GEI Consultants

Geotechnical
Environmental and
Water Resources
Engineering

Phase II Remedial Action Work Plan
Glen Cove Former Manufactured Gas Plant Site

City of Glen Cove
Nassau County, New York
AOC Index No. D1-0001-98-11
Site No. 1-30-089P

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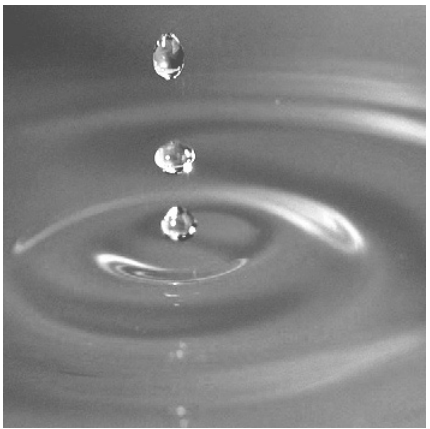
September 26, 2014
093270-4-1404



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Professional Engineer Certification

I, Matthew J. O'Neil, certify that I am currently a NYS registered professional engineer and that this Remedial Action Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

9/26/14
Date

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It is a violation of Article 145 of New York State Education Law for any person to alter this document in any way without the express written verification of adoption by any New York State licensed engineer in accordance with Section 7209(2), Article 145, New York State Education Law.

Abbreviations and Acronyms

AWQS	Ambient Water Quality Standards
ASME	American Society of Mechanical Engineers
BTEX	Benzene, toluene, ethylbenzene, and xylene
BUG	Brooklyn Union Gas
CAMP	Community Air Monitoring Plan
CRZ	Contamination Reduction Zone
DER	Department of Environmental Remediation
DNAPL	Dense Non-Aqueous Phase Liquid
EH	Electrical hazards
EPA	United States Environmental Protection Agency
EZ	Exclusion Zone
Frac	Fractionation
GEI	GEI Consultants, Inc., P.C.
HASP	Health and Safety Plan
HDPE	High Density Polyethylene
HSA	Hollow Stem Auger
ID	Inside Diameter
IRM	Interim Remedial Measure
LILCO	Long Island Lighting Company
LIPA	Long Island Power Authority
LIRR	Long Island Railroad
Matrix	Matrix Environmental Technologies, Inc.
MGP	Manufactured Gas Plant
NAPL	Non-Aqueous Phase Liquid
NCHD	Nassau County Health Department
NFPA	National Fire Protection Association
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
OM&M	Operation, Maintenance and Monitoring
OSHA	Occupational Safety and Health Administration
PAH	Polycyclic Aromatic Hydrocarbon
PPE	Personal Protective Equipment
PSEG	Public Service Enterprise Group
PS&S	Paulus, Sokolowski, and Sartor Engineering, PC
PVC	Polyvinyl Chloride
Q1	First Quarter
Q2	Second Quarter
RA	Remedial Action

Abbreviations and Acronyms (cont.)

RAO	Remedial Action Objective
RAP	Remedial Action Plan
RAWP	Remedial Action Work Plan
RI	Remedial Investigation
RIR	Remedial Investigation Report
ROI	Radius of influence
ROW	Right of Way
SCGs	Standards, Criteria, and Guidance
SCOs	Soil Cleanup Objective
SVOCs	Semivolatile Organic Compounds
SZ	Support Zone
TOGS	Technical and Operational Guidance Series
USDOT	United States Department of Transportation
VOCs	Volatile Organic Compounds
MEASUREMENTS	
feet bgs	feet below ground surface
feet-msl	feet above mean sea level
psi	pounds per square inch

1. Introduction

National Grid has prepared this Phase II Remedial Action Work Plan (Phase II RAWP) to address the installation of an oxygen injection system and the installation groundwater monitoring wells at the Glen Cove former Manufactured Gas Plant (MGP) site (the Site) located in Glen Cove, Nassau County, New York. The Site location is shown in **Figure 1**. This Phase II RAWP represents the second phase of the complete site remedy detailed in the *Remedial Action Plan, Glen Cove Former Manufactured Gas Plant, Town of Oyster Bay, Nassau County, New York* (RAP) prepared by GEI Consultants, Inc., P.C. (GEI), dated March 2010 (GEI, 2010a).

