of the NAPL and/or thickness of NAPL, distinct NAPL samples may be selected for PAH (Method 8270), VOC (Method 8260B) and/or TPH Fingerprinting (Method 8100M or equivalent).

#### Report Preparation

Following completion of all investigation activities, GZA will prepare a *Site Investigation Report* generally following the format prescribed in Section 7.03 of the RIDEM's Remediation Regulations.

In broad terms, the report will describe the information obtained during the course of the investigation and our professional opinion with respect to:

- the nature, extent and character of the observed conditions,
- the potential sources of the observed conditions,
- the potential environmental and public health impacts from those conditions, and
- recommendations for remedial action including the identification of applicable alternatives and evaluation of the No Action alternative.

The pertinent information and laboratory test data obtained as part of the current and past assessment studies will be compiled and evaluated by GZA as part of the *Site Investigation Report*. Our evaluation will consider the significance of the data with respect to regulatory requirements, and the remedial implications of these requirements. Specifically, we will include in our evaluation:

- implications of potential off-site impacts, and
- implications with respect to intended future use of the property and the potential need for assurances for continuation of this use.

## **TABLES**

**TABLE 1  
PROPOSED TEST PIT LOCATIONS**

FORMER TIDEWATER FACILITY  
Pawtucket, Rhode Island

Proposed Exploration	Site Area	General Location and/or Purpose
TP-300	FGPA	TP-205, TP-211; Assess UCL (coal tar) condition
TP-301	FGPA	Underground Tar Tank No. 2
TP-302	FGPA	GZA-TP-5, TP-218; Assess UCL conditions (coal tar; <i>pyrene and naphthalene</i> )
TP-303	FGPA	TB-210/MW-210, TP-220; Assess UCL (coal tar) condition
TP-304	FGPA	TP-11; Assess UCL (coal tar) condition & <i>VOCs</i>
TP-305	FGPA	TP-11; Assess UCL (coal tar) condition & <i>VOCs</i>
TP-306	FGPA	TP-11; Assess UCL (coal tar) condition & <i>VOCs</i>
TP-307	FGPA	Napthalene Tower
TP-308	FGPA	Tar Extractor/Underground Tar Tank No. 5
TP-309	FGPA	Underground Tar Tank No.3
TP-310	FGPA	TB-11; Assess UCL (coal tar) condition
TP-311	FGPA	Oil Tanks/Aboveground Tank Area (specifically 138,000 gallon oil tank)
TP-312	FGPA	Oil Tanks/Aboveground Tank Area (specifically drip oil tank)
TP-313	FGPA	Oil Tanks/Aboveground Tank Area (specifically tar dehydration tank)
TP-314	FGPA	Oil Tanks/Aboveground Tank Area
TP-315	FGPA	Oil Tanks/Aboveground Tank Area (specifically 1902 oil tank)
TP-316	FGPA	Gas Holder No. 5
TP-317	FGPA	Purifier House; Assess UCL (coal tar) condition at TP-202
TP-318	FGPA	Purifier House
TP-319	FGPA	Purifier House
TP-320	FGPA	TP-8B; Assess UCL (coal tar) condition
TP-321	FGPA	Relief Holder Drip Pump Outlet
TP-322	FGPA	Tanks near natural gas operations
TP-323	FGPA	Tanks near natural gas operations
TP-324	FGPA	TB-12/MW-3; Assess UCL (LNAPL) condition
TP-325	FGPA	TB-12/MW-3; Assess UCL (LNAPL) condition
TP-326	FGPA	TB-12/MW-3; Assess UCL (LNAPL) condition
TP-327	FPPA	W-BVE-TP-2, W-BVE-MW-5 and MW-2; Assess UCL conditions (coal tar and DNAPL)
TP-328	FPPA	W-BVE-MW-5 AND MW-2; Assess UCL conditions (DNAPL)
TP-329	FPPA	TB-103/MW-103; Assess UCL conditions (coal tar and LNAPL)
TP-330	FPPA	TB-103/MW-103; Assess UCL conditions (coal tar and LNAPL)
TP-331	FPPA	TB-103/MW-103; Assess UCL conditions (coal tar and LNAPL)
TP-332	FPPA	TB-103/MW-103; Assess UCL conditions (coal tar and LNAPL)
TP-3333	FPPA	Fuel Oil Tanks No. 1 and 2
TP-334	FPPA	Fuel Oil Tanks No. 1 and 2
TP-335	FPPA	Fuel Oil Tanks No. 1 and 2; Assess UCL (coal tar) condition
TP-336	FPPA	Fuel Oil Tanks No. 1 and 2; buried oil sludge area
TP-337	FPPA	Fuel Oil Tanks No. 1 and 2
TP-338	FPPA	Fuel Oil Tanks No. 1 and 2

**TABLE 1**  
**PROPOSED TEST PIT LOCATIONS**

FORMER TIDEWATER FACILITY  
Pawtucket, Rhode Island

Proposed Exploration	Site Area	General Location and/or Purpose
TP-339	FPPA	Fuel Oil Tanks No. 1 and 2
TP-340	FPPA	Fuel Oil Tanks No. 1 and 2
TP-341	FPPA	Fuel Oil Tanks No. 1 and 2; buried oil sludge area
TP-342	FPPA	Fuel Oil Tanks No. 1 and 2
TP-343	FPPA	W-BVE-TP-9; Assess UCL (coal tar) condition
TP-344	FPPA	W-BVE-TP-9; Assess UCL (coal tar) condition
TP-345	FPPA	W-BVE-TP-9; Assess UCL (coal tar) condition
TP-346	FPPA	W-BVE-TP-9; Assess UCL (coal tar) condition
TP-347	FPPA	TP-3/W-BVE-TP-7; Assess UCL (coal tar) condition
TP-348	FPPA	TP-3/W-BVE-TP-7; Assess UCL (coal tar) condition
TP-349	FPPA	TP-3/W-BVE-TP-7; Assess UCL (coal tar) condition
TP-350	FPPA	TP-3A
TP-351	FPPA	TP-3A
TP-352	FPPA	TP-3A; buried oil sludge area
TP-353	FGPA	TP-13; Assess UCL conditions ( <i>naphthalene</i> ; coal tar) & <i>VOCs</i>
TP-354	FGPA	TP-13; Assess UCL conditions ( <i>naphthalene</i> ; coal tar) & <i>VOCs</i>
TP-355	NFA	TB-16; Assess white crystalline powder condition and <i>naphthalene</i>
TP-356	NFA	TB-16; Assess white crystalline powder condition and <i>naphthalene</i>
TP-357	NFA	TB-16; Assess white crystalline powder condition and <i>naphthalene</i>
TP-358	NFA	TB-16; Assess white crystalline powder condition and <i>naphthalene</i>
TP-359	FPPA	Fuel Oil Tanks No. 1 and 2; buried oil sludge area
TP-360	FPPA	Fuel Oil Tanks No. 1 and 2; buried oil sludge area
TP-361	FPPA	TP-3A; buried oil sludge area
TP-362	NFA	GZA-TP-2; Assess UCL (coal tar) condition
TP-363	NFA	GZA-TP-2; Assess UCL (coal tar) condition
TP-364	NFA	GZA-TP-2; Assess UCL (coal tar) condition
TP-365	FGPA	GZA-TP-7; Assess UCL (coal tar) condition

Notes:

1. Soil samples will be collected at TP-302, -304, -305, -306, -353, -354, -355, -356, -357 and -358 and submitted for analytical testing for contaminant constituents noted in *bold italics* .
2. At least one soil sample from each test pit location will be submitted for VOCs, TPH, PAHs, total cyanide and/or PP-13 metals.

**TABLE 2**  
**SUMMARY OF PROPOSED TEST BORING AND MONITORING WELL LOCATIONS**

FORMER TIDEWATER FACILITY  
Pawtucket, Rhode Island

Proposed Exploration	Site Area	General Location and/or Purpose
TB-300	NFA	TB-17; Assess UCL (coal tar) condition
TB-301	NFA	TB-17; Assess UCL (coal tar) condition
TB-302	FGPA	TB-13/MW-4, TP-211, TP-222, TP-12; Assess UCL conditions ( <i>TPH</i> , coal tar, NAPL) & <i>VOCs</i>
TB-303	FGPA	TB-13/MW-4, TP-211, TP-222, TP-12; Assess UCL conditions ( <i>TPH</i> , coal tar, NAPL) & <i>VOCs</i>
TB-304	FGPA	TB-13/MW-4, TP-211, TP-222, TP-12; Assess UCL conditions ( <i>TPH</i> , coal tar, NAPL) & <i>VOCs</i>
TB-305	FGPA	TB-13/MW-4, TP-211, TP-222, TP-12; Assess UCL conditions ( <i>TPH</i> , coal tar, NAPL) & <i>VOCs</i>
TB-306	FGPA	Oil Tanks/Aboveground Tank Area, Assess UCL conditions (TPH, coal tar, NAPL) and bedrock depth
TB-307	FPPA	TB-9; Assess UCL (coal tar) condition and elevated <i>benzene</i> concentration
TB-308	FPPA	TB-9; Assess UCL (coal tar) condition and elevated <i>benzene</i> concentration
TB-309	FPPA	TB-9; Assess UCL (coal tar) condition and elevated <i>benzene</i> concentration
TB-310/MW-310	NFA	Data gap between MW-203 and MW-204
TB-311/MW-311	NFA	Data gap between MW-203 and MW-204
TB-312/MW-312	FGPA	Data gap between MW-203 and MW-4; Assess UCL conditions ( <i>pyrene and naphthalene</i> ) at GZA-TP-5
TB-313/MW-313	FGPA	Data gap between TB-13/MW-4 and TB-12/MW-3
TB-314/MW-314	FPPA	TB-9; Assess UCL (coal tar) condition and elevated <i>benzene</i> concentration
TB-315/MW-315	FPPA	Assess downgradient of M&E MW-5
TB-316/MW-316	FPPA	Data gap in upland area of FPPA along access road adjacent to former Tank No. 3
TB-317/MW-317	FPPA	Data gap in upland area of FPPA along access road adjacent to former Tank No. 3
TB-318/MW-318	SFA	Data gaps between MW-1 and MW-102
TB-319/MW-319	SFA	Data gap south of MW-1
TB-320/MW-320	SFA	Data gap downgradient of MW-1 (tentative location pending drill rig accessibility)
TB-321/MW-321	SFA	Data gap south of south wash out area (tentative location pending drill rig accessibility)
TB-322/MW-322	SFA	Data gap south of south wash out area (tentative location pending drill rig accessibility)
TB-323	FPPA	Assess fuel oil impacts at B-109/MW-109
TB-324	FPPA	Assess fuel oil impacts at B-109/MW-109
TB-325	FPPA	Assess fuel oil impacts at B-109/MW-109

## Notes:

1. Soil samples will be collected at TB-302 through TB-305, TB-312/MW-312 and TB-314/MW-314 and submitted for analytical testing for contaminant constituents noted in *bold italics*.
2. All proposed groundwater monitoring well locations will consist of shallow and deep cluster wells, unless otherwise noted.

