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



May 23, 2017
GZA File No. 05.0043654.00-C

Mr. Joseph Martella
Rhode Island Department of Environmental Management (RIDEM)
Office of Waste Management
235 Promenade Street, 3rd Floor
Providence, Rhode Island 02908

Re: Site Investigation Report (SIR) Addendum
Former Tidewater Facility
RIDEM File No. SR-26-0934A
RIDEM Case Number: 95-022
Tidewater Street
Pawtucket, Rhode Island

Dear Mr. Martella:

GZA GeoEnvironmental, Inc. (GZA), on behalf of The Narragansett Electric Company d/b/a National Grid (National Grid), has prepared this *Site Investigation Report (SIR) Addendum* for the Former Tidewater Facility Property located in Pawtucket, Rhode Island (herein referred to as the Site). GZA prepared and submitted to RIDEM a January 2011 *Site Investigation Data Report (SIDR)*, a July 2011 *Remedial Alternative Evaluation Report (RAER)*, the September 2012 *Site Investigation Report Addendum*, the October 2013 *Site Investigation Report Addendum* and the July 2014 *Site Investigation Report Addendum*. These reports serve to complete the Site Investigation Report (SIR) for the Site consistent with the requirements of Section 7.08 of the Remediation Regulations. This addendum serves as our response to your SIR comment letter dated April 19, 2017. For your convenience, each of the Department's comments are repeated below followed by our responses in italics.

Comment #1a:

Regarding the January 11, 2011, Site Investigation Data Report (SIDR), Section 8.30 (Exposure Pathways) pg. 102, identifies seven (7) potential exposure pathways. It is the Department's position that the potential inhalation of volatile vapors by workers in future buildings (if the volatilization to indoor air pathway is not mitigated), as well as potential inhalation exposure to future construction/ utility workers, represent additional potential exposure pathways.

Response:

The recorded Environmental Land Usage Restriction (ELUR) for the Site will stipulate that any future buildings constructed on the Site (occupied or non-occupied) will be equipped with a vapor barrier to mitigate potential migration of impacted soil vapor into the overlying structure. In addition, the ELUR will include a Soil Management Plan (SMP) which will describe appropriate personal protective equipment, health and safety monitoring and environmental controls for earthwork activities at the Site to mitigate potential inhalation exposure to any construction / utility workers and protect the surrounding community.



Comment #1b:

Regarding the January 11, 2011, Site Investigation Data Report (SIDR), Section 8.30 (Exposure Pathways) pg. 104, paragraph 2, and Section 9.20 (Summary of Investigations and Results) Subsection (Sediments) pg. 113, paragraph 2, both noted in general the likelihood that upgradient/regional impacts to the Seekonk River and other possible upgradient industrial sources could have degraded sediment quality adjacent to the Site. Please clarify if any specific upgradient sediment contamination sources (industrial or otherwise) have been identified as potentially contributing to sediment contamination adjacent to the Tidewater Site.

Response:

While no specific industrial properties or sources were identified, the Site is located adjacent to the western bank of the Seekonk River, only approximately 1,200 feet downstream of downtown Pawtucket which has a long history of industrial waterfront activity (including textiles and heavy manufacturing). These local industrial uses combined with urban surface water runoff and storm water discharges serve to contribute to regional sediment impacts along this portion of the Seekonk River.

Comment #1c:

Regarding the January 11, 2011, Site Investigation Data Report (SIDR), Please correct the title of Figure 14B to replace the word "Subsurface" with "Surface."

Response:

See attached Figure 14B, Shallow Surface Soil Distribution (0 to 2') Arsenic, Cyanide, Lead, Inorganics Impacts, Former Power Plant Area and South Fill Area.

Comment #2:

Regarding the July 8, 2011, Gasholder Nos. 7 and 8 Decommissioning and Demolition Completion Report, the fourth paragraph on page 16 indicates that the analytical testing results for the imported fill and loam used to backfill the gasholder footprints was compared to the Department's Method 1 Industrial/Commercial Direct Exposure Criteria (I/CDEC). The analytical results for imported clean material should have been compared to the Department's Method 1 Residential Direct Exposure Criteria (RDEC). Please clarify and/or explain exactly what was done and if all imported material was determined to be compliant with the Department's Method 1 RDEC.

Response:

As described in the June 2011 Gasholder Nos. 7 and 8 Decommissioning and Demolition Completion Report, the holder area was capped with approximately 150 tons of crushed stone, 1,430 tons of processed gravel, 9,980 tons of granular fill (common borrow), overlain by 4 to 6 inches of loam. With respect to the quality of the import fill, attached is a table summarizing the analytical testing of the processed gravel, common borrow, and loam. No testing was performed on the crushed stone material as it was determined to be non-jurisdictional. Consistent with typical Department requirements, these materials were tested for Total Petroleum Hydrocarbons, Volatile Organic Compounds, Semi-Volatile Organic Compounds, and Priority Pollutant Metals at a frequency of one sample per 2,000 cubic yards and arsenic at a frequency of one sample per 500 cubic yards. As indicated in the attached table, all results were below RIDEM Residential DEC criteria with the exception of one sample of the processed gravel which contained arsenic at 7.9 ppm (Grab 1) versus the criteria of 7 ppm. As indicated in the attached table, the other three samples of this material were all below 7 ppm.



Consistent with typical RIDEM capping requirements, at least one foot of clean import materials was placed over a geotextile fabric. Within the former tank locations themselves, the thickness of clean import fill generally ranged from approximately 1 to 6 feet.

Comment #3a:

Regarding the July 29, 2011, Remedial Alternative Evaluation Report (RAER), Section 2.20 (Site Investigation Results) Subsection (Sediments) pg. 13, paragraph 2, indicates "Given the localized nature of observed sediment impact and the likely existence of additional upgradient/regional sources, future response actions specific to sediment impact do not appear to be warranted and have therefore not been included as part of this evaluation. However, as described further herein, in the development and evaluation of remedial alternatives for the Site, potential migration of impacts to the Seekonk River was considered a key exposure pathway to be addressed." At this time the Department acknowledges that the investigation of the terrestrial upland portion of the Site has been completed. While no Remedial Alternative specific to the impacted sediments in the Seekonk River adjacent to the Site has been proposed or approved, the Department also acknowledges that the proposed containment wall, if it performs properly as designed, should provide a barrier to future releases of hazardous materials from the Site to the sediments. National Grid may continue to move forward through the regulatory process for the terrestrial upland portion of the Site. Please be advised however, that the subsequent Program Letter, Remedial Decision Letter (RDL) and Order of Approval (Order) for this Site, unless otherwise specified by the Department, shall be limited to the investigation and proposed remediation of the terrestrial upland portion of the Site, and does not preclude additional investigation and/or remediation activities related to sediments impacted by historic or ongoing releases of hazardous materials at or from the Site.

Response:
Acknowledged.

Comment #3b:

Regarding the July 29, 2011, Remedial Alternative Evaluation Report (RAER), Section 3.30 (Exposure Pathways) pg. 21, paragraph 4, same comment as SIDR comment 1.a above.

Response:
Please see response to Comment 1a above.

Comment #3c:

Regarding the July 29, 2011, Remedial Alternative Evaluation Report (RAER), Section 3.30.2 (Direct Contact/Potential Tracking/Erosion - Surface Soils) pg. 24, paragraph 1, indicates "The entirety of the Site is fenced and restricted to unauthorized access. Therefore, under current Site conditions, the concern related to direct exposure is somewhat mitigated by the presence of a security fence which restricts access to National Grid personnel and authorized visitors." The Department acknowledges that the presence of a security fence somewhat mitigates direct exposure by restricting easy access to the Site, however the history of this Site clearly indicates that trespassing is an ongoing possibility and concern which cannot be adequately addressed by fencing alone, reinforcing the need for the installation of a long term barrier to direct exposure to impacted surface soils.



Response:

As described in the July 2011 RAER, the recommended remedial action alternative #2 includes construction of an engineered cap and implementation of an Environmental Land Usage Restriction (ELUR) to mitigate potential exposure to impacted Site soils. Note, as part of the remedy design process the types of engineered caps employed will be further evaluated for certain areas of the Site in consideration of the nature and extent of subsurface impact, Site grades and density of tree cover, and current and foreseeable future Site use.