The Site is currently occupied by an active electric system substation and is owned by the Long Island Power Authority (LIPA). LIPA is conducting a facility upgrade which includes the installation of underground utilities, foundations, pilings, and associated electric equipment. LIPA's upgrade to this substation is necessary to meet the growing energy demand in the Glen Cove region. The upgrade was initiated in late 2011 and the majority of the subsurface work associated with the upgrade was completed in the first quarter (Q1) 2014. Additional subsurface construction to complete the substation upgrade has not been scheduled as of the date of this Phase II RAWP.

The New York State Department of Environmental Conservation (NYSDEC)-approved remedy for the Site included two remedial phases to accommodate the substation upgrades. Phase I included the excavation of shallow soil and off-site disposal of accessible MGP-related source material (or "hot spots"). Phase I was completed in May 2011. Phase II includes groundwater treatment using oxygen injection technology and the installation of recovery wells to remove mobile non-aqueous phase liquids (NAPL). The installation of NAPL recovery wells was intended to be completed as part of this Phase II RAWP. However, due to the length of the ongoing LIPA expansion and expedited access permission, these wells were installed in February 2012 under a separate work plan (GEI, 2012a).

Phase I remedial activities were performed from February through May 2011, and included the removal and proper disposal of 3,411 tons of material at depths of up to approximately 17 feet below ground surface (feet bgs). An oxygen injection pilot test was conducted on April 27, 2011; the results of which were incorporated into the Phase II oxygen injection system design. Additional excavation of surface soils along the property boundary in the southwest portion of the Site was conducted from July 15 through 18, 2011. Approximately 240 tons of polycyclic aromatic hydrocarbon (PAH)-impacted material was removed to a depth of approximately 2 feet and transported off-site for proper disposal. Details of the Phase I activities are provided in the NYSDEC-approved *Phase I Construction Completion Report, Glen Cove Former MGP*, prepared by GEI, dated September 28, 2012 (GEI, 2012b). Phase

II remediation began in February 2012 with the installation of one recovery well. Two additional recovery wells were installed in May 2012. The remaining portion of the LIPA expansion project is more scheduled as of the date of this Phase II RAWP. It is anticipated that the remaining Phase II remedial activities detailed in this Phase II RAWP will be completed prior to any additional subsurface work related to the substation upgrade and completion of the LIPA substation surface structures.

This Phase II RAWP has been prepared to be consistent with the Order on Consent, Index Number D1-001-98-11 between National Grid and the NYSDEC, the factors set forth in 6 New York Codes, Rules, and Regulations Part 375 for remedial action, and the NYSDEC *Final DER-10* [Department of Environmental Remediation] *Technical Guidance for Site Investigation and Remediation,* May 2010. This Phase II RAWP describes the Phase II remedial action goals and objectives as well as the techniques used for oxygen system installation, groundwater monitoring well installation, material handling, waste characterization, processing, transportation, and disposal of MGP-related source material. This effort will be performed under the approval and oversight of the NYSDEC and the New York State Department of Health (NYSDOH).

1.1 Work Plan Organization

This Phase II RAWP has been organized as follows:

- Section 1, the introduction, describes the purpose and objectives of the Phase II Remedial Action (RA). It also includes a description and historical information relative to the Site and information on previous investigations.
- Section 2 presents the Phase II RA goals and objectives.
- Section 3 presents a summary of the Phase II RA scope of work.
- Section 4 presents the air monitoring and vapor/odor management program.
- Section 5 describes the erosion and sediment control plan.
- Section 6 presents the Site security plan.
- Section 7 presents the equipment decontamination plan.
- Section 8 includes the waste management practices for the Phase II RA.
- Section 9 provides the water management plan for the Site.
- Section 10 outlines the traffic control concerns and measures for the Site.
- Section 11 presents the proposed schedule for implementation of the Phase II RA.
- Section 12 discusses the Completion Report, to be prepared following the conclusion of the remedial action.

1.2 Site Description and History

The Site is an inverted L-shaped parcel of approximately 1.9 acres presently occupied by an active electrical substation which services Glen Cove and the surrounding area.

Topographically the Site is a flat depression bounded by approximately 20-foot high slopes to the north, south and east. The Site Plan is shown in **Figure 2**. This plan reflects the site conditions at the completion of the Phase I remedial work. The figure and associated design drawings will be updated with the current site conditions prior to the start of construction.