**TABLE 3**  
**PROPOSED SURFACE SOIL SAMPLE LOCATIONS**

FORMER TIDEWATER FACILITY  
Pawtucket, Rhode Island

Proposed Exploration	Site Area	General Location and/or Purpose
SS-100	FGPA	Assess elevated PAHs at SS-42
SS-101	FGPA	Assess elevated PAHs at SS-42
SS-102	FGPA	Assess elevated PAHs at SS-42
SS-103	FGPA	Assess elevated PAHs at SS-42
SS-104	FGPA	Assess UCL surface soil condition (naphthalene) at TP-14
SS-105	FGPA	Assess UCL surface soil condition (naphthalene) at TP-14
SS-106	FGPA	Assess UCL surface soil condition (naphthalene) at TP-14
SS-107	NFA	Assess surface soil conditions
SS-108	NFA	Assess surface soil conditions proximate to Gas Holders Nos. 7 and 8*
SS-109	NFA	Assess surface soil conditions
SS-110	FGPA	Assess surface soil conditions
SS-111	FGPA	Assess surface soil conditions proximate to Gas Holders Nos. 7 and 8*
SS-112	FGPA	Assess surface soil conditions proximate to Gas Holders Nos. 7 and 8*
SS-113	FGPA	Assess surface soil conditions proximate to Gas Holders Nos. 7 and 8*
SS-114	FGPA	Assess surface soil conditions proximate to Gas Holders Nos. 7 and 8*
SS-115	FGPA	Assess surface soil conditions proximate to Gas Holders Nos. 7 and 8*
SS-116	FGPA	Assess surface soil conditions proximate to Gas Holders Nos. 7 and 8*
SS-117	FGPA	Assess surface soil conditions proximate to Gas Holders Nos. 7 and 8*
SS-118	FGPA	Assess surface soil conditions
SS-119	FGPA	Assess surface soil conditions
SS-120	FGPA	Assess surface soil conditions
SS-121	FGPA	Assess surface soil conditions
SS-122	FGPA	Assess surface soil conditions
SS-123	FGPA	Assess surface soil conditions
SS-124	FPPA	Assess surface soil conditions
SS-125	FPPA	Assess surface soil conditions
SS-126	FPPA	Assess surface soil conditions
SS-127	FPPA	Assess surface soil conditions
SS-128	FPPA	Assess UCL surface soil condition (coal tar) at WBVE-TP-8
SS-129	FPPA	Assess UCL surface soil condition (coal tar) at WBVE-TP-8
SS-130	NFA	Assess elevated lead concentration at VHB-400
SS-131	NFA	Assess elevated lead concentration at VHB-400
SS-132	NFA	Assess elevated lead concentration at VHB-400

Notes:

1. Surface soil samples will be collected from the upper 1 foot of soil column at the locations identified and submitted for the following analyses, unless otherwise noted: cyanide, lead and arsenic via EPA Method 6010, PAHs via EPA Method 8270C, TPH via EPA Method 8100M.
2. Indicates surface soil samples to be submitted for PCBs via EPA Method 8082 in addition to the analyses listed above.



**TABLE 4  
EXISTING GROUNDWATER MONITORING WELL SUMMARY**

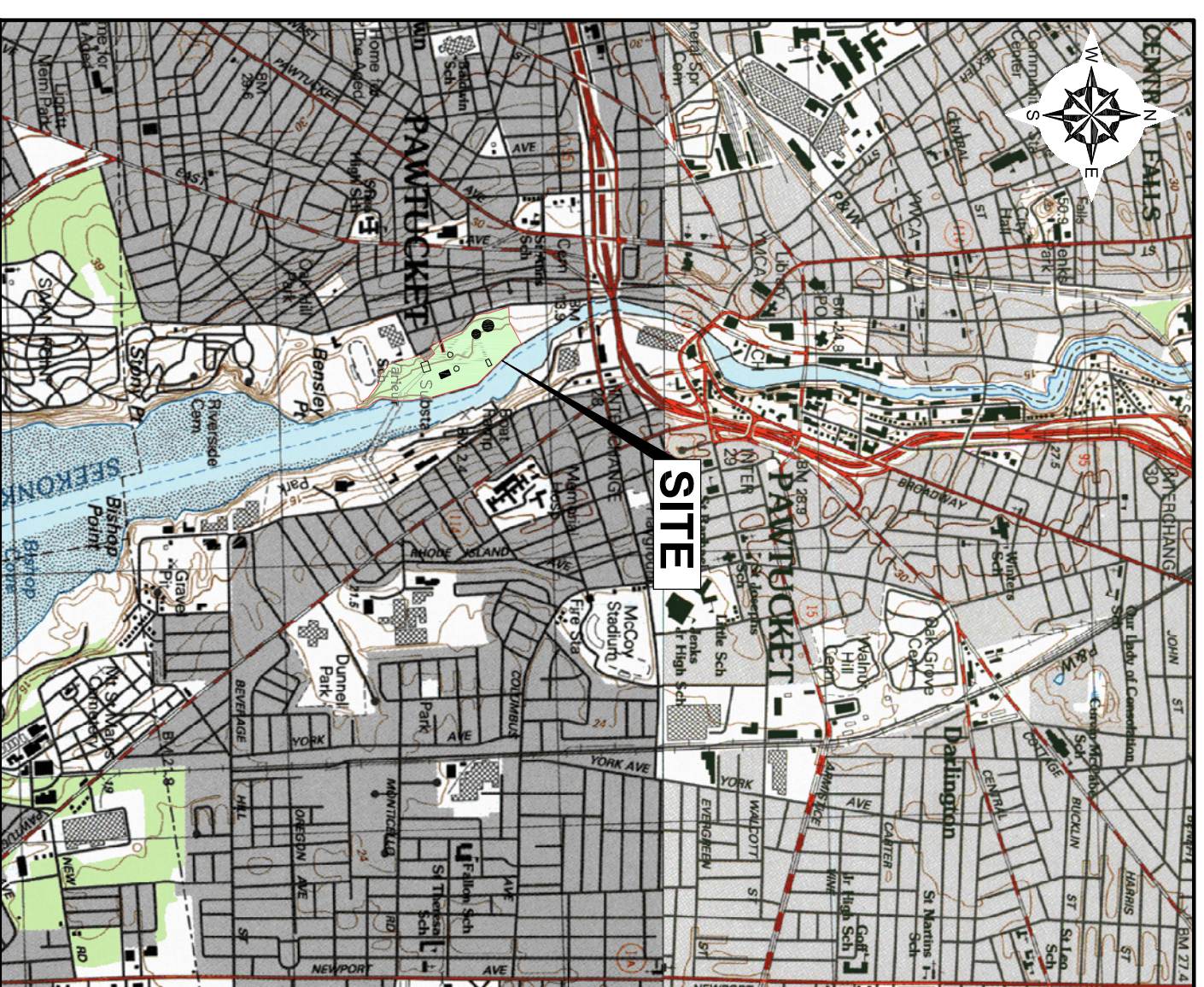
FORMER TIDEWATER FACILITY  
Pawtucket, Rhode Island