Comment #3d:

Regarding the July 29, 2011, Remedial Alternative Evaluation Report (RAER), Section 4.00 (Remedial Objectives) pg. 25, paragraph 4, lists 5 overall Remedial Objectives. As indicated in comments 1.a and 3.b above, it is the Department's opinion that mitigation of potential future vapor intrusion and inhalation exposures in indoor air should be included in the list of overall Site Remedial Objectives.

Response:

Please see response to Comment 1a above.

Comment #3e:

Regarding the July 29, 2011, Remedial Alternative Evaluation Report (RAER), Section 4.00 (Remedial Objectives) pg. 25, paragraph 5, indicates that the Environmental Land Usage Restriction (ELUR) will include a Materials Management Plan (MMP). Please clarify how the proposed MMP, which is not included in the Remediation Regulations, differs from a Soil Management Plan (SMP) which is typically associated with an ELUR and is specifically referenced in the draft ELUR template.

Response:

The use of the term Materials Management Plan (MMP) was intended to be interchangeable with a typical Soil Management Plan (SMP). The word "materials" was used in consideration that, in addition to soils, this plan will cover the management of groundwater and debris that may be encountered during future construction or maintenance projects. To avoid any further confusion, this document will be referred to as a Soil Management Plan consistent with the Remediation Regulations.

Comment #3f:

Regarding the July 29, 2011, Remedial Alternative Evaluation Report (RAER), Regarding Section 5.00 (Remedial Action Alternative Evaluation) pg. 26, paragraph 2, when evaluating estimated costs for implementing the remedial alternatives, is there an increased cost associated with implementing certain remedies (i.e. source removal and disturbance vs. capping in place) due to the necessity of increased precautions (i.e. stricter odor, dust and vapor controls, associated monitoring and stricter action level thresholds), required by operating in the proximity of sensitive receptors (i.e. students, residents, etc.), and was this cost differential, if it exists, considered as part of the evaluation?

Response:

Yes, the anticipated scope and resulting estimated costs associated with environmental controls and monitoring were evaluated as part of the remedy selection process. As indicated in Table 5 – Estimated Remedial Costs of the RAER, each of the alternatives includes substantial costs for environmental controls to protect the surrounding community during implementation. As indicated in Table 5, the estimated odor controls and air monitoring costs were higher for



the alternatives involving more substantial source removal (RAAs #3A, #3B, and #4) when compared to the recommended remedy (RAA #2) which involves less Site disturbance. The actual costs associated with implementation of environmental controls and monitoring will depend on the final remedy design and implementation duration.

Comment #3g-i:

Regarding the July 29, 2011, Remedial Alternative Evaluation Report (RAER), Regarding Section 5.10.2 (Remedial Action Alternative #2: Engineered Cap, Physical Containment and Limited Source Removal) pg. 27, Paragraph 1, referring to the design of the impermeable engineered cap indicates "this cap would consist of an impermeable cap comprised of up to 2 feet of clean soil underlain by a geomembrane or clay material." Please be reminded that to be consistent with the Department's capping requirements, a cap over a geomembrane must consist of a minimum of one (1) foot of clean material.

Response:

Acknowledged. We understand that the Department's capping requirements include one (1) foot of clean material over a geomembrane. For the conceptual design of the impermeable cap presented in the RAER, two (2) feet of clean material was included to protect the geomembrane from damage during construction and withstand future construction and vehicle loadings. The actual thickness of the clean cover material over the geomembrane will be further evaluated as the design progresses, but in no case will be less than one (1) foot.

Comment #3g-ii:

Regarding the July 29, 2011, Remedial Alternative Evaluation Report (RAER), Regarding Section 5.10.2 (Remedial Action Alternative #2: Engineered Cap, Physical Containment and Limited Source Removal) pg. 27, Paragraph 2 indicates this alternative includes focused NAPL recovery immediately upgradient of the containment wall and at other locations on the Site. Please provide additional details regarding the proposed focused NAPL recovery.

Response:

We anticipate that shallow and deep well pairs will be installed upgradient of the containment wall for the collection and recovery of LNAPL and DNAPL. In addition and as indicated in the response to Comment 3g-iv below, a network of shallow/deep NAPL monitoring wells will also be installed on the downgradient side of the containment wall. The shallow wells will be screened primarily in the fill unit while the deeper wells will be screened in the glacial outwash and will extend to the top of the underlying till material. The spacing of the wells installed on both sides of the wall will vary depending on the nature and extent of impact. We currently anticipate this spacing will range from approximately 50 to 100 feet. LNAPL recovery activities will be performed either manually via periodic removal with peristaltic pumps or passively with oil collection traps installed within the wells. DNAPL recovery activities will be performed manually via periodic removal with peristaltic pumps or suction pumps. With respect to frequency, LNAPL and DNAPL monitoring and recovery in the area of the containment wall will be performed coincident with the overall Site monitoring and maintenance program. As described in the RAER, we currently anticipate that NAPL recovery will be performed quarterly for the first five years, semi-annually for the following five years and annually thereafter. Further information about the overall post-completion long term monitoring will be provided in the Remedial Action Work Plan (RAWP).

Please note, based on further evaluation performed since the July 2011 RAER, the containment wall will not be continuous in the area of the electrical transmission towers (southeast portion of the Site). This adjustment was



necessitated due to safety concerns associated with construction of such a wall in the vicinity of the high voltage overhead transmission lines. The containment wall configuration will likely include wing walls and integral NAPL recovery wells immediately north and south of the transmission tower area to facilitate NAPL containment. A revised version of Figure 4 - Remedial Action Alternative No. 2 Engineered Cap, Physical Containment and Limited Source Removal, is attached which depicts this conceptual containment wall alignment adjustment. The actual configuration of the containment wall will be determined based on the results of design investigations and will be presented in the RAWP.

Comment #3g-iii:

Regarding the July 29, 2011, Remedial Alternative Evaluation Report (RAER), Regarding Section 5.10.2 (Remedial Action Alternative #2: Engineered Cap, Physical Containment and Limited Source Removal) pg. 27, Paragraph 2 indicates this alternative includes routine groundwater quality monitoring to assess performance. Please provide additional details regarding the proposed routine groundwater quality monitoring and how performance will be assessed.

Response:

We currently anticipate that the long term natural attenuation groundwater monitoring program will be consistent with the current program which consists of gauging the entire monitoring well network for the presence of NAPL, recovering NAPL if feasible, and the collection of groundwater samples from select monitoring wells for groundwater quality analyses. As described in the RAER and consistent with the current program, we currently anticipate the groundwater quality monitoring will be performed annually. This program currently includes the collection and analysis of groundwater samples from twenty seven (27) monitoring wells from across the Site. We anticipate that certain of the NAPL monitoring and recovery wells installed proximate to the containment wall may be added to this groundwater quality monitoring program.

Groundwater sampling will continue to be performed in general accordance with the US EPA's January 19, 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 Volatile Organic Compounds (VOCs) and natural attenuation parameters including nitrates, iron, manganese, sulfate and total organic carbon. In addition, a Matrix Spike/Matrix Spike Duplicate, a blind duplicate, and a VOC trip blank (in each cooler submitted to the laboratory) will be analyzed each sampling round.

The results of this natural attenuation groundwater monitoring program will continue to be documented in annual reports submitted to RIDEM. Further information about the overall post-completion long term monitoring will be provided in the Remedial Action Work Plan (RAWP).

Comment #3g-iv:

Regarding the July 29, 2011, Remedial Alternative Evaluation Report (RAER), Regarding Section 5.10.2 (Remedial Action Alternative #2: Engineered Cap, Physical Containment and Limited Source Removal) pg. 27, As the Department has previously discussed with National Grid on similar Sites where construction of a subsurface containment wall is proposed, please add language to Remedial Alternative #2 indicating that this alternative will include the installation of an appropriate number of groundwater monitoring wells located downgradient of the



newly installed containment wall for the purpose of demonstrating proper performance of the wall. Periodic NAPL gauging and groundwater sampling/analysis of the downgradient wells shall be included in the long-term post-remedial Groundwater Monitoring Plan.