The Site is bordered by a health club parking area to the north, with the Long Island Railroad (LIRR) tracks to the northwest, mixed commercial/residential properties to the south and east, and Glen Cove Arterial Highway (Route 107) right-of-way (ROW) to the west. To the west, the property slopes downward about 17 feet to Glen Cove Creek, a channelized stream, which eventually discharges to Hempstead Bay. Glen Cove Creek flows in a general south to north direction along the western property line. It approaches the property via a culvert which passes beneath Route 107 and flows along the property line in an open channelized section. The creek leaves the property boundary at the northwest corner of the Site through a box culvert that directs flow beneath the LIRR tracks. The creek eventually discharges to Mosquito Cove (Hempstead Bay).

Vehicle access to the Site is limited to a one-lane steeply-graded access road from Grove Street, a residential neighborhood terminating at the flat area in the center of the Site. The active LIPA substation, located on the flat portion of the Site, is an important component of the utility's infrastructure. The active substation is fenced, as is access to the southwestern portion of the Site, and access from Grove Street. The western portion of the site was a wooded area where surface run-off pooled and collected at the site. The area was partially cleared to accommodate the Phase I remedy. Following completion of the Following completion of the Phase I remedial work, the area was cleared of all vegetation, the grade was increased by an average of 3-5 feet and a series of retaining structures were installed to accommodate the future construction of additional electrical facilities at the site. There is a pile and lagging containment wall that is approximately 15 feet high that runs along the southeastern edge of the Site. It was constructed prior to the excavation activities performed as part of the Glen Cove Phase I RAWP. An easement runs along the north boundary of the property parallel to the health club property terminating to the east at Cedar Swamp Road.

MGP operations at the Site began in 1905 under the ownership of the Sea Cliff and Glen Cove Gas Company. The facility's footprint was relatively small and remained unchanged through its operational period, which ended in 1929. Facility structures were located on the northern section of the property, and consisted of a 60,000 cubic foot gas holder, boilers, purifiers, retorts, coal shed, engine room, tar and oil tank, and approximately eight gas tanks. In 1923, Sea Cliff and Glen Cove Gas Company was purchased or merged with the Long Island Lighting Company (LILCO). A 40,000 cubic foot high pressure Hortonsphere gas holder was added to the facility in the southwestern portion of the Site in 1925 for gas distribution purposes.

In 1929, LILCO terminated MGP operations and demolished the facility's surface structures

sometime, thereafter. Site activities following 1929 consisted solely of natural gas storage in the Hortonsphere gas holder through the 1950s. The Hortonsphere was decommissioned and demolished between 1959 and 1966. A major electrical substation was constructed on the Site in the mid-1960s. In 1998, Brooklyn Union Gas (BUG) and LILCO merged to form the KeySpan Corporation, at which time the ownership of the substation was transferred to LIPA. In 2007, National Grid acquired responsibility for the former MGP property through the acquisition of KeySpan. Currently, the Site is owned by LIPA and operated by Public Service Enterprise Group (PSEG) Long Island under contract to LIPA.

The substation footprint is coincidental with the majority of the main operations area of the former MGP. High voltage transmission lines transverse the fenced substation area and the west and northwest sections of the Site both aerially and below grade.

Through the 2007 acquisition of KeySpan, National Grid has accepted responsibility for addressing the environmental issues at the Site. As such, National Grid will be referenced in the performance of all past and future work throughout the remainder of the document.

1.3 Summary of Previous Investigations

The Final Remedial Investigation Report (RIR) prepared by Paulus, Sokolowski and Sartor Engineering, PC (PS&S) was submitted by National Grid to the NYSDEC on November 14, 2008 (PS&S, 2008). The Remedial Investigation (RI) included the installation of soil borings, groundwater probes, monitoring wells and the sampling and analysis of soil, sediment, groundwater, surface water, and soil vapor.

The results of the RI delineate the nature and extent of soil, creek sediment, groundwater and surface water impacts associated with the former MGP operations. Soil vapor was not determined to be a media of concern at this site; therefore, there is no further discussion of soil vapor nature and extent. The RI presented a compilation of the remedial and supplemental remedial investigations completed by PS&S and the findings of the following previously conducted site investigations:

- *Phase I Site Investigation Report For The Glen Cove Former Manufactured Gas Plant Site*, GEI Consultants, Inc./Atlantic Environmental Division, dated April 21, 1997;
- *Due Diligence Investigation*, Dvirka and Bartilucci, dated February 16, 2000; and
- *Remedial Investigation – Preliminary Data Submittal and Proposed Additional Work Scope*, Paulus, Sokolowski and Sartor Engineering, PC, October 2004.