Site Area	Well ID	Measured Well Depth (Feet below TPVC)	Top of PVC Elevation (Feet)	April 23, 2009					June 18, 2009					
				Depth to GW (Feet)	GW Elevation (Feet)	Depth to Product (Feet)	Product Thickness (Feet)	Product Type	Depth to GW (Feet)	GW Elevation (Feet)	Depth to Product (Feet)	Product Thickness (Feet)	Product Type	
NFA	MW-5 / TB-14	11.6	29.70	Dry		NP				Dry at 11.6		NP		
NFA	MW-7 / TB-20	27.4	29.24							18.6	10.64	NP		
NFA	MW-204	16.8	8.50							9.15	-0.65	NP		
NFA	MW-205		10.00							Could Not Locate				
NFA	MW-206	28.2	35.60							25.85	9.75	NP		
FGPA	MW-201	15.0	11.00							9.26	1.74	NP		
FGPA	MW-202	13.8	12.00							2.70	9.30	NP		
FGPA	MW-203	14.8	8.60							7.70	0.90	NP		
FGPA	MW-207	11.8	14.50							1.10	13.40	NP		
FGPA	MW-208	21.7	26.40	11.90	14.50	NP				13.94	12.46	NP		
FGPA	MW-209	21.0	22.70	8.91	13.79	NP				10.75	11.95	NP		
FGPA	MW-210	17.3	8.50							8.40	0.10	8.35	0.05	LNAPL
FGPA	MW-3 / TB-12	14.0	8.53							11.47	-2.94	11.45	0.02	LNAPL
FGPA	MW-4 / TB-13	15.4	7.87							2.70	5.17	NP		
FPPA	M&E MW-1	15.1		9.20		NP				7.85		NP		
FPPA	M&E MW-2	13.7		9.22		NP				9.49		NP		
FPPA	M&E MW-4	7.8		5.50		NP				5.93		NP		
FPPA	M&E MW-5	16.9		10.47		9.12	1.35	LNAPL		7.94		7.50	0.44	LNAPL
FPPA	MW-6 / TB-8	18.7	10.96	11.54	-0.58	NP				Could Not Locate				
FPPA	MW-101/TB-101	16.0	10.9	10.20	0.70	NP				10.12	0.78	NP		
FPPA	MW-109/TB-109	19.3	14.40	9.98	4.42	NP				11.36	3.04	NP		
FPPA	MW-102	26.8	17.40	17.78	-0.38	NP				18.18	-0.78	NP		
FPPA	MW-103	16.9	8.50	9.70	-1.20	NP				9.98	-1.48	NP		
FPPA	MW-104	16.9	11.00	10.90	0.10	NP				11.20	-0.20	NP		
FPPA	MW-105	27.5	17.00	19.75	-2.75	NP				20.14	-3.14	NP		
SFA	MW-1 / TB-6	23.2	17.11	17.44	-0.33	22.91	0.24	DNAPL		17.77	-0.66	22.40	0.75	DNAPL
SFA	MW-107	28.7	19.50	19.40	0.10	NP				19.80	-0.30	NP		

## **FIGURES**

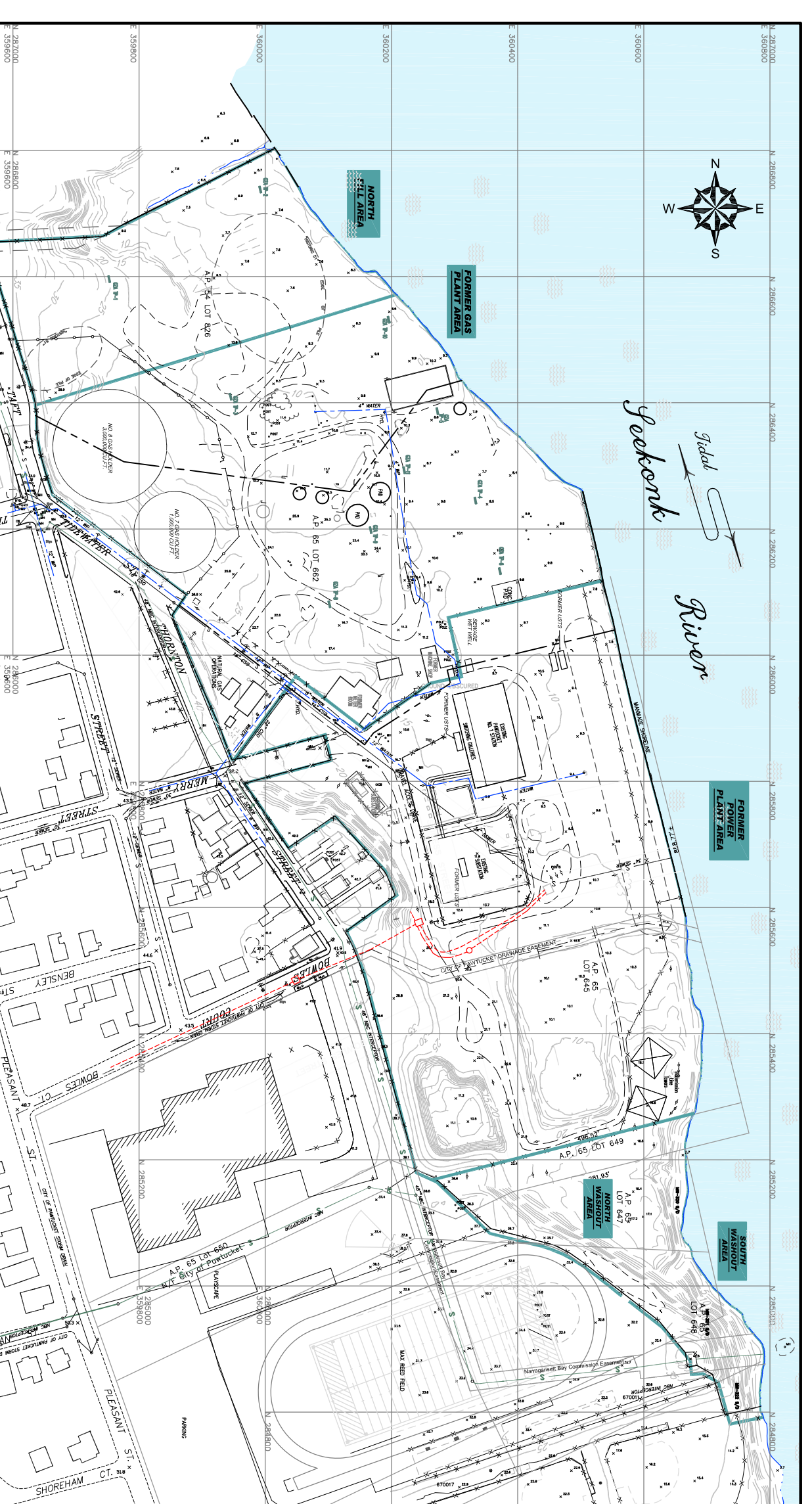
# FORMER TIDEWATER FACILITY SUPPLEMENTAL SITE INVESTIGATION WORK PLAN PAWTUCKET, RHODE ISLAND

NOVEMBER, 2009



SITE LOCATION PLAN

0 1000 2000 4000 6000  
Scale: 1"=2000'



LOCATION MAP

0 100 200 400 600  
Scale: 1"=200'

PREPARED FOR: 

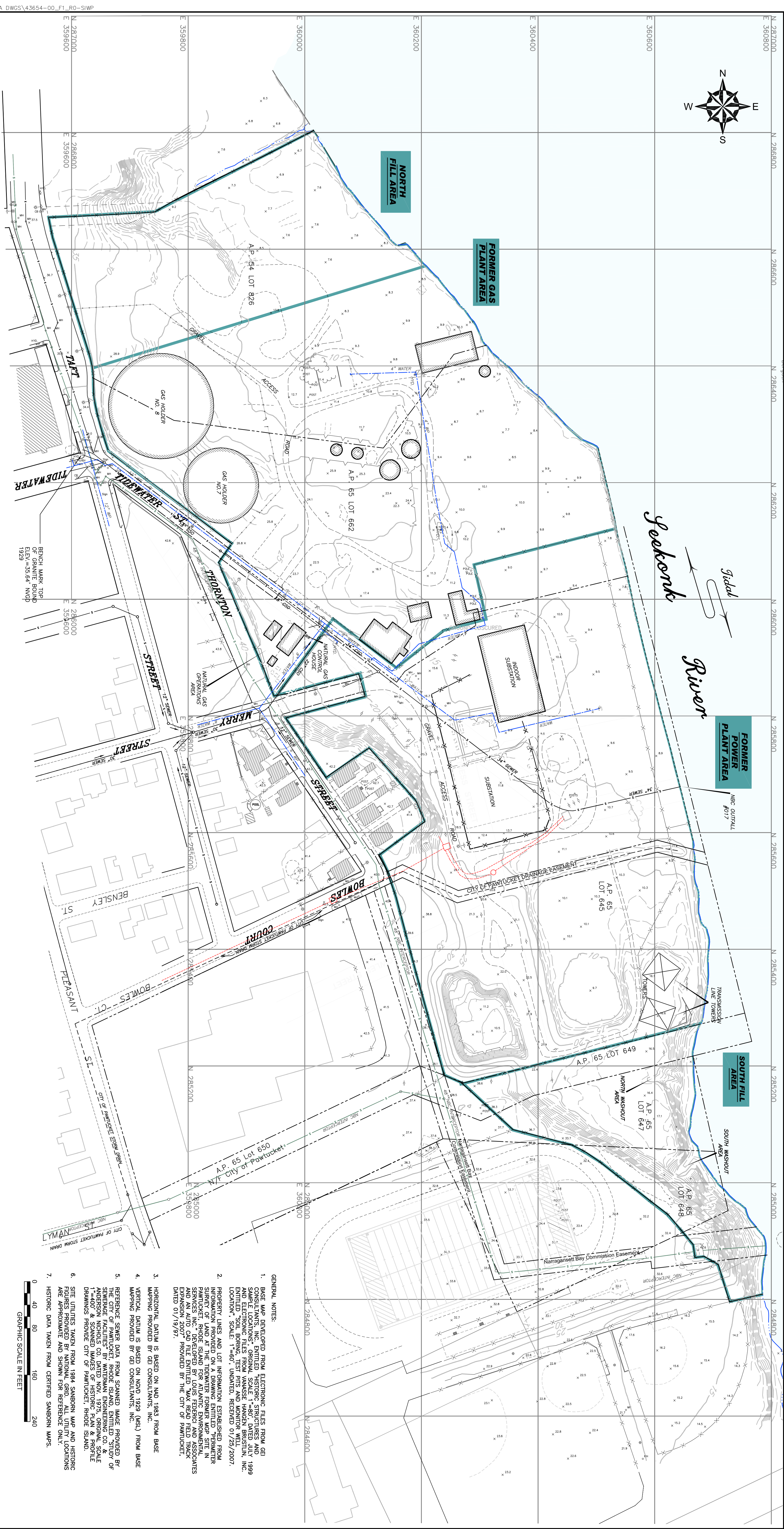
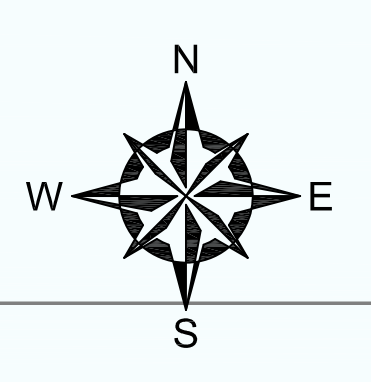