Response:

Acknowledged. Monitoring wells will be installed on the downgradient side of the containment wall where practical. These wells will be monitored for NAPL and sampled for groundwater quality as part of the Site long term monitoring program. Further information about the overall post-completion long term monitoring will be provided in the Remedial Action Work Plan (RAWP).

Comment #3h-i:

Regarding the July 29, 2011, Remedial Alternative Evaluation Report (RAER), Regarding Section 6.20 (Details of the Preferred Remedial Action Alternative), Page 33, paragraph 3 indicates "The cap across the remainder of the Site (FGPA, FPPA and SFA) would consist of an impermeable cap comprised of up to 2 feet of soil, an underlying drainage system, underlain by an impermeable layer (i.e., geomembrane or clay layer)." As stated in comment 3.g.i above, please be reminded that to be consistent with the Department's capping requirements, a cap over a geomembrane must consist of a minimum of one (1) foot of clean material.

Response:

Please see response to Comment 3g-i above.

Comment #3h-ii:

Regarding the July 29, 2011, Remedial Alternative Evaluation Report (RAER), Regarding Section 6.20 (Details of the Preferred Remedial Action Alternative), Page 33, paragraph 3 also indicates "Cap installation would require clearing/grubbing and Site grading ..." Please clarify if the proposed plan is to maintain and protect existing Site groundwater monitoring wells during the cap installation process, or to close all groundwater monitoring wells and reinstall new monitoring wells at appropriate locations and depths when the cap installation has been completed.

Response:

Efforts will be made to protect existing groundwater monitoring wells during remedial construction so as to maintain the current groundwater monitoring well network (see response to Comment 3g-iii). In the event monitoring wells need to be removed to accommodate implementation of the remedy, they will be decommissioned in accordance with Appendix 1 of RIDEM's June 2010 Groundwater Quality Rules. Wells that are part of the current groundwater quality monitoring network that are destroyed or decommissioned during construction will be replaced as necessary to maintain consistency with the current Site groundwater monitoring program.

Comment #3h-iii:

Regarding the July 29, 2011, Remedial Alternative Evaluation Report (RAER), Regarding Section 6.20 (Details of the Preferred Remedial Action Alternative), Regarding page 34, paragraph 3, please be advised that it is the Department's position that decisions regarding any future changes or modifications to the frequency and/or duration of NAPL gauging and recovery, and/or groundwater sampling and analysis, shall be determined by the Department based upon review and consideration of the periodic NAPL gauging results and trends, the groundwater analytical results and trends, the effectiveness of the containment wall, and the overall Site compliance status at the time of each review.



Response:
Acknowledged.

Comment #4:

General Comment — Please provide a summary of all remedial activities completed since the RAER was submitted, and as applicable, how those activities may change the proposed remedy. For example, any areas of the Site that have been addressed through a Short Term Remedial Action Plan (STRAP) and therefore may not require additional remedial work.

Response:

The following presents a brief summary of remedial activities / projects that have been completed at the Site since the RAER was submitted on July 29, 2011. The attached Figure 1, Remedial Actions, shows the locations of each of these activities.

Former Process Pipe Removal Short Term Response Action (2011)

The Former Process Pipe Removal Short Term Response Action (STRA) was completed consistent with the October 2010 (Revised January 2011) Short Term Response Action Plan (STRAP), which was approved by RIDEM in a letter dated August 17, 2011. As shown on the attached Figure 1, Remedial Actions, the STRA involved removal and off-Site disposal of the above ground portions of this former process pipe and residual coal tar-impacted surface materials. An engineered cap consisting of a geotextile overlain with at least 12-inches of imported certified clean fill was installed over the areas where these surface materials were removed. This STRA does not alter our recommended remedial alternative presented in the RAER, as the STRA area was relatively small. This area will be capped consistent with surrounding areas as part of the final remedy.

Natural Gas Regulator Station Upgrade Work (2011 – 2013)

National Grid upgraded their existing Natural Gas Regulator Station between 2011 and 2013, with all earthwork being conducted in 2011. The facility upgrades consisted of the relocation of an existing overhead 16-inch gas main to below ground, shallow excavation work within the fenced natural gas station area to properly abandon existing facilities, general renovation of the buildings, and updating of all the above ground equipment including electronic and communication services within the buildings. GZA prepared the April 2011 Materials Management Plan (MMP) to establish procedures for impacted soil and groundwater management as well as to establish procedures (including required analytical testing) to import clean fill. Additionally, as part of the upgrade activities, polychlorinated biphenyl (PCB) remediation activities were performed within the fenced natural gas regulator station area. These remediation activities were completed in accordance with the Work Plan dated August 9, 2011, prepared by GZA which was submitted to the Environmental Protection Agency (EPA) and the Rhode Island Department of Environmental Management (RIDEM). The completed work was performed consistent with the Performance Based Disposal provisions of the Toxic Substance Control Act (TSCA), 40 CFR Part 761.61(b). A Completion Report was submitted to RIDEM and EPA on November 3, 2011. All fill imported to the Site during this effort and all samples collected were compliant with the Residential Direct Exposure Criteria (R-DEC). At least two (2) feet of clean tested imported fill (processed gravel overlain with crushed stone) was placed over the majority of the Natural Gas Regulator Station area. This area of the Site which is shown on the attached Figure 1, Remedial Activities, is considered to be capped and no further remedial activities in this area are anticipated.



Substation Upgrade Work (2012 – 2013)

National Grid upgraded their existing electrical substation between 2012 and 2013. The facility upgrades consisted of limited earthwork to install new conduit, a new precast TRENWA trench (open bottomed cable-carrying box culvert) to encase the new conduit and/or cable, a new duct bank from the existing switching station to the TRENWA trench and an associated handhole. GZA prepared the November 2012 Soil Management Plan (SMP) to establish procedures for impacted soil and groundwater management as well as to establish procedures (including required analytical testing) to import any clean fill. All fill imported to the Site during this effort was tested and all samples were less than the Residential Direct Exposure Criteria (R-DEC). As shown on the attached Figure 1, Remedial Activities, this area of the Site is controlled by National Grid and is surrounded by locked perimeter fencing. As indicated in the RAER, any further remediation in this area of the Site will be performed consistent with plans approved by EPA and RIDEM.

Former Gas Buildings Demolition Work (2015)

During the summer of 2015, National Grid demolished three buildings at the Site - the former machine shop, purifier house and the meter room (see attached Figure 1, Remedial Activities, for locations of these former buildings). All imported fill was tested with the requirements specified in both the April 2011 Materials Management Plan (MMP) and the November 2012 Soil Management Plan (SMP). All fill imported to the Site during this effort and all samples collected were compliant with the Residential Direct Exposure Criteria (R-DEC). At least six-inches of clean tested imported fill was placed in all depressions and disturbed areas within the work area. The Site was graded to promote positive surface run-off drainage consistent with general site drainage patterns. This demolition work does not alter our recommended remedial alternative presented in the RAER. This area will be capped consistent with the surrounding area as part of the final remedy.

South Washout Area Short Term Response Action (2016)

As described in the September 23, 2016 STRA Completion Report, National Grid performed remedial activities in the south fill area at the Site in 2016. The remedial activities were performed consistent with the STRAP dated January 25th, 2016, which was approved by the Department on April 19th, 2016. The remedial activities were performed by National Grid between July 18, 2016 and August 26, 2016 and included limited removal of vegetation, site preparation and grading, capping of the former washout area with a subsurface geomembrane liner system (40 mil textured linear low density polyethylene (LLDPE)) and associated barrier protection soils, installation of a new drainage system to convey stormwater from the Max Read Field area to the Seekonk River, backfilling the former washout area with clean imported fill (at least two feet in thickness) and Site restoration and seeding. The cap installed as part of this work is consistent with the requirements for a RIDEM approved engineered cap. Consistent with the RIDEM-approved STRAP, National Grid also provided assistance to the City of Pawtucket in excavating and managing certain limited suspected MGP impacted soils encountered during their reconstruction of Max Read Field. The City of Pawtucket also transported excess soils from the Max Read Field reconstruction project to the Tidewater Site as approved by RIDEM which were used to fill a low lying area. Both of these areas are shown on the attached Figure 1, Remedial Actions. This work serves to complete the capping in the former south washout area of the Site. The low lying area where the materials from the Max Read Field construction were placed (within the Former Power Plant Area) will be capped as part of the final remedy.