The following sections provide a summary of the findings of the RI and subsequent investigations. Additional details can be found in the 2008 RIR. Copies of the boring logs and well logs are included in **Appendix A**.

1.3.1 Geology

The shallow stratigraphy beneath the Site is considered heterogeneous fill and Upper Pleistocene deposits. The stratigraphic sequence consists of outwash deposits overlain by heterogeneous fill. The heterogeneous fill across most of the Site ranges in thickness from approximately 10 feet throughout most of the former site to 30 feet in the off-site area just north of the Site boundary. The fill composition is primarily poorly sorted and highly permeable sand and gravel with varying percentages of gravel, silt, clay, and coal fragments. The glacial outwash deposits consist mainly of interbedded layers of permeable sand and gravel, and less permeable silty sand. The top of the glacial unit was encountered from approximately 10 feet bgs on the central portion of the Site to approximately 32 feet bgs from the top of the railroad embankment. The ground surface elevation of the Site is significantly lower than the top of the railroad embankment and when factoring in the ground surface elevation difference, the glacial deposits are encountered at similar elevations across the Site and beneath the railroad embankment.

Glen Cove Creek originally occupied a natural stream channel just to the west of the Site before it was channelized along its present alignment. The natural creek bed is indicated by the alluvial deposits consisting of reworked glacial outwash present along the western boundary of the Site. The alluvial deposits associated with the original stream channel consist of isolated sand and gravelly sand layers encountered in the upper 5 to 10 feet of soils at the western site boundary. During implementation of the LIPA construction, additional lenses of organic silt and peat were encountered at depths of approximately 5 feet from the ground surface in the formerly wooded portions of the site adjacent to Glen Cove Creek.

1.3.2 Hydrogeology

The groundwater beneath the Site is considered part of the regional Upper Glacial aquifer. Regionally, this aquifer is not used for drinking water. Drinking water for Long Island is provided by the deeper Magothy aquifer. The Upper Glacial aquifer occurs in the glacial outwash encountered beneath the Site. Outwash soils encountered during well installation were permeable sands and gravelly sands with little to no fines interbedded with less permeable silty sands. These soil types are consistent with the Upper Glacial aquifer matrix description and the observed interbedding of permeable and lower permeability soil is consistent with the regional anisotropy (horizontal to vertical) of 10:1.

The observed interbedding and resulting anisotropy significantly limits the rate of vertical flow and migration as compared to the horizontal direction.

Groundwater elevations of site wells were similar for the shallow and intermediate wells ranging from about 43 to 53 feet above mean sea level (feet-msl). In general, groundwater is encountered near the base of the fill layer at the Site. Groundwater elevation contours indicate a consistent groundwater flow direction to the west for the shallow zone wells (3 to

22 feet bgs) and the west-northwest for the intermediate zone (16 to 36 feet bgs). The potentiometric surface in the shallow groundwater follows the general topography of the Site sloping from east to west. The hydraulic gradient is relatively steep (0.06 feet/foot) in the eastern and western portions of the Site and less steep (0.02 feet/foot) in the central portion of the Site with an average gradient of 0.04 feet/foot. A uniform hydraulic gradient of about 0.01 feet/foot appears in the intermediate groundwater across the Site. The estimated groundwater seepage flow velocities, assuming an effective porosity of 20%, were calculated for the shallow and intermediate aquifer zones as 0.044 and 0.001 feet/day, respectively. The potential vertical hydraulic gradient in the central portion of the Site indicated a downward potential vertical gradient. An upward potential vertical gradient was present along the Site's western boundary. Wells installed off-site to the north of the Site showed variable potential vertical gradients likely due to recharge from rainfall events.