GeoEnvironmental, Inc.  
Engineers and Scientists  
530 Broadway  
Providence, Rhode Island 02909

PREPARED BY:

## INDEX OF DRAWINGS

- 1 COVER SHEET & SITE LOCUS PLAN
- 2 EXISTING CONDITIONS PLAN
- 3 HISTORIC SITE PLAN
- 4 NORTH FILL AREA AND GAS PLANT AREA
- 5 HISTORIC SITE PLAN
- 6 FORMER POWER PLANT AREA AND SOUTH FILL AREA
- 7 EXISTING EXPLORATION LOCATION PLAN
- 8 NORTH FILL AREA AND GAS PLANT AREA
- 9 PROPOSED EXPLORATION LOCATION PLAN
- 10 NORTH FILL AREA AND GAS PLANT AREA
- 11 PROPOSED EXPLORATION LOCATION PLAN
- 12 FORMER POWER PLANT AREA AND SOUTH FILL AREA



**LEGEND**

	EXISTING STRUCTURES ON-SITE		EXISTING NBIC INTERCEPTOR SANITARY SEWER
	FORMER STRUCTURES ON-SITE		EXISTING CITY OF PAWTUCKET STORM DRAIN
	EXISTING BUILDINGS/STRUCTURES OFF-SITE		EXISTING STORM/COMBINED SAN. SEWER OVERFLOW
	APPROXIMATE PROPERTY/LOT LINE (SEE GENERAL NOTE 2)		EXISTING UNDERGROUND ELECTRIC CABLE IN CONDUIT
	INTERIOR PROPERTY LINE		EXISTING CONTOUR (MINOR 1 FOOT INTERVAL)
	LIGHT POLES		EXISTING CONTOUR (MAJOR 5 FOOT INTERVAL)
	UTILITY POLES		
	UTILITY LIGHT POLE		
	MANHOLE		
	CATCHBASINS		
	FENCE		
	SPOT ELEVATION		
	EXISTING WATER LINE		



**FORMER TIDEWATER FACILITY**

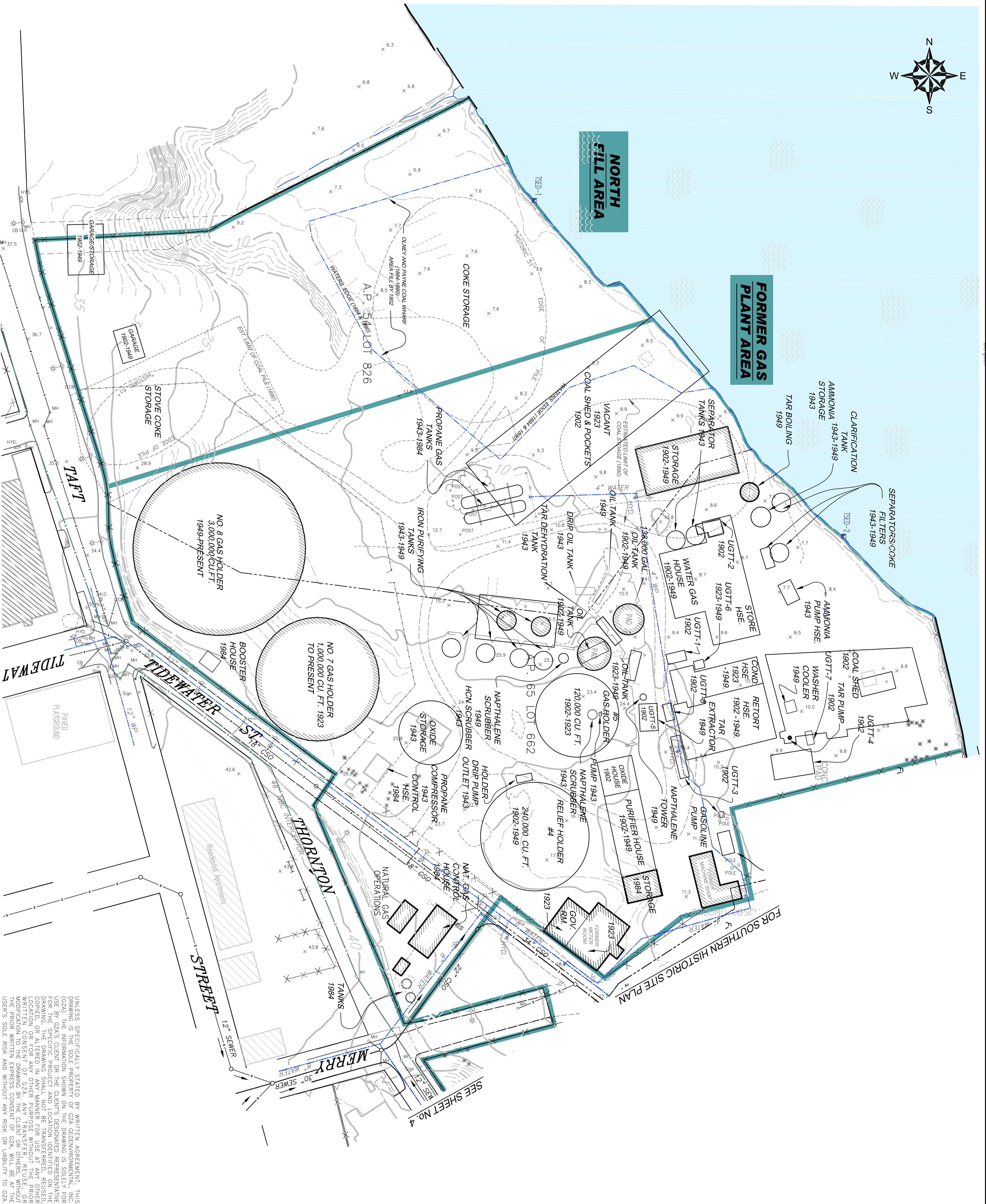
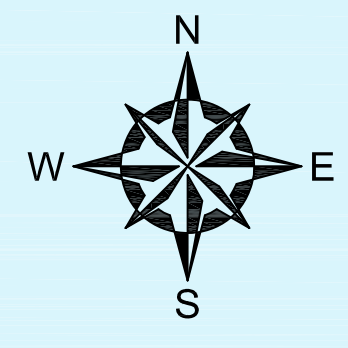
**PAWTUCKET, RHODE ISLAND**

**EXISTING CONDITIONS SITE PLAN**

<p>PREPARED BY: GZA GeoEnvironmental, Inc. Engineers and Scientists 500 BROADWAY PROVIDENCE, RHODE ISLAND 02909</p>	<p>PREPARED FOR: NATIONAL GRID</p>
<p>PROJ MGR: MSR DESIGNED BY: SMA DATE: SEPT. 2009</p>	<p>CHECKED BY: SMA SCALE: 1"=80' REVISION NO.</p>
<p>PRODUCT NO. 43654-00</p>	<p>FIGURE 2</p>
<p>SHEET NO. 2 OF 8</p>	

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

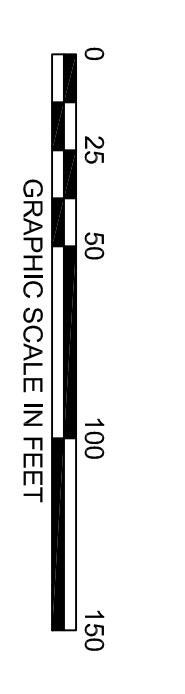
- GENERAL NOTES:**
1. BASE MAP DEVELOPED FROM ELECTRONIC FILES FROM GED SAMPLE LOCATIONS - ORIGINAL SCALE 1"=80', DATED JULY 1999 AND ELECTRONIC FILES FROM VANASSE HANGEN BRUSTLIN, INC. LOCATION, SCALE 1"=80', UNDATED, RECEIVED 01/25/2007.
  2. PROPERTY LINES AND LOT INFORMATION ESTABLISHED FROM SURVEY OF LAND AT THE TIDEWATER FORMER MAP SITE IN PAWTUCKET, RHODE ISLAND FOR ATLANTIC ENVIRONMENTAL SERVICES AND ALSO GED FILE ENTITLED "MAX READ FIELD TRACK EXPANSION 2007" PROVIDED BY THE CITY OF PAWTUCKET, DATED 01/19/97.
  3. HORIZONTAL DATUM IS BASED ON NAD 1983 FROM BASE MAPPING PROVIDED BY GED CONSULTANTS, INC.
  4. VERTICAL DATUM IS BASED ON MGD 1929 (MSL) FROM BASE MAPPING PROVIDED BY GED CONSULTANTS, INC.
  5. REFERENCE SEWER DATA FROM SCANNED MAPS PROVIDED BY THE CITY OF PAWTUCKET, RHODE ISLAND, ENTITLED "STUDY OF SEWERAGE FACILITIES BY WATERWAY ENGINEERING CO. & PROFILE 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.
  7. HISTORIC DATA TAKEN FROM CERTIFIED SANBORN MAPS.