We trust this information addresses your comments and look forward to continuing to work cooperatively with RIDEM. Should you have any questions or comments regarding the information presented herein, please do not hesitate to contact the undersigned or Jesse Edmands at (781) 907-3682.

Very truly yours,

GZA GEOENVIRONMENTAL, INC.

A handwritten signature in cursive script, appearing to read 'Sophia Narkiewicz'.

Sophia Narkiewicz, P.E.
Assistant Project Manager
401-421-4140 – sophia.narkiewicz@gza.com

A handwritten signature in cursive script, appearing to read 'Todd Greene'.

Todd Greene, P.E.
Senior Consultant
401-421-4140 – todd.greene@gza.com

A handwritten signature in cursive script, appearing to read 'James J. Clark'.

James J. Clark, P.E.
Senior Principal
860-858-3134 - james.clark@gza.com

cc: Mr. Jesse Edmands, National Grid
Ms. Michele Leone, National Grid

Attachments:

April 19, 2017 SIR Comment Letter issued by RIDEM to National Grid
Figure 14B Shallow Surface Soil Distribution (0 to 2') Arsenic, Cyanide, Lead, Inorganics Impacts, Former Power Plant Area and South Fill Area (REVISED)
Table 1 Summary of Imported Material Analytical Data –Gasholder Nos. 7 and 8
Figure 1 Remedial Actions
Figure 4 Remedial Action Alternative No. 2, Engineered Cap, Physical Containment and Limited Source Removal (REVISED)



RHODE ISLAND
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

235 Promenade Street, Providence, RI 02908-5767

TDD 401-222-4462

SIR COMMENT LETTER

April 19, 2017

File No. SR-26-0934A

(Formerly Case No. Case No. 95-022)

Mr. Jesse Edmands
Project Manager
National Grid
40 Sylvan Road
Waltham, MA 02451

RE: Tidewater Manufactured Gas Plant (former)
Tidewater Street
Pawtucket, Rhode Island
Plat Map 65B / Lots 647, 648 & 649

Dear Mr. Edmands:

The Rhode Island Department of Environmental Management's (the Department) Office of Waste Management (OWM) has reviewed several documents for the above referenced property (the Site), which were submitted in accordance with Section 7.00 of the Department's Rules and Regulations for the Investigation and Remediation of Hazardous Material Releases (the Remediation Regulations).

After careful review of the above referenced documents, the Department requires a response to the attached comments, questions, and concerns about the submittals, which must be fully addressed in writing to receive a Program Letter.

If you have any questions regarding this letter or would like the opportunity to meet with Department personnel, please contact me by telephone at (401) 222-2797, ext. 7109, or by E-mail at joseph.martella@dem.ri.gov.

Sincerely,

Joseph T. Martella II
Senior Engineer
Office of Waste Management

cc: Kelly Owens, RIDEM/OWM
Ronald Gagnon, RIDEM/OCTA
Ruth Gold, RIDEM. OAR

Alisa Richardson, RIDEM/OWR
Neil Personeus, RIDEM/OWR/WQC
Barbara Morin, RIDOH
Tracy A. Silvia, RI CRMC
Susan Mara, Pawtucket Planning
Andrew Silvia, Pawtucket/DPW
Gerard Charbonneau, Chairman, Pawtucket School Committee
Michele Leone, National Grid
Julie Nora, Ph.D., International Charter School
Carolyn Sheehan, Blackstone Academy
Mary Murray, Francis J. Varieur Elementary School
Dania Alejandra Flores-Heagney, EJLRI
James J. Clark, GZA

DEPARTMENT COMMENTS

April 19, 2017

Site Investigation Data Report, dated January 11, 2011
Gasholder Nos. 7 and 8 Decommissioning and Demolition Completion Report, dated July 8, 2011
Remedial Alternative Evaluation Report, dated July 29, 2011

Tidewater Manufactured Gas Plant (former)
Pawtucket, Rhode Island

1. Regarding the January 11, 2011, Site Investigation Data Report (SIDR):
 - a. Section 8.30 (Exposure Pathways) pg. 102, identifies seven (7) potential exposure pathways. It is the Department's position that the potential inhalation of volatile vapors by workers in future buildings (if the volatilization to indoor air pathway is not mitigated), as well as potential inhalation exposure to future construction/utility workers, represent additional potential exposure pathways.
 - b. Section 8.30 (Exposure Pathways) pg. 104, paragraph 2, and Section 9.20 (Summary of Investigations and Results) Subsection (Sediments) pg. 113, paragraph 2, both noted in general the likelihood that upgradient/regional impacts to the Seekonk River and other possible upgradient industrial sources could have degraded sediment quality adjacent to the Site. Please clarify if any specific upgradient sediment contamination sources (industrial or otherwise) have been identified as potentially contributing to sediment contamination adjacent to the Tidewater Site.
 - c. Please correct the title of Figure 14B to replace the word "Subsurface" with "Surface."
2. Regarding the July 8, 2011, Gasholder Nos. 7 and 8 Decommissioning and Demolition Completion Report, the fourth paragraph on page 16 indicates that the analytical testing results for the imported fill and loam used to backfill the gasholder footprints was compared to the Department's Method 1 Industrial/Commercial Direct Exposure Criteria (I/CDEC). The analytical results for imported clean material should have been compared to the Department's Method 1 Residential Direct Exposure Criteria (RDEC). Please clarify and/or explain exactly what was done and if all imported material was determined to be compliant with the Department's Method 1 RDEC.
3. Regarding the July 29, 2011, Remedial Alternative Evaluation Report (RAER):
 - a. Section 2.20 (Site Investigation Results) Subsection (Sediments) pg. 13, paragraph 2, indicates *"Given the localized nature of observed sediment impact and the likely existence of additional upgradient/regional sources, future response*

actions specific to sediment impact do not appear to be warranted and have therefore not been included as part of this evaluation. However, as described further herein, in the development and evaluation of remedial alternatives for the Site, potential migration of impacts to the Seekonk River was considered a key exposure pathway to be addressed.” At this time the Department acknowledges that the investigation of the terrestrial upland portion of the Site has been completed. While no Remedial Alternative specific to the impacted sediments in the Seekonk River adjacent to the Site has been proposed or approved, the Department also acknowledges that the proposed containment wall, if it performs properly as designed, should provide a barrier to future releases of hazardous materials from the Site to the sediments. National Grid may continue to move forward through the regulatory process for the terrestrial upland portion of the Site. Please be advised however, that the subsequent Program Letter, Remedial Decision Letter (RDL) and Order of Approval (Order) for this Site, unless otherwise specified by the Department, shall be limited to the investigation and proposed remediation of the terrestrial upland portion of the Site, and does not preclude additional investigation and/or remediation activities related to sediments impacted by historic or ongoing releases of hazardous materials at or from the Site.