1.3.3 Remedial Investigation Findings for Soil

A number of investigations were performed to characterize the Site conditions and identify impacts to soil. Based on the findings of the previous investigations, the RI program, and subsequent investigations, the following conclusions were reached:

- The shallow stratigraphy beneath the Site consists of approximately 10 to 30 feet of heterogeneous fill soil at the surface overlying Upper Pleistocene glacial deposits. The fill soils are underlain by glacial outwash deposits to the greatest depth investigated (82 feet). The outwash deposit soils consist of highly permeable sands and gravelly sands interbedded with lower-permeability silty sands which appear to have retarded the vertical migration of dense non aqueous phase liquid (DNAPL) at the Site.
- Groundwater was generally encountered near the base of the fill soils at a depth of 8 feet bgs on the Site proper and is part of the regional Upper Glacial Aquifer. Groundwater flows in an east to west direction across the Site to Glen Cove Creek and eventually enters Glen Cove Creek as a non-point discharge.
- The areal extent of the visually apparent residual MGP-related impacts is limited to areas beneath or in the immediate vicinity of the former MGP operations in the northern and western portions of the Site and just beyond the Site limits to the north.
- The vertical distribution of MGP-related visual impacts begins at the water table, at a depth of 8 feet bgs as DNAPL/tar saturation and blebs, and their occurrence reduces with depth. The interbedded lower-permeability silty sand layers appear to have contributed to the limited vertical extent of DNAPL migration beneath the former MGP.
- The fill soils which are predominately above the water table are generally free of MGP residuals indicating that the fill was likely placed after removal of the MGP operation. The fill layer extends approximately 8 to 10 ft bgs Indicating that the

original surface topography of the MGP was approximately 8 feet lower than the current topography.

- PAHs and metals are the identified constituents of concern in surface and near surface site soils. Based on the background surface soil study, the relatively elevated PAHs detected on-site in surface/near surface soils suggests a potential contribution of PAH constituents from activities conducted on the former MGP site after or as part of placement of the surface fill soils. The source of the PAHs detected in soils at depths below the water table are associated with the MGP-related visual impacts, including DNAPL saturated and stained soil, present at the same locations and depths. The background surface soil study indicated similar conditions between on-site and off-site surface soil regarding the detected metals (arsenic, barium, cadmium, chromium, lead and mercury). This indicates that concentrations noted on-site are consistent with local conditions surrounding the Site and are not likely attributable to the activities on the former MGP.

- There are no significant or imminent threats to human health that warrant an interim remedial measure (IRM). The on-site risks are associated with potential contact with PAHs detected in the Site surface soils, which are presently prevented through Institutional and Engineering Controls. The Institutional Controls currently in place include site awareness and worker training. The current Engineering Controls include a gravel cover, which is restricting direct contact with surface soils and preventing fugitive dust generation. Also, fencing and gating is maintained at the Site to restrict public access.

- A number of chemicals of potential ecological concern in soil, sediment and surface water exceed some toxicological benchmark values; however, there is little area for ecological communities to come in contact with contaminated media within the Site. Although the chemicals of potential ecological concern pose a potential risk of impacting local wildlife species, this risk is minimal due to several reasons: the industrial/commercial area provides minimal habitat, constant physical disturbance prevents wildlife population from developing; only transient species and few individual animals utilize the area; and the frequency and duration of exposure is limited.

  Therefore, the observed chemicals detected on-site do not pose a current risk nor is any risk expected in the future.

- Soil vapor samples were collected on properties adjacent to the Site to evaluate the potential migration of chemicals of potential concern impacting adjacent structures. Although the chemicals of potential concern were detected in soil vapor on these properties above the Upper Fence Values of the NYSDOH Background Outdoor Air Concentrations, the concentrations were too low to present a risk if associated with adjacent structures. They were also too low to determine whether their presence in

the soil vapor was related to activities conducted on these properties versus soil vapor migrating from the Site. Therefore, no further investigation regarding off-site soil vapor was found to be warranted.

1.3.4 Remedial Investigation Findings for Groundwater

Three groundwater monitoring events were conducted at the Site prior to 2010. Groundwater sample collection and analysis, and NAPL/groundwater measurements were conducted in 2004, 2005, and 2008. Quarterly groundwater sampling was conducted through 2010. Semiannual sampling began in July 2011 after completion of the Phase I remedial excavation. The results of the most resent semi-annual groundwater sampling and a summary of historical data are provided in the *Glen Cove Groundwater Monitoring Report, July 2013 Semi-Annual Sampling Event, Glen Cove Former MGP Site*, prepared by GEI, dated September 2013 (GEI, 2013).