REFERENCES:  
 CERTIFIED SANBORN MAPS DATED: 1894, 1890, 1902, 1923, 1949 & 1954  
 HISTORIC SITE PLAN "1923": BVG & E CO. PAWTUCKET, RHODE ISLAND HOUSE 1  
 SITE CONDITIONS & PROPOSED SAMPLING LOCATIONS: ATLANTIC ENVIRONMENTAL SERVICES, INC. UNDATED, FIGURE 4-1

- LEGEND:
- SITE AREA BOUNDARIES
  - ▨ EXISTING STRUCTURES ON-SITE
  - EXISTING STRUCTURES-OFF-SITE
  - ▩ EXISTING BUILDINGS/STRUCTURES OFF-SITE
  - 31 — EXISTING CONTOUR (MINOR 1 FOOT INTERVAL)
  - 35 — EXISTING CONTOUR (MAJOR 5 FOOT INTERVAL)
  - - - INTERIOR PROPERTY LINE
  - - - UGTT-8 1902 INDICATES TYPE OF STRUCTURE AND YEAR PRESENT
  - - - 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 WY/STRUCTURE

- GENERAL NOTES:
1. BASE MAP DEVELOPED FROM ELECTRONIC FILES FROM GE CONSULTANTS, INC. ENTITLED HISTORIC STRUCTURES AND SAMPLING LOCATIONS - ORIGINAL SCALE HANDED OUT IN 1999 BY THE CITY OF PAWTUCKET. THIS MAP WAS DEVELOPED BY GEA AND AN AUTO CAD FILE ENTITLED "MAP READ FIELD TRACK EXPANSION 2007" PROVIDED BY THE CITY OF PAWTUCKET.
  2. PROPERTY LINES AND LOT INFORMATION ESTABLISHED FROM INFORMATION PROVIDED ON A DRAWING ENTITLED "PERIMETER MAP" AND A PLAN ENTITLED "DEVELOPMENT CONCEPT MAP" IN 1999 BY THE CITY OF PAWTUCKET. THIS MAP WAS DEVELOPED BY ANDERSSON NICHOLS CO. DATED NOV. 1975. ORIGINAL SCALE 1"=400' AND SCANNED IMAGES OF HISTORIC PLAN & PROFILE DRAWINGS PROVIDED BY THE CITY OF PAWTUCKET, RHODE ISLAND.
  3. SITE UTILITIES TAKEN FROM 1984 SANBORN MAP AND HISTORIC FIGURES PROVIDED BY NATIONAL GRID. ALL UTILITY LOCATIONS ARE APPROXIMATE AND SHOWN FOR REFERENCE ONLY.
  4. HORIZONTAL DATUM IS BASED ON NAD 1983 FROM BASE MAPS PROVIDED BY GSI CONSULTANTS, INC.
  5. VERTICAL DATUM IS BASED ON NGVD 1929 (MSL) FROM BASE MAPS PROVIDED BY GSI CONSULTANTS, INC.
  6. REFERENCE SEWER DATA FROM SCANNED IMAGE PROVIDED BY THE CITY OF PAWTUCKET, RHODE ISLAND, ENTITLED "STUDY OF ANDERSSON NICHOLS CO. DATED NOV. 1975. ORIGINAL SCALE 1"=400' AND SCANNED IMAGES OF HISTORIC PLAN & PROFILE DRAWINGS PROVIDED BY THE CITY OF PAWTUCKET, RHODE ISLAND.
  7. HISTORIC DATA TAKEN FROM CERTIFIED SANBORN MAPS.



**FORMER TIDEWATER FACILITY**  
 PAWTUCKET, RHODE ISLAND

**HISTORIC SITE PLAN**  
 NORTH FILL AREA AND GAS PLANT AREA

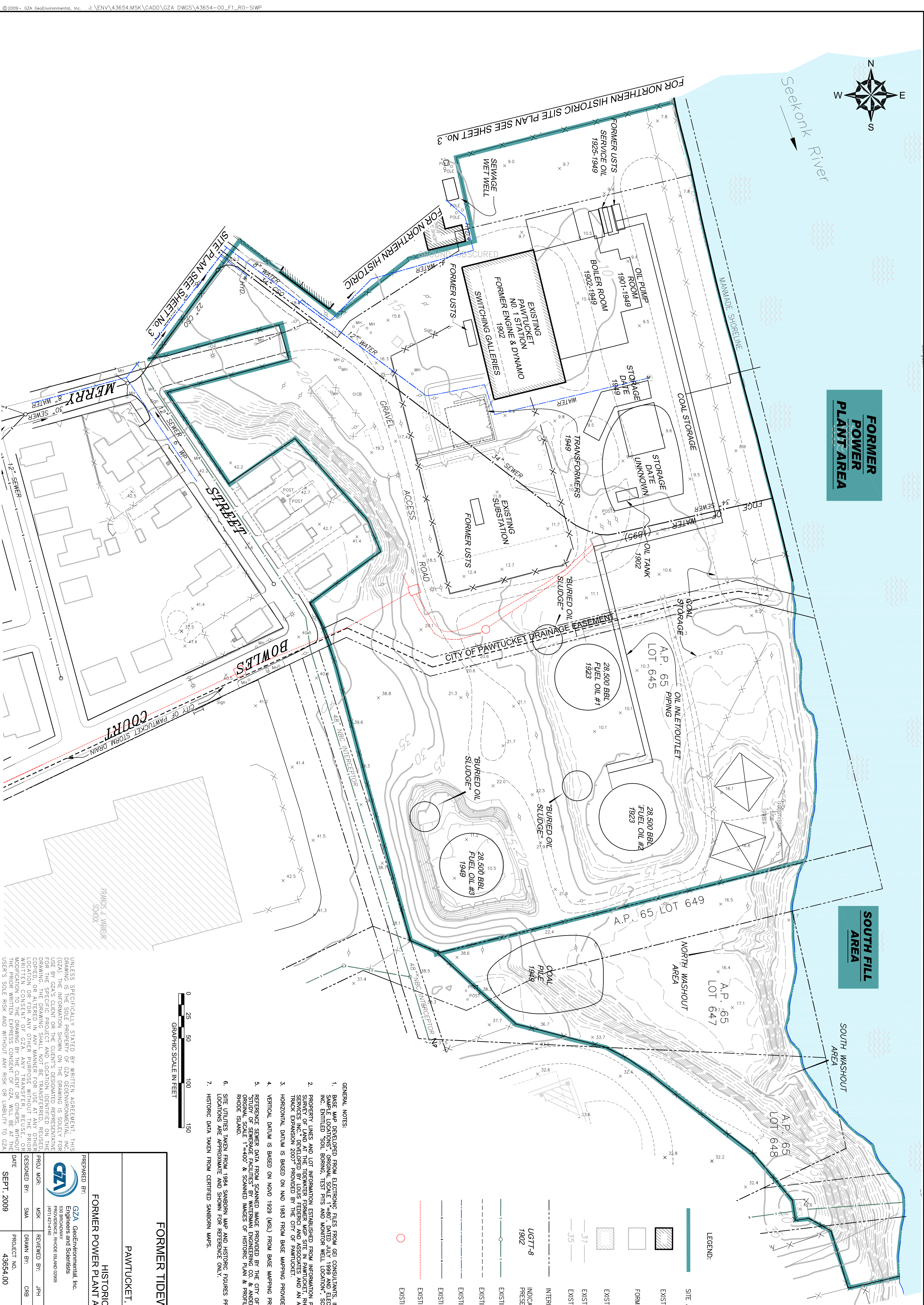
PREPARED FOR: NATIONAL GRID

PREPARED BY:	GZA GeoEnvironmental, Inc. 550 BROADWAY PROVIDENCE, RHODE ISLAND 02909	FIGURE	3
DESIGNED BY:	MSK	CHECKED BY:	SMA
DRAWN BY:	SMA	SCALE:	1"=50'
DATE:	SEPT. 2009	REVISION NO.:	
		PROJECT NO.:	43634-00
		SHEET NO.:	3 OF 8



**FORMER POWER PLANT AREA**

**SOUTH AREA**

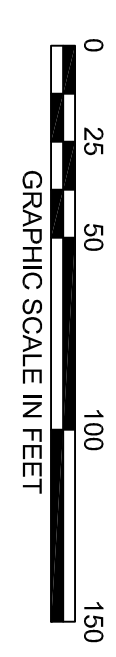


**REFERENCES:**  
 CERTIFIED SANBORN MAPS DATED: 1884, 1890, 1902, 1923, 1949 & 1984  
 HISTORIC SITE PLAN "1923", BGC & E CO. PAWTUCKET, RHODE ISLAND FIGURE 1  
 SITE CONDITIONS & PROPOSED SAMPLING LOCATIONS, FIGURES 1-11  
 SANBORN ENGINEERING COMPANY, INC. UNDER: FIGURE 1-11

**LEGEND:**

- SITE AREA BOUNDARIES
- ▨ EXISTING STRUCTURES ON-SITE
- FORMER STRUCTURES ON-SITE
- ▨ EXISTING BUILDINGS/STRUCTURES OFF-SITE
- EXISTING CONTOUR (MINOR 1 FOOT INTERVAL)
- EXISTING CONTOUR (MAJOR 5 FOOT INTERVAL)
- INTERIOR PROPERTY LINE
- UGTT-8 1902  
INDICATES TYPE OF STRUCTURE AND YEAR PRESENT
- 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