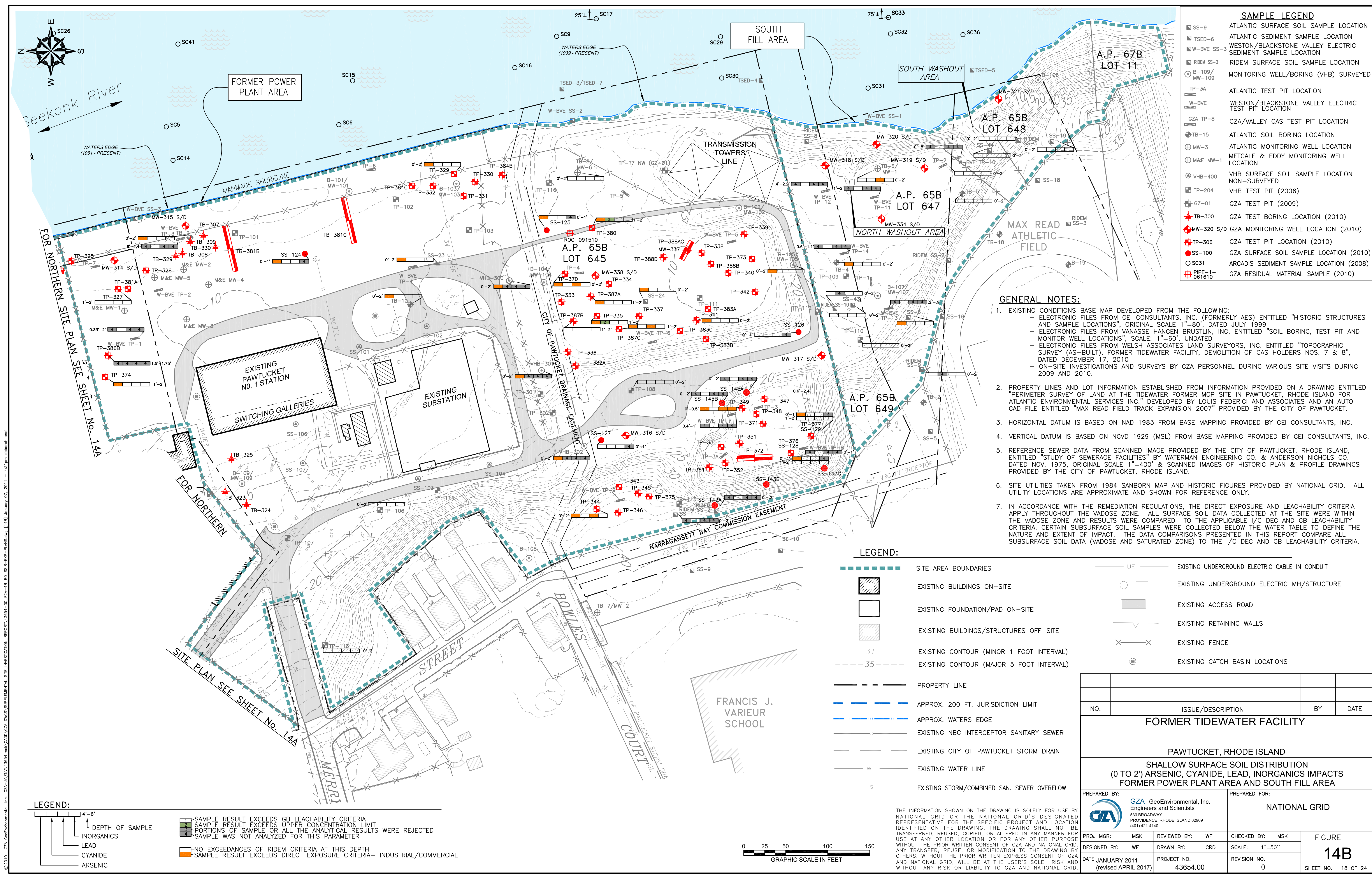
- b. Section 3.30 (Exposure Pathways) pg. 21, paragraph 4, same comment as SIDR comment 1.a above.
- c. Section 3.30.2 (Direct Contact/Potential Tracking/Erosion - Surface Soils) pg. 24, paragraph 1, indicates *“The entirety of the Site is fenced and restricted to unauthorized access. Therefore, under current Site conditions, the concern related to direct exposure is somewhat mitigated by the presence of a security fence which restricts access to National Grid personnel and authorized visitors.”* The Department acknowledges that the presence of a security fence somewhat mitigates direct exposure by restricting easy access to the Site, however the history of this Site clearly indicates that trespassing is an ongoing possibility and concern which cannot be adequately addressed by fencing alone, reinforcing the need for the installation of a long term barrier to direct exposure to impacted surface soils.
- d. Section 4.00 (Remedial Objectives) pg. 25, paragraph 4, lists 5 overall Remedial Objectives. As indicated in comments 1.a and 3.b above, it is the Department’s opinion that mitigation of potential future vapor intrusion and inhalation exposures in indoor air should be included in the list of overall Site Remedial Objectives.
- e. Section 4.00 (Remedial Objectives) pg. 25, paragraph 5, indicates that the Environmental Land Usage Restriction (ELUR) will include a Materials Management Plan (MMP). Please clarify how the proposed MMP, which is not included in the Remediation Regulations, differs from a Soil Management Plan

(SMP) which is typically associated with an ELUR and is specifically referenced in the draft ELUR template.

- f. Regarding Section 5.00 (Remedial Action Alternative Evaluation) pg. 26, paragraph 2, when evaluating estimated costs for implementing the remedial alternatives, is there an increased cost associated with implementing certain remedies (i.e. source removal and disturbance vs. capping in place) due to the necessity of increased precautions (i.e. stricter odor, dust and vapor controls, associated monitoring and stricter action level thresholds), required by operating in the proximity of sensitive receptors (i.e. students, residents, etc.), and was this cost differential, if it exists, considered as part of the evaluation?
- g. Regarding Section 5.10.2 (Remedial Action Alternative #2: Engineered Cap, Physical Containment and Limited Source Removal) pg. 27:
 - i. Paragraph 1, referring to the design of the impermeable engineered cap indicates *“this cap would consist of an impermeable cap comprised of up to 2 feet of clean soil underlain by a geomembrane or clay material.”* Please be reminded that to be consistent with the Department’s capping requirements, a cap over a geomembrane must consist of a minimum of one (1) foot of clean material.
 - ii. Paragraph 2 indicates this alternative includes focused NAPL recovery immediately upgradient of the containment wall and at other locations on the Site. Please provide additional details regarding the proposed focused NAPL recovery.
 - iii. Paragraph 2 indicates this alternative includes routine groundwater quality monitoring to assess performance. Please provide additional details regarding the proposed routine groundwater quality monitoring and how performance will be assessed.
 - iv. As the Department has previously discussed with National Grid on similar Sites where construction of a subsurface containment wall is proposed, please add language to Remedial Alternative #2 indicating that this alternative will include the installation of an appropriate number of groundwater monitoring wells located downgradient of the newly installed containment wall for the purpose of demonstrating proper performance of the wall. Periodic NAPL gauging and groundwater sampling/analysis of the downgradient wells shall be included in the long-term post-remedial Groundwater Monitoring Plan.
- h. Regarding Section 6.20 (Details of the Preferred Remedial Action Alternative):
 - i. Page 33, paragraph 3 indicates *“The cap across the remainder of the Site (FGPA, FPPA and SFA) would consist of an impermeable cap comprised*

of up to 2 feet of soil, an underlying drainage system, underlain by an impermeable layer (i.e., geomembrane or clay layer).” As stated in comment 3.g.i above, please be reminded that to be consistent with the Department’s capping requirements, a cap over a geomembrane must consist of a minimum of one (1) foot of clean material.

- ii. Page 33, paragraph 3 also indicates “*Cap installation would require clearing/ grubbing and Site grading ...*” Please clarify if the proposed plan is to maintain and protect existing Site groundwater monitoring wells during the cap installation process, or to close all groundwater monitoring wells and reinstall new monitoring wells at appropriate locations and depths when the cap installation has been completed.
 - iii. Regarding page 34, paragraph 3, please be advised that it is the Department’s position that decisions regarding any future changes or modifications to the frequency and/or duration of NAPL gauging and recovery, and/or groundwater sampling and analysis, shall be determined by the Department based upon review and consideration of the periodic NAPL gauging results and trends, the groundwater analytical results and trends, the effectiveness of the containment wall, and the overall Site compliance status at the time of each review
4. General Comment – Please provide a summary of all remedial activities completed since the RAER was submitted, and as applicable, how those activities may change the proposed remedy. For example, any areas of the Site that have been addressed through a Short Term Remedial Action Plan (STRAP) and therefore may not require additional remedial work.
5. Please submit an SIR Addendum that addresses the abovementioned comments on or before May 31 2017.



SAMPLE LEGEND

SS-9	ATLANTIC SURFACE SOIL SAMPLE LOCATION
TSED-6	ATLANTIC SEDIMENT SAMPLE LOCATION
W-BVE SS-1	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)

- 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.
 - IN ACCORDANCE WITH THE REMEDIATION REGULATIONS, THE DIRECT EXPOSURE AND LEACHABILITY CRITERIA APPLY THROUGHOUT THE VADOSE ZONE. ALL SURFACE SOIL DATA COLLECTED AT THE SITE WERE WITHIN THE VADOSE ZONE AND RESULTS WERE COMPARED TO THE APPLICABLE 1/C DEC AND GB LEACHABILITY CRITERIA. CERTAIN SUBSURFACE SOIL SAMPLES WERE COLLECTED BELOW THE WATER TABLE TO DEFINE THE NATURE AND EXTENT OF IMPACT THE DATA COMPARISONS PRESENTED IN THIS REPORT COMPARE ALL SUBSURFACE SOIL DATA (VADOSE AND SATURATED ZONE) TO THE 1/C DEC AND GB LEACHABILITY CRITERIA.