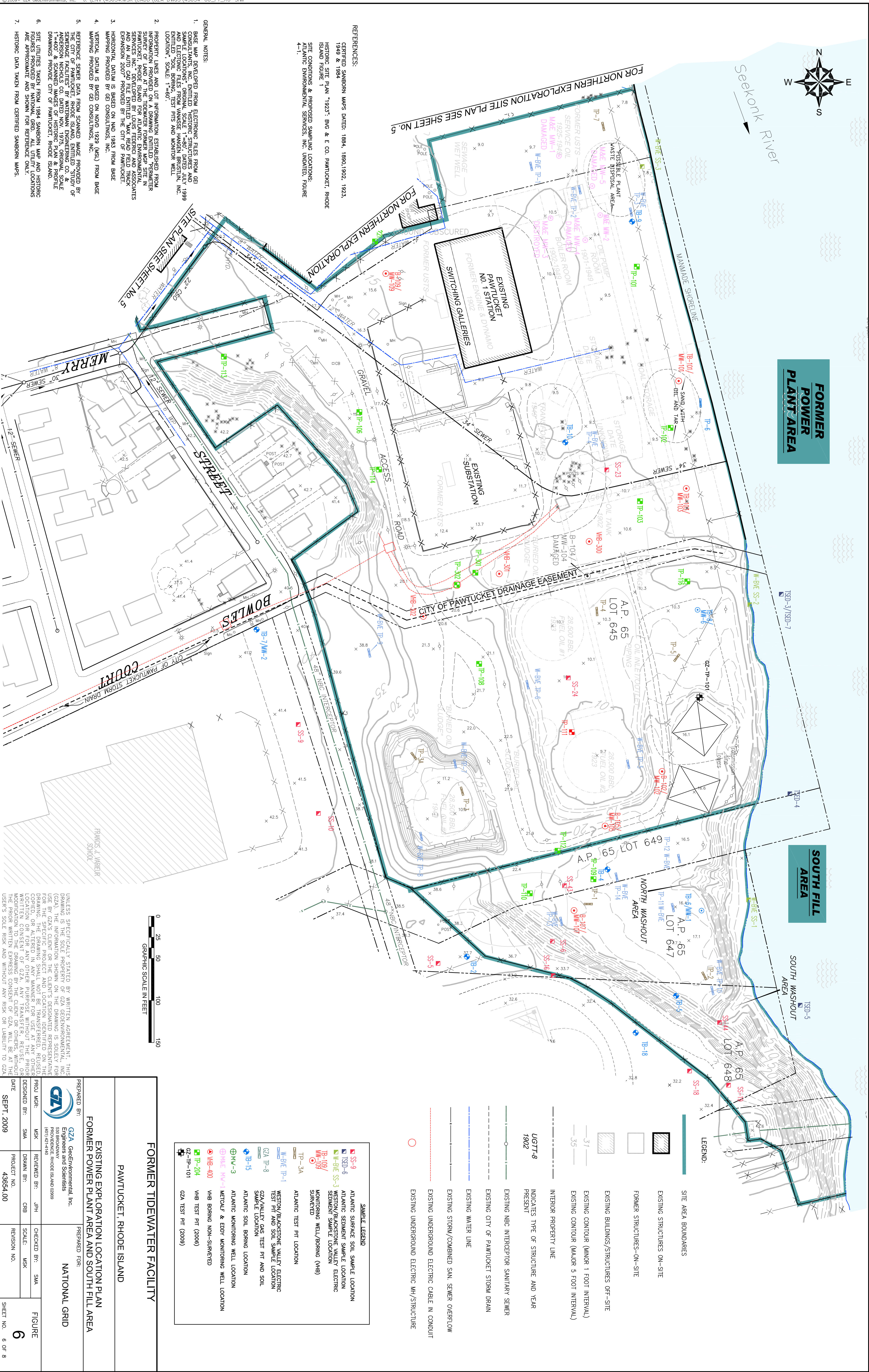
- GENERAL NOTES:**
- BASE MAP DEVELOPED FROM ELECTRONIC FILES FROM GEI CONSULTANTS, INC. ENTITLED "HISTORIC STRUCTURES AND SAMPLE LOCATIONS", ORIGINAL SCALE 1"=80', DATED JULY 1999 AND ELECTRONIC FILES FROM VANASSE HANGEN BRUSTLIN, INC. ENTITLED "SOIL BORING, TEST PITS AND MONITOR WELL LOCATION", SCALE: 1"=60'.
  - PROPERTY LINES AND LOT INFORMATION ESTABLISHED FROM INFORMATION PROVIDED ON A DRAWING ENTITLED "PERMETER SURVEY OF LAND AT THE TIDEWATER FORMER MFG SITE IN PAWTUCKET, RHODE ISLAND FOR ATLANTIC ENVIRONMENTAL SERVICES AND DEVELOPED BY LUIS FERRAZ AND ASSOCIATES, AN AUTO CAD FILE ENTITLED "M&R ROAD FIELD BOOK" AND/OR FROM THE SANBORN ENGINEERING COMPANY.
  - HORIZONTAL DATUM IS BASED ON NAD 1983 FROM BASE MAPPING PROVIDED BY GEI CONSULTANTS, INC.
  - VERTICAL DATUM IS BASED ON MVD 1929 (M.S.L.) FROM BASE MAPPING PROVIDED BY GEI CONSULTANTS, INC.
  - REFERENCE SEWER DATA FROM SANBORN MAPS PROVIDED BY THE CITY OF PAWTUCKET, RHODE ISLAND, ENTITLED "SEWER MAP OF THE CITY OF PAWTUCKET, RHODE ISLAND, ORIGINAL SCALE 1"=400' & SCANNED IMAGES OF HISTORIC PLAN & PROFILE DRAWINGS PROVIDED BY 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.
  - HISTORIC DATA TAKEN FROM CERTIFIED SANBORN MAPS.



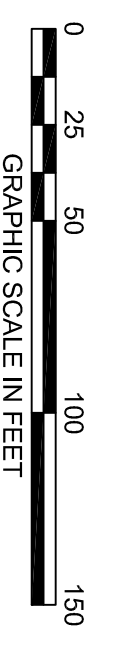
UNLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF GZA GEOENVIRONMENTAL, INC. (GZA). THE INFORMATION SHOWN ON THE DRAWING IS SOLELY FOR USE BY GZA'S CLIENT OR THE CLIENT'S DESIGNATED REPRESENTATIVE FOR THE SPECIFIC PROJECT AND LOCATION IDENTIFIED ON THE DRAWING. IT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

<p align="center"><b>FORMER TIDEWATER FACILITY</b></p> <p align="center">PAWTUCKET, RHODE ISLAND</p>		<p align="center"><b>FIGURE 4</b></p> <p align="center">SHEET NO. 4 OF 8</p>
<p align="center"><b>HISTORIC SITE PLAN</b></p> <p align="center">FORMER POWER PLANT AREA AND SOUTH FILL AREA</p>		
<p>PREPARED BY: GZA GeoEnvironmental, Inc. 500 BROADWAY PROVIDENCE, RHODE ISLAND 02909</p>	<p>PREPARED FOR: NATIONAL GRID</p>	<p>DATE: SEPT. 2009</p> <p>PROJECT NO: 43634-00</p>
<p>PROJ MGR: MSR DESIGNED BY: SMA CHECKED BY: SMA</p>	<p>REVIEWED BY: JPH DRAWN BY: CRB SCALE: 1"=50'</p>	





- GENERAL NOTES:**
1. BASE MAP DERIVED FROM ELECTRONIC FILES FROM GE CONSULTANTS, INC. ENTITLED HISTORIC STRUCTURES AND SAMPLE LOCATIONS. ORIGINAL SCALE 1"=400'. DATED JULY 1989 AND REVISIONS FROM GE CONSULTANTS, INC. UNDATED. LOCATION "SCALE 1"=400'.
  2. PROPERTY LINES AND LOT INFORMATION ESTABLISHED FROM SURVEY OF LAND AT THE TIDEWATER FORMER MGP SITE IN SERVICE. LOTS 645-700 DEIGNED BY GUS FEDERICO AND ASSOCIATES AND AN AUTO CAD FILE ENTITLED "MAY READ FIELD TRACK EXPANSION 2007" PROVIDED BY THE CITY OF PAWTUCKET.
  3. HORIZONTAL DATUM IS BASED ON NAD 1983 FROM BASE MAPPING PROVIDED BY GE CONSULTANTS, INC.
  4. VERTICAL DATUM IS BASED ON NGVD 1929 (MSL) FROM BASE MAPPING PROVIDED BY GE CONSULTANTS, INC.
  5. REFERENCE SPWER DATA FROM SCANNED IMAGE PROVIDED BY THE CITY OF PAWTUCKET, RHODE ISLAND, ENTITLED "STUDY OF SEWER FACILITIES BY WAREHAM ENGINEERING CO. & ASSOCIATES, INC. FOR THE CITY OF PAWTUCKET, RHODE ISLAND, 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.
  7. HISTORIC DATA TAKEN FROM CERTIFIED SANBORN MAPS.



**SAMPLE LEGEND**

SS-9	ATLANTIC SURFACE SOIL SAMPLE LOCATION
SSD-6	ATLANTIC SEDIMENT SAMPLE LOCATION
W-BIC SS-3	WESTON/BLACKSTONE VALLEY ELECTRIC SEDIMENT SAMPLE LOCATION
WB-109/ MW-109	MONITORING WELL/BORING (VHB) SURVEYED
TP-3A	ATLANTIC TEST PIT LOCATION
W-BIC TP-1	WESTON/BLACKSTONE VALLEY ELECTRIC TEST PIT AND SOIL SAMPLE LOCATION
WB-15	ATLANTIC SOIL BORING LOCATION
WB-M-3	ATLANTIC MONITORING WELL LOCATION
WB-M-4	METALF & EDY MONITORING WELL LOCATION
WB-BORING NON-SURVEYED	WB BORING NON-SURVEYED
WB-204	WB TEST PIT (2006)
GZ-TP-101	GZA TEST PIT (2009)

**LEGEND:**

[Solid line]	SITE AREA BOUNDARIES
[Dashed line]	EXISTING STRUCTURES ON-SITE
[Hatched box]	FORMER STRUCTURES-ON-SITE
[Diagonal lines]	EXISTING BUILDINGS/STRUCTURES OFF-SITE
[Dotted line]	EXISTING CONTOUR (MINOR 1 FOOT INTERVAL)
[Long dashed line]	EXISTING CONTOUR (MAJOR 5 FOOT INTERVAL)
[Thin solid line]	INTERIOR PROPERTY LINE
[Thick solid line]	INDICATES TYPE OF STRUCTURE AND YEAR PRESENT
[Circle with cross]	UGTT-8 1902
[Circle with dot]	EXISTING UNDERGROUND ELECTRIC CABLE IN CONDUIT
[Circle with horizontal lines]	EXISTING UNDERGROUND ELECTRIC WH/STRUCTURE
[Circle with vertical lines]	EXISTING STORM/COMBINED SAN. SEWER OVERFLOW
[Circle with diagonal lines]	EXISTING WATER LINE
[Circle with horizontal lines]	EXISTING CITY OF PAWTUCKET STORM DRAIN
[Circle with vertical lines]	EXISTING INTERCEPTOR SANITARY SEWER

**FORMER TIDEWATER FACILITY**  
 PAWTUCKET, RHODE ISLAND

**EXISTING EXPLORATION LOCATION PLAN**  
**FORMER POWER PLANT AREA AND SOUTH FILL AREA**

PREPARED BY: GZA GeoEnvironmental, Inc.  
 500 BROADWAY  
 PROVIDENCE, RHODE ISLAND 02909

DESIGNED BY: SMA  
 DRAWN BY: CHB  
 CHECKED BY: SMA  
 REVISION NO.

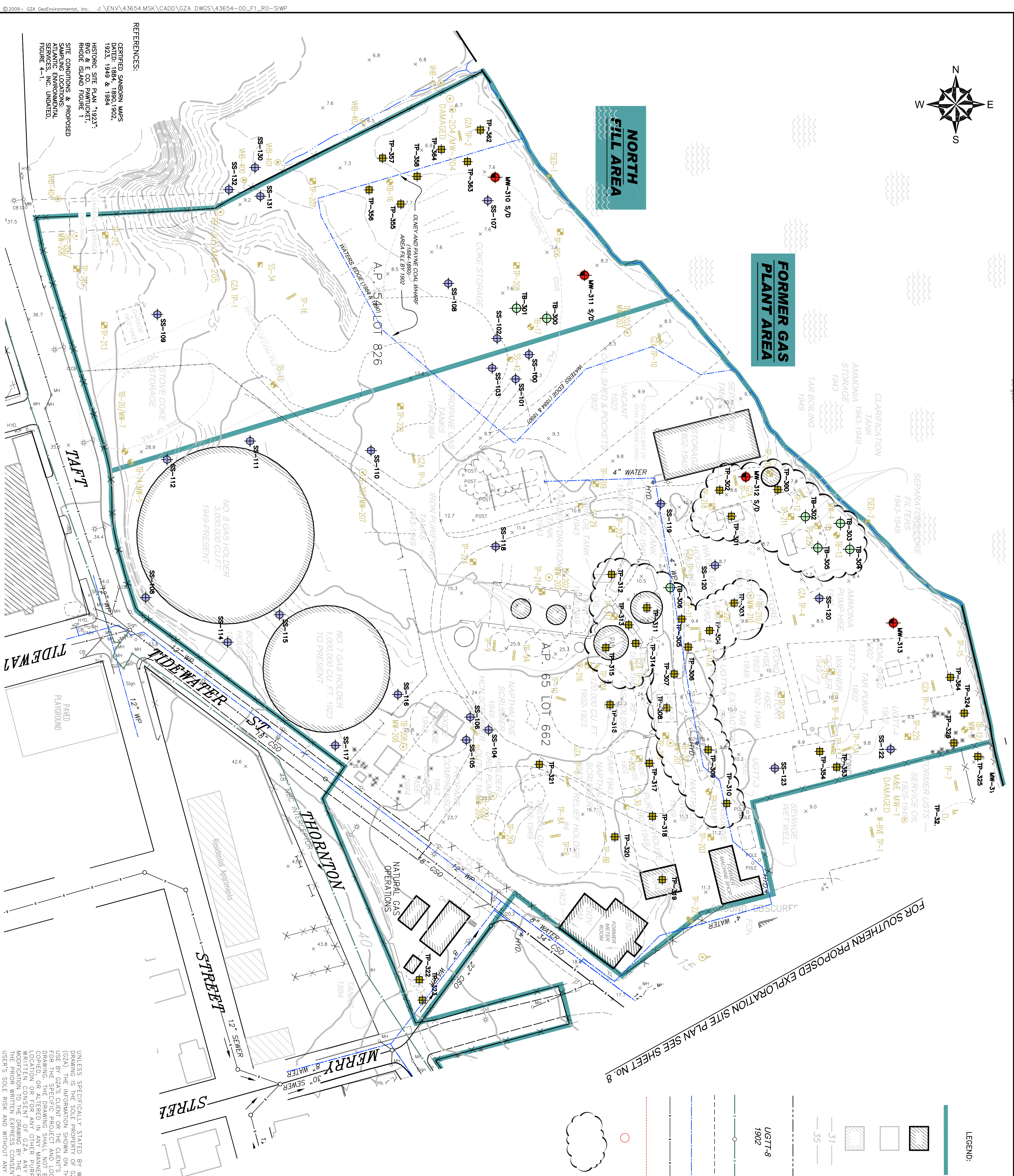
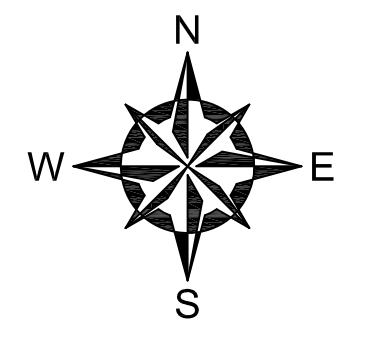
PROJECT NO: 43654.00  
 SHEET NO. 6 OF 8

DATE: SEPT. 2009

FIGURE 6

NATIONAL GRID





**REFERENCES:**  
 CERTIFIED SANBORN MAPS  
 DATED 1884, 1890, 1902,  
 1923, 1949 & 1984  
 HISTORIC SITE PLAN "1923":  
 BRU & CO. PATMUCKET,  
 RHODE ISLAND ROUTE 1  
 SITE CONDITIONS & PROPOSED  
 ATLANTIC ENVIRONMENTAL  
 SERVICES, INC. UNDATED,  
 FIGURE 4-1.

UNLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF GZA GEOTECHNICAL, 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/OR LOCATION IDENTIFIED ON THE DRAWING. IT IS NOT TO BE REPRODUCED, COPIED, REPRODUCED, COPIED, OR ALTERED IN ANY MANNER FOR USE AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF GZA. THE PRIOR WRITTEN CONSENT OF GZA WILL BE AT THE USER'S SOLE RISK AND WITHOUT ANY RISK OR LIABILITY TO GZA.

**LEGEND:**

	SITE AREA BOUNDARIES
	EXISTING STRUCTURES ON-SITE
	FORMER STRUCTURES-ON-SITE
	EXISTING BUILDINGS/STRUCTURES OFF-SITE
	EXISTING CONTOUR (MAJOR 5 FOOT INTERVAL)
	EXISTING CONTOUR (MINOR 1 FOOT INTERVAL)
	INTERIOR PROPERTY LINE
	INDICATES TYPE OF STRUCTURE AND YEAR PRESENT
	UGTT-8 1902
	EXISTING NBC INTERCEPTION 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 W/ STRUCTURE
	PROPOSED EXPLORATION AREAS WHICH MAY BE COMPLETED AS TRENCHES AS FIELD CONDITIONS ALLOW.

**SAMPLE LEGEND**

	ATLANTIC SURFACE SOIL SAMPLE LOCATION
	ATLANTIC SEAWATER SAMPLE LOCATION
	ATLANTIC SUBMERGED SOIL SAMPLE LOCATION
	MONITORING WELL/BORING (WB) SUBMERGED
	ATLANTIC TEST PIT LOCATION
	WESTON/BLACKSTONE VALLEY ELECTRIC TEST PIT AND SOIL SAMPLE LOCATION
	GZA/MALLEY GAS TEST PIT AND SOIL SAMPLE LOCATION
	ATLANTIC SOIL BORING LOCATION
	ATLANTIC MONITORING WELL LOCATION
	M&E M/W-1 METALF & EDDY MONITORING WELL LOCATION
	WB BORING NON-SUBMERGED
	WB TEST PIT (2009)
	GZA TEST PIT (2009)
	PROPOSED TEST BORING LOCATION
	PROPOSED MONITORING WELL LOCATION
	PROPOSED TEST PIT LOCATION
	PROPOSED SOIL SAMPLE LOCATION

- GENERAL NOTES:**
- BASE MAP DEVELOPED FROM ELECTRONIC FILES FROM GEOTECHNICAL, INC. (GZI) AND ELECTRONIC FILES FROM WASSER HANSEN BRISTLIN, INC. (WHB). SCALE 1"=50'. THIS MAP AND ELECTRONIC FILES FROM WASSER HANSEN BRISTLIN, INC. (WHB) ARE THE PROPERTY OF WHB AND MONITOR WELL LOCATION.
  - PROPERTY LINES AND LOT INFORMATION ESTABLISHED FROM SURVEY OF LAND AT THE TIDEWATER FORMER GAS PLANT IN PAWTUCKET, RHODE ISLAND FOR ATLANTIC ENVIRONMENTAL SERVICES, INC. (AES) 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 CONSULTING, INC.
  - VERTICAL DATUM IS BASED ON NAD 1929 (M.S.L.) FROM BASE MAPPING PROVIDED BY GEI CONSULTING, INC.
  - REFER TO SEWER DATA FROM SANBORN MAPS PROVIDED BY THE CITY OF PAWTUCKET, RHODE ISLAND. ENTITLED "STUDY OF SEWERAGE FACILITIES" BY WATERWAY ENGINEERING CO. & ANDERSON NICHOLS CO. DATED NOV. 1975. ORIGINAL SCALE 1"=100'. THIS DATA IS SHOWN FOR REFERENCE ONLY.
  - DRAINAGE DRAWINGS PROVIDED BY THE CITY OF PAWTUCKET, RHODE ISLAND.
  - SITE UTILITIES TAKEN FROM 1884 SANBORN MAP AND HISTORIC AERIAL PHOTOGRAPHS. APPROXIMATE AND SHOWN FOR REFERENCE ONLY.
  - HISTORIC DATA TAKEN FROM CERTIFIED SANBORN MAPS.