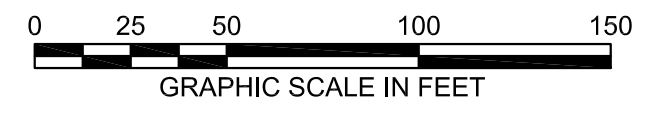
LEGEND:

	SITE AREA BOUNDARIES		EXISTING UNDERGROUND ELECTRIC CABLE IN CONDUIT
	EXISTING BUILDINGS ON-SITE		EXISTING UNDERGROUND ELECTRIC MH/STRUCTURE
	EXISTING FOUNDATION/PAD ON-SITE		EXISTING ACCESS ROAD
	EXISTING BUILDINGS/STRUCTURES OFF-SITE		EXISTING RETAINING WALLS
	EXISTING CONTOUR (MINOR 1 FOOT INTERVAL)		EXISTING FENCE
	EXISTING CONTOUR (MAJOR 5 FOOT INTERVAL)		EXISTING CATCH BASIN LOCATIONS
	PROPERTY LINE		
	APPROX. 200 FT. 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		

LEGEND:

	SAMPLE RESULT EXCEEDS GB LEACHABILITY CRITERIA
	SAMPLE RESULT EXCEEDS UPPER CONCENTRATION LIMIT
	PORTIONS OF SAMPLE OR ALL THE ANALYTICAL RESULTS WERE REJECTED
	SAMPLE WAS NOT ANALYZED FOR THIS PARAMETER
	NO EXCEEDANCES OF RIDEM CRITERIA AT THIS DEPTH
	SAMPLE RESULT EXCEEDS DIRECT EXPOSURE CRITERIA- INDUSTRIAL/COMMERCIAL
	DEPTH OF SAMPLE
	INORGANICS
	LEAD
	CYANIDE
	ARSENIC

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
FORMER TIDEWATER FACILITY			
PAWTUCKET, RHODE ISLAND			
SHALLOW SURFACE SOIL DISTRIBUTION (0 TO 2') ARSENIC, CYANIDE, LEAD, INORGANICS IMPACTS 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:	JANUARY 2011 (revised APRIL 2017)	PROJECT NO.:	43654.00
CHECKED BY:	MSK	REVISION NO.:	0
SCALE:	1"=50'	FIGURE	14B
		SHEET NO.	18 OF 24

Summary of Imported Material Analytical Data

Gasholders Nos. 7 and 8
Former Tidewater MGP Site
Pawtucket, Rhode Island

		Units	RIDEM Residential DEC	RIDEM Industrial / Commercial DEC	Loam							
					Loam - Comp 7/20/10		Loam - Grab 1 7/20/10		Loam - Grab 2 7/20/10		Loam - Grab 3 7/20/10	
					Result	RL	Result	RL	Result	RL	Result	RL
VOLATILE ORGANICS												
EPA 8260	All VOC Compounds Analyzed	mg/kg	Varies	Varies	ND	Varies	NA	NA	NA	NA		
TOTAL PETROLEUM HYDROCARBON												
8100M	Hydrocarbon Content	mg/kg	500	2,500	ND	43.1	NA	NA	NA	NA		
PRIORITY POLLUTANT METALS												
Various Methods	Antimony	mg/kg	10	820	ND	5.3	NA	NA	NA	NA		
	Arsenic	mg/kg	7	7	ND	2.7	4.3	4	3.4	3.4		
	Beryllium	mg/kg	1.5	1.5	0.29		NA	NA	NA	NA		
	Cadmium	mg/kg	39	1,000	ND	0.53	NA	NA	NA	NA		
	Chromium	mg/kg	1,400	10,000	4.8		NA	NA	NA	NA		
	Copper	mg/kg	3,100	10,000	4.4		NA	NA	NA	NA		
	Lead	mg/kg	150	500	10.9		NA	NA	NA	NA		
	Mercury	mg/kg	23	610	ND	0.036	NA	NA	NA	NA		
	Nickel	mg/kg	1,000	10,000	2.7		NA	NA	NA	NA		
	Selenium	mg/kg	390	10,000	ND	5.3	NA	NA	NA	NA		
	Silver	mg/kg	200	10,000	ND	0.53	NA	NA	NA	NA		
	Thallium	mg/kg	5.5	140	ND	1.32	NA	NA	NA	NA		
Zinc	mg/kg	6,000	10,000	17.2		NA	NA	NA	NA			
SEMI-VOLATILE ORGANIC COMPOUNDS (SVOCs)												
EPA 8270	All Other SVOC Compounds Analyzed	mg/kg	Varies	Varies	ND	Varies	NA	NA	NA	NA		
	Benzo [a] Pyrene	mg/kg	0.4	0.8	ND	0.187	NA	NA	NA	NA		
	Chrysene	mg/kg	0.4	780	ND	0.187	NA	NA	NA	NA		

Notes :

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Summary of Imported Material Analytical Data

Gasholders Nos. 7 and 8
Former Tidewater MGP Site
Pawtucket, Rhode Island

		Units	RIDEM Residential DEC	RIDEM Industrial / Commercial DEC	Granular Fill									
					Common Borrow Comp		Common Borrow-Grab 1		Common Borrow-Grab 2		Common Borrow-Grab 3		Common Borrow-Comp Left	
					7/20/10	7/20/10	7/20/10	7/20/10	7/20/10	7/20/10	9/23/10	9/23/10		
Result	RL	Result	RL	Result	RL	Result	RL	Result	RL					
VOLATILE ORGANICS														
EPA 8260	All VOC Compounds Analyzed	mg/kg	Varies	Varies	ND	Varies	NA		NA		NA		ND	Varies
TOTAL PETROLEUM HYDROCARBON														
8100M	Hydrocarbon Content	mg/kg	500	2,500	ND	37.4	NA		NA		NA		ND	39.3
PRIORITY POLLUTANT METALS														
Various Methods	Antimony	mg/kg	10	820	ND	4.7	NA		NA		NA		ND	4.4
	Arsenic	mg/kg	7	7	ND	2.3	4.2		3.4		2.3		ND	2.2
	Beryllium	mg/kg	1.5	1.5	0.11		NA		NA		NA		0.13	
	Cadmium	mg/kg	39	1,000	ND	0.47	NA		NA		NA		ND	0.44
	Chromium	mg/kg	1,400	10,000	2.6		NA		NA		NA		2.8	
	Copper	mg/kg	3,100	10,000	3.8		NA		NA		NA		5.1	
	Lead	mg/kg	150	500	ND	4.7	NA		NA		NA		ND	4.4
	Mercury	mg/kg	23	610	ND	0.031	NA		NA		NA		ND	0.033
	Nickel	mg/kg	1,000	10,000	ND	2.3	NA		NA		NA		ND	2.2
	Selenium	mg/kg	390	10,000	ND	4.7	NA		NA		NA		ND	4.4
	Silver	mg/kg	200	10,000	ND	0.47	NA		NA		NA		ND	0.44
	Thallium	mg/kg	5.5	140	ND	1.16	NA		NA		NA		ND	1.09
Zinc	mg/kg	6,000	10,000	17.8		NA		NA		NA		25.3		
SEMI-VOLATILE ORGANIC COMPOUNDS (SVOCs)														
EPA 8270	All Other SVOC Compounds Analyzed	mg/kg	Varies	Varies	ND	Varies	NA		NA		NA		ND	Varies
	Benzo [a] Pyrene	mg/kg	0.4	0.8	ND	0.165	NA		NA		NA		ND	0.165
	Chrysene	mg/kg	0.4	780	ND	0.165	NA		NA		NA		ND	0.165

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Summary of Imported Material Analytical Data