**FORMER TIDEWATER FACILITY**  
 PAWTUCKET, RHODE ISLAND

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

PREPARED BY: GZA Geotechnical, Inc.  
 500 BROADWAY  
 PROVIDENCE, RHODE ISLAND 02909

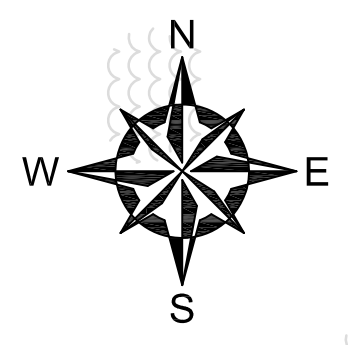
DESIGNED BY: SMA  
 DRAWN BY: CHB  
 CHECKED BY: SMA

PROJECT NO: 43654.00

DATE: SEPT. 2009

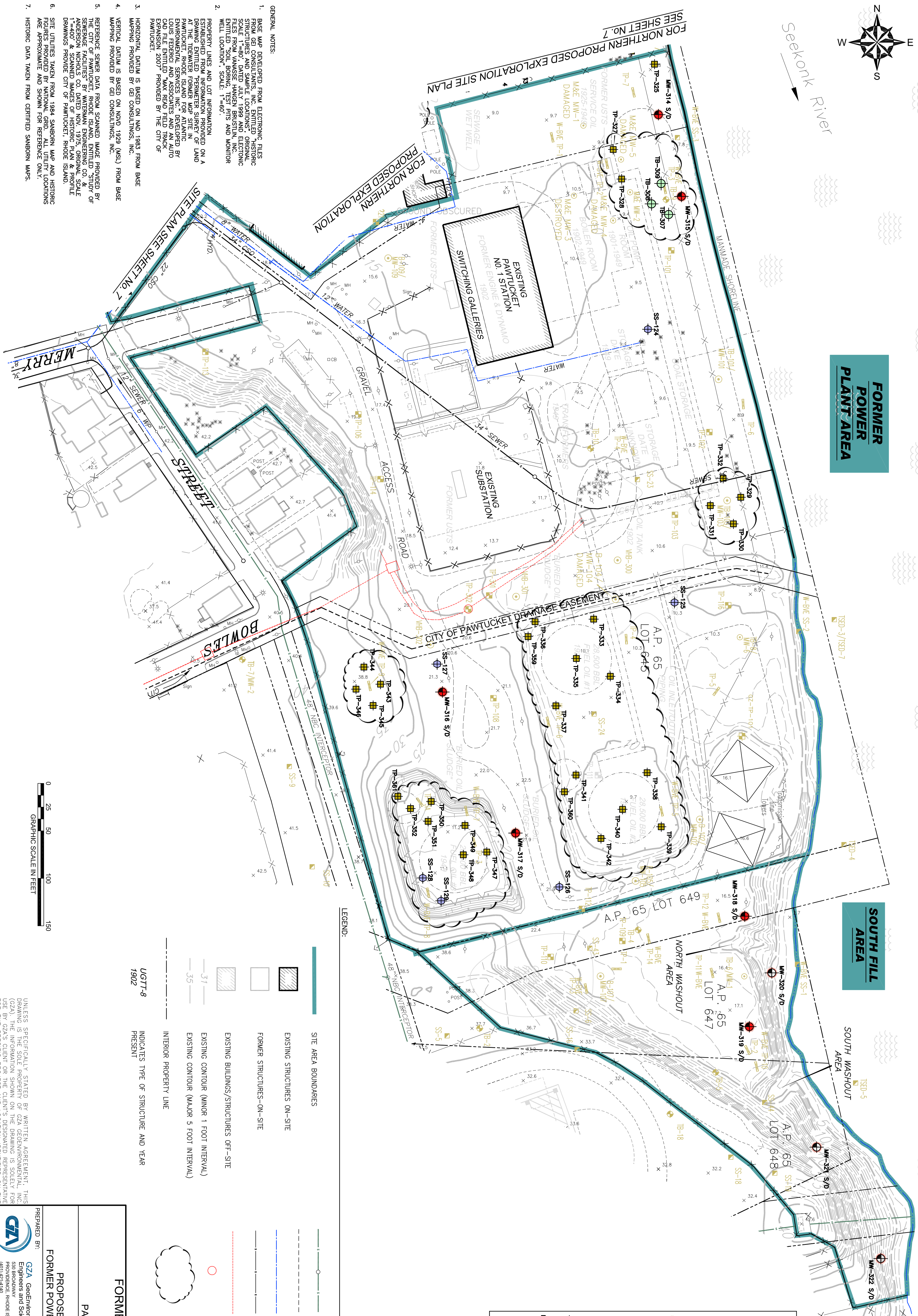
FIGURE 7

SHEET NO. 7 OF 8



**FORMER  
POWER  
PLANT AREA**

**SOUTH FILL  
AREA**



- GENERAL NOTES:**
1. BASE MAP DEVELOPED FROM ELECTRONIC FILES FROM GEI CONSULTANTS, INC. ENTITLED "HISTORIC STRUCTURES AND SAMPLE LOCATIONS", ORIGINAL SCALE 1"=50'. ORIGINAL SCALE DRAWING FILED FROM VANASSE HANGEN BRUSTLIN, INC. ENTITLED "SOIL BORING, TEST PITS AND MONITOR WELL LOCATION", SCALE: 1"=60'.
  2. PROPERTY LINES AND LOT INFORMATION ESTABLISHED FROM INFORMATION PROVIDED ON A RECORDED DEED FOR THE LAND AT THE INTERSECTION OF THE CITY OF PAWTUCKET, RHODE ISLAND FOR ATLANTIC TIDEWATER FACILITY, PROVIDED BY LOUIS FEDERER AND ASSOCIATES AND AN ATMO 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. REFERRED TO DATA FROM SCANNED MAPS 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"=50'. REFERRED TO DATA FROM SCANNED MAPS PROVIDED BY THE CITY OF PAWTUCKET, RHODE ISLAND, DATED NOV. 1975, ORIGINAL SCALE 1"=50'. REFERRED TO DATA FROM SCANNED MAPS PROVIDED BY THE CITY OF PAWTUCKET, RHODE ISLAND, DATED NOV. 1975, ORIGINAL SCALE 1"=50'.
  6. SITE UTILITIES TAKEN FROM 1984 SANBORN MAP AND HISTORIC PHOTOGRAPHS OF THE AREA. UTILITIES SHOWN ARE APPROXIMATE AND SHOWN FOR REFERENCE ONLY.
  7. HISTORIC DATA TAKEN FROM CERTIFIED SANBORN MAPS.



- LEGEND:**
- SITE AREA BOUNDARIES
  - EXISTING STRUCTURES ON-SITE
  - FORMER STRUCTURES-ON-SITE
  - EXISTING BUILDINGS/STRUCTURES OFF-SITE
  - EXISTING CONTOUR (MAJOR 1 FOOT INTERVAL)
  - EXISTING CONTOUR (MAJOR 5 FOOT INTERVAL)
  - INTERIOR PROPERTY LINE
  - INDICATES TYPE OF STRUCTURE AND YEAR
  - 1902
  - 1907-8
  - PRESENT

- SAMPLE LEGEND**
- SS-9 ATLANTIC SURFACE SOIL SAMPLE LOCATION
  - SS-6 ATLANTIC SEDIMENT SAMPLE LOCATION
  - SS-3 WESTON/BLACKSTONE VALLEY ELECTRIC SEDIMENT SAMPLE LOCATION
  - WB-109 MONITORING WELL/BORING (WB) SUMPED
  - TP-3A ATLANTIC TEST PIT LOCATION
  - WB-1 WESTON/BLACKSTONE VALLEY ELECTRIC TEST PIT AND SOIL SAMPLE LOCATION
  - WB-15 ATLANTIC SOIL BORING LOCATION
  - WB-3 ATLANTIC MONITORING WELL LOCATION
  - WB-1 METOLF & EDDY MONITORING WELL LOCATION
  - WB-400 H&B BORING NON-SURFICED
  - TP-204 H&B TEST PIT (2009)
  - TP-101 GZA TEST PIT (2009)
  - TP-301 PROPOSED TEST BORING LOCATION
  - TP-300 TENANTILEY PROPOSED MONITORING WELL LOCATION PENDING ACCESSIBILITY
  - TP-100 PROPOSED TEST PIT LOCATION
  - SS-100 PROPOSED SOIL SAMPLE LOCATION

- REFERENCES:**
- CERTIFIED SANBORN MAPS DATED: 1884, 1890, 1902, 1923, 1949 & 1984
  - HISTORIC SITE PLAN "1923, BING & E CO. PAWTUCKET, RHODE ISLAND PLUMB 1"
  - SITE CONDITIONS & PROPOSED SAMPLING LOCATIONS: ATLANTIC ENVIRONMENTAL SERVICES, INC. DATED: FIGURE 4-11.

**FORMER TIDEWATER FACILITY**  
PAWTUCKET, RHODE ISLAND

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

PREPARED BY: GZA GeoEnvironmental, Inc.  
500 BROADWAY  
PROVIDENCE, RHODE ISLAND 02909

PROJECT NO.	43654.00	FIGURE	8
DATE	SEPT. 2009	SHEET NO.	8 OF 8
DESIGNED BY:	SMA	CHECKED BY:	SMA
DRAWN BY:	CHB	SCALE:	1"=50'
REVISION NO.			