Gasholders Nos. 7 and 8
Former Tidewater MGP Site
Pawtucket, Rhode Island

		Units	RIDEM Residential DEC	RIDEM Industrial / Commercial DEC	Granular Fill									
					Common Borrow-Grab A Left		Common Borrow-Grab B Left		Common Borrow-Comp Right		Common Borrow-Grab A Right		Common Borrow-Grab B Right	
					9/23/10 Result	RL	9/23/10 Result	RL	9/23/10 Result	RL	9/23/10 Result	RL	9/23/10 Result	RL
VOLATILE ORGANICS														
EPA 8260	All VOC Compounds Analyzed	mg/kg	Varies	Varies	NA		NA		ND	Varies	NA		NA	
TOTAL PETROLEUM HYDROCARBON														
8100M	Hydrocarbon Content	mg/kg	500	2,500	NA		NA		ND	38.9	NA		NA	
PRIORITY POLLUTANT METALS														
Various Methods	Antimony	mg/kg	10	820	NA		NA		4.8	4.8	NA		NA	
	Arsenic	mg/kg	7	7	ND	2.3	ND	2.4	ND	2.4	ND	2.4	ND	2.4
	Beryllium	mg/kg	1.5	1.5	NA		NA		0.12		NA		NA	
	Cadmium	mg/kg	39	1,000	NA		NA		ND	0.48	NA		NA	
	Chromium	mg/kg	1,400	10,000	NA		NA		2.5		NA		NA	
	Copper	mg/kg	3,100	10,000	NA		NA		4.8		NA		NA	
	Lead	mg/kg	150	500	NA		NA		ND	4.8	NA		NA	
	Mercury	mg/kg	23	610	NA		NA		ND	0.03	NA		NA	
	Nickel	mg/kg	1,000	10,000	NA		NA		ND	2.4	NA		NA	
	Selenium	mg/kg	390	10,000	NA		NA		ND	4.8	NA		NA	
	Silver	mg/kg	200	10,000	NA		NA		ND	0.48	NA		NA	
	Thallium	mg/kg	5.5	140	NA		NA		ND	1.18	NA		NA	
Zinc	mg/kg	6,000	10,000	NA		NA		24.8		NA		NA		
SEMI-VOLATILE ORGANIC COMPOUNDS (SVOCs)														
EPA 8270	All Other SVOC Compounds Analyzed	mg/kg	Varies	Varies	NA		NA		ND	Varies	NA		NA	
	Benzo [a] Pyrene	mg/kg	0.4	0.8	NA		NA		ND	0.169	NA		NA	
	Chrysene	mg/kg	0.4	780	NA		NA		ND	0.169	NA		NA	

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Summary of Imported Material Analytical Data

Gasholders Nos. 7 and 8
Former Tidewater MGP Site
Pawtucket, Rhode Island

		Units	RIDEM Residential DEC	RIDEM Industrial / Commercial DEC	Granular Fill							
					Common Borrow-Comp 11/10/10		Common Grab-Middle 11/10/10		Common Grab-Left Side 11/10/10		Common Grab-Right Side 11/10/10	
					Result	RL	Result	RL	Result	RL	Result	RL
VOLATILE ORGANICS												
EPA 8260	All VOC Compounds Analyzed	mg/kg	Varies	Varies	ND	Varies	NA		NA		NA	
TOTAL PETROLEUM HYDROCARBON												
8100M	Hydrocarbon Content	mg/kg	500	2,500	ND	39.6	NA		NA		NA	
PRIORITY POLLUTANT METALS												
Various Methods	Antimony	mg/kg	10	820	ND	5.2	NA		NA		NA	
	Arsenic	mg/kg	7	7	ND	2.6	ND	2.5	ND	2.6	ND	2.5
	Beryllium	mg/kg	1.5	1.5	0.15		NA		NA		NA	
	Cadmium	mg/kg	39	1,000	ND	0.52	NA		NA		NA	
	Chromium	mg/kg	1,400	10,000	2.5		NA		NA		NA	
	Copper	mg/kg	3,100	10,000	5.8		NA		NA		NA	
	Lead	mg/kg	150	500	ND	5.2	NA		NA		NA	
	Mercury	mg/kg	23	610	ND	0.03	NA		NA		NA	
	Nickel	mg/kg	1,000	10,000	ND	2.6	NA		NA		NA	
	Selenium	mg/kg	390	10,000	ND	5.2	NA		NA		NA	
	Silver	mg/kg	200	10,000	ND	0.52	NA		NA		NA	
Thallium	mg/kg	5.5	140	ND	1.28	NA		NA		NA		
Zinc	mg/kg	6,000	10,000	29.1		NA		NA		NA		
SEMI-VOLATILE ORGANIC COMPOUNDS (SVOCs)												
EPA 8270	All Other SVOC Compounds Analyzed	mg/kg	Varies	Varies	ND	Varies	NA		NA		NA	
	Benzo [a] Pyrene	mg/kg	0.4	0.8	ND	0.184	NA		NA		NA	
	Chrysene	mg/kg	0.4	780	ND	0.184	NA		NA		NA	

Notes :

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Summary of Imported Material Analytical Data

Gasholders Nos. 7 and 8
Former Tidewater MGP Site
Pawtucket, Rhode Island

		Units	RIDEM Residential DEC	RIDEM Industrial / Commercial DEC	1.5-inch RIDOT Processed Gravel							
					Proc Gravel - Comp 7/20/10		Proc Gravel - Grab 1 7/20/10		Proc Gravel - Grab 2 7/20/10		Proc Gravel - Grab 2 7/20/10	
					Result	RL	Result	RL	Result	RL	Result	RL
VOLATILE ORGANICS												
EPA 8260	All VOC Compounds Analyzed	mg/kg	Varies	Varies	ND	Varies	NA	NA	NA	NA		
TOTAL PETROLEUM HYDROCARBON												
8100M	Hydrocarbon Content	mg/kg	500	2,500	ND	38.7	NA	NA	NA	NA		
PRIORITY POLLUTANT METALS												
Various Methods	Antimony	mg/kg	10	820	ND	4.8	NA	NA	NA	NA		
	Arsenic	mg/kg	7	7	ND	2.4	7.9	3.2	6.1			
	Beryllium	mg/kg	1.5	1.5	0.22		NA	NA	NA			
	Cadmium	mg/kg	39	1,000	ND	0.48	NA	NA	NA			
	Chromium	mg/kg	1,400	10,000	3.6		NA	NA	NA			
	Copper	mg/kg	3,100	10,000	6.3		NA	NA	NA			
	Lead	mg/kg	150	500	5.0		NA	NA	NA			
	Mercury	mg/kg	23	610	ND	0.034	NA	NA	NA			
	Nickel	mg/kg	1,000	10,000	ND	2.4	NA	NA	NA			
	Selenium	mg/kg	390	10,000	ND	4.8	NA	NA	NA			
	Silver	mg/kg	200	10,000	ND	0.48	NA	NA	NA			
	Thallium	mg/kg	5.5	140	ND	1.19	NA	NA	NA			
Zinc	mg/kg	6,000	10,000	25.8		NA	NA	NA				
SEMI-VOLATILE ORGANIC COMPOUNDS (SVOCs)												
EPA 8270	All Other SVOC Compounds Analyzed	mg/kg	Varies	Varies	ND	Varies	NA	NA	NA	NA		
	Benzo [a] Pyrene	mg/kg	0.4	0.8	ND	0.170	NA	NA	NA	NA		
	Chrysene	mg/kg	0.4	780	ND	0.170	NA	NA	NA	NA		

Notes :

NE = Not Established

NA = Not Analyzed

RL = Reporting Limit

ND = Not Detected

mg/kg = milligrams per kilogram

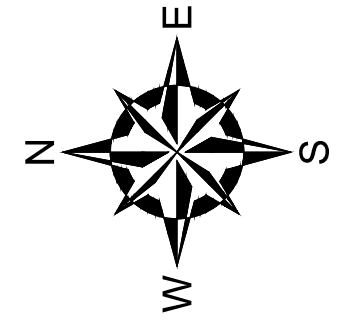
Gray shaded cells with bolded text indicate that the result was detected in excess of the RIDEM Residential Direct Exposure Criteria (R-DEC)



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- LEGEND:**
- PROPERTY LINES
 - SITE BOUNDARY
 - SITE AREA BOUNDARY
 - REMEDIAL ACTIVITIES/PROJECTS (2011-2016)

- REFERENCE NOTES:**
1. THIS MAP CONTAINS A GOOGLE PROFESSIONAL IMAGE OBTAINED IN AUGUST OF 2016.
 2. GIS DATA WAS PROVIDED BY THE CITY OF PAWTUCKET IN OCTOBER 2016 FOR REFERENCE PURPOSES ONLY AND SHOULD NOT BE CONSIDERED A LEGALLY AUTHORITATIVE SOURCE AS TO LOCATION OF ANY LINE OR FEATURE. THESE DATA ARE FOR PLANNING PURPOSES ONLY AND DO NOT REPRESENT A LEGALLY RECORDED PLAN, DEED, SURVEY OR ENGINEERING SCHEMATIC AND ARE NOT INTENDED TO BE USED AS SUCH.
 3. SITE BOUNDARIES ARE APPROXIMATE.



NO.	ISSUE/DESCRIPTION	BY	DATE

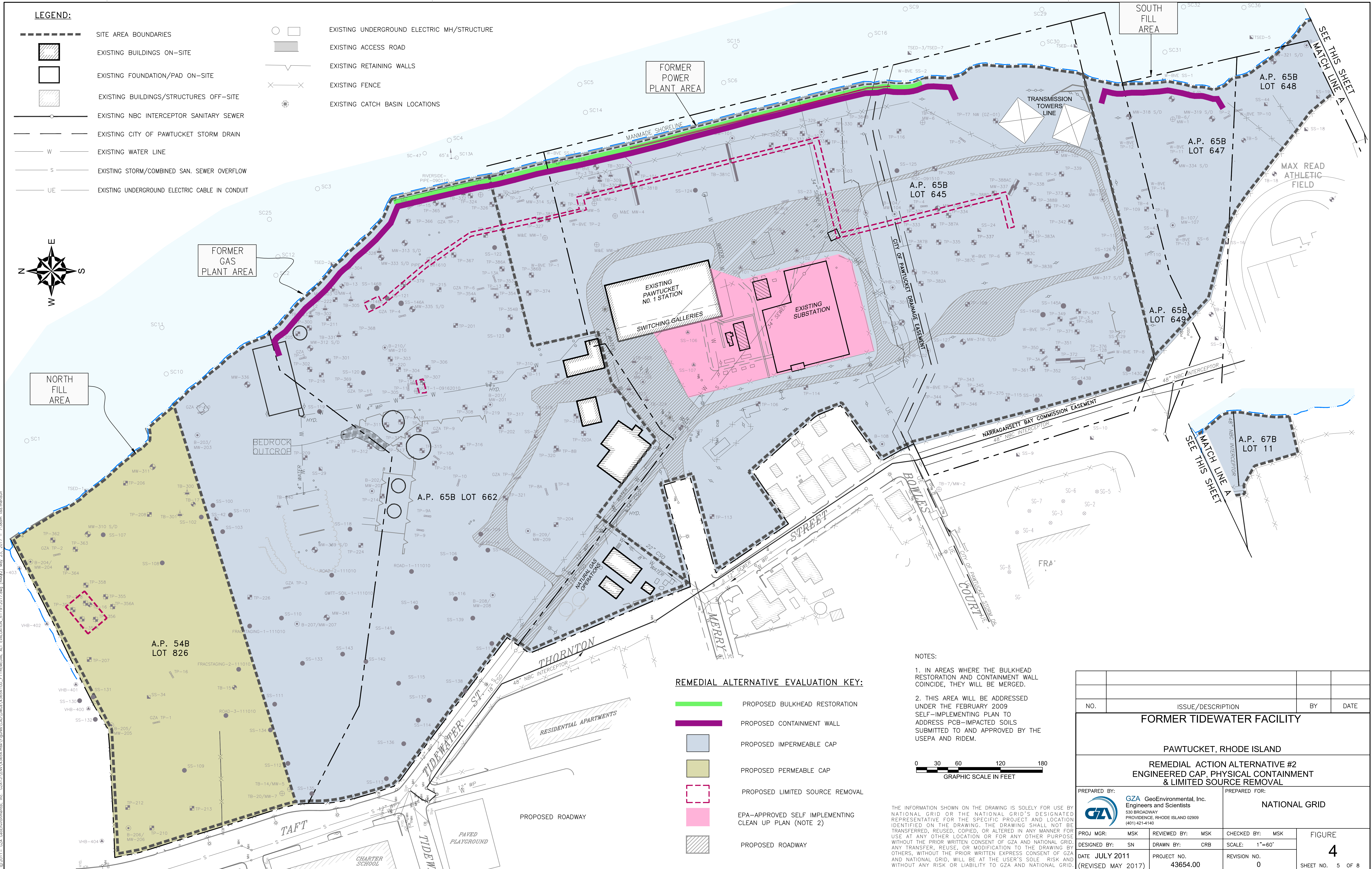
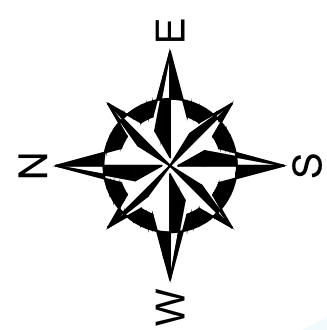
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**FORMER TIDEWATER FACILITY
PAWTUCKET, RHODE ISLAND**

REMEDIAL ACTIONS

PREPARED BY: GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com	PREPARED FOR: nationalgrid		
PROJ MGR: SN	REVIEWED BY: JC	CHECKED BY: JC	FIGURE
DESIGNED BY: SN	DRAWN BY: LDT	SCALE: AS NOTED	1
DATE: MAY, 2017	PROJECT NO.: 43654.00	REVISION NO.: 0	SHEET NO. 1 OF 1

- LEGEND:**
- SITE AREA BOUNDARIES
 - [Hatched Box] EXISTING BUILDINGS ON-SITE
 - [White Box] EXISTING FOUNDATION/PAD ON-SITE
 - [Hatched Box] EXISTING BUILDINGS/STRUCTURES OFF-SITE
 - EXISTING NBC INTERCEPTOR SANITARY SEWER
 - EXISTING CITY OF PAWTUCKET STORM DRAIN
 - W --- EXISTING WATER LINE
 - S --- EXISTING STORM/COMBINED SAN. SEWER OVERFLOW
 - UE --- EXISTING UNDERGROUND ELECTRIC CABLE IN CONDUIT
 - [Circle] EXISTING UNDERGROUND ELECTRIC MH/STRUCTURE
 - [Line] EXISTING ACCESS ROAD
 - [Line] EXISTING RETAINING WALLS
 - [X] EXISTING FENCE
 - [Circle] EXISTING CATCH BASIN LOCATIONS



REMEDIAL ALTERNATIVE EVALUATION KEY:

- [Green Line] PROPOSED BULKHEAD RESTORATION
- [Purple Line] PROPOSED CONTAINMENT WALL
- [Blue Box] PROPOSED IMPERMEABLE CAP
- [Yellow Box] PROPOSED PERMEABLE CAP
- [Red Dashed Box] PROPOSED LIMITED SOURCE REMOVAL
- [Pink Box] EPA-APPROVED SELF IMPLEMENTING CLEAN UP PLAN (NOTE 2)
- [Hatched Box] PROPOSED ROADWAY

NOTES:

1. IN AREAS WHERE THE BULKHEAD RESTORATION AND CONTAINMENT WALL COINCIDE, THEY WILL BE MERGED.
2. THIS AREA WILL BE ADDRESSED UNDER THE FEBRUARY 2009 SELF-IMPLEMENTING PLAN TO ADDRESS PCB-IMPACTED SOILS SUBMITTED TO AND APPROVED BY THE USEPA AND RIDEM.



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NO.	ISSUE/DESCRIPTION	BY	DATE
FORMER TIDEWATER FACILITY			
PAWTUCKET, RHODE ISLAND			
REMEDIAL ACTION ALTERNATIVE #2 ENGINEERED CAP, PHYSICAL CONTAINMENT & LIMITED SOURCE REMOVAL			
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:	MSK
DESIGNED BY:	SN	DRAWN BY:	CRB
DATE:	JULY 2011 (REVISED MAY 2017)	PROJECT NO.:	43654.00
CHECKED BY:	MSK	REVISION NO.:	0
SCALE:	1"=60'	FIGURE:	4
			SHEET NO. 5 OF 8

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