A total of 22 monitoring wells and piezometers were installed at or adjacent to the Site during the remedial investigation and subsequent investigations. Currently, only 11 monitoring wells and piezometers remain. Three recovery wells GCRW-01, GCRW-02 and GCRW-03 were installed in Q1 and the second quarter (Q2) 2012 and are currently monitored for NAPL accumulation and sampled for groundwater analysis. Piezometer PZ-03 is believed to have been destroyed in 2007. Monitoring wells GCMW-09S, GCMW-09I, GCMW-10S, GCMW-10I, GCMW-14S and GCMW-14I, as well as piezometers PZ-01A, PZ-02A, PZ-04 and PZ-07 were either destroyed or abandoned as part of the remedial activities conducted between March and May 2011. Monitoring well, recovery well and piezometer locations are depicted in **Figure 2**.

Based on the findings of the previous investigations, the RI program, and subsequent investigations, the following conclusions were reached:

- Based on the NAPL and water level measurements performed on all site wells, DNAPL accumulated only in one monitoring well GCMW-13S, ranging in thickness from 0.34 to 0.74 feet. The limited presence of measurable DNAPL in monitoring wells leads to the conclusion that the DNAPL observed in the subsurface soils has a low potential for continued migration as a DNAPL plume beyond its present location.
- In groundwater, benzene, toluene, ethylbenzene, and xylene (BTEX) and to a lesser frequency PAHs were detected above the NYSDEC Technical and Operational Guidance Series (TOGS) Ambient Water Quality Standards (AWQS) in the shallow and intermediate zones beneath, and north and west of the former MGP operations area. BTEX and PAH groundwater concentrations are highest beneath the former MGP operation area and coincide with the observed MGP-related DNAPL impacts. The analytical data suggests that the only remaining source of the dissolved phase

BTEX and PAH detections in groundwater is the residual DNAPL observed in soil at and below the water table.

- The dissolved phase BTEX and PAH plume is limited in extent to the areas/depths exhibiting residual DNAPL in the soil and is not migrating at significant concentrations beyond the site. This conclusion is evident as the presence of non-detectable to low BTEX and PAH concentrations were reported at the downgradient perimeter of the site and just beyond the site limits to the north.
- The limited extent of downgradient migration of the dissolved phase BTEX/PAH plume appears to be the result of early removal of the former MGP operations and due to naturally occurring retardation and attenuation processes degrading the residual observed soil impacts. The fate and transport mechanisms apparent at the former Glen Cove MGP Site include sorption, aqueous solubility (or dissolution), volatilization and biodegradation. These natural processes in combination with the historical removal of the former MGP operations explain the observed limited extent of residual DNAPL impacts, and a relatively compact groundwater plume. These processes in combination with the ageing of the DNAPL source material and depletion of the soluble constituents will continue to prevent the observed on-site impacts from migrating beyond the existing plume limits. The dissolved phase BTEX and PAH plume emanating from the DNAPL impacts in groundwater will persist in the near future and eventually decrease in size and decline in concentration over the long term as MGP-related constituents dissolve and degrade.
- In groundwater, the metals exceeding the NYSDEC TOGS AWQS were either naturally occurring or from infiltrating precipitation through the historic fill. Polychlorinated biphenyls and pesticides have not been detected in the Site soils at significant levels and have not impacted the Site groundwater. The detected metals in groundwater are not migrating at significant concentrations beyond the Site.

The results of the most current and previous groundwater sampling events were evaluated in the design of the oxygen injection system. This data is presented in the design report provided as **Appendix B**.

1.3.5 Pre-Characterization Investigation

GEI conducted a Pre-Characterization Investigation at the Site in February 2010. Details of this investigation are provided in the *Final Phase I Remedial Action Work Plan, Glen Cove Former MGP Site*, prepared by GEI, dated May 26, 2010 (GEI, 2010a). The investigation included:

- A private utility survey.
- Nine Geoprobe® soil borings in the Phase I excavation area to a depth of 20 feet bgs with analytical samples collected from each boring.

- Installation of six, 1-inch-diameter monitoring wells (GCMW-17I, 17I2; GCMW-18I, 18I2; GCMW-19I and 19I2) for use in pilot testing the oxygen injection technology at the Site.
- Three hollow stem auger (HSA) borings with split spoon samples collected via standard penetration tests to gather geotechnical data on the excavation area.
- Two groundwater probes GCGWP-101 and GCGWP-102 in the area of the proposed oxygen injection system to confirm current groundwater conditions for system design.

Groundwater data obtained from this investigation was used in the design of the oxygen injection system and is provided in the Design Report (**Appendix B**).

1.3.6 Oxygen Injection Pilot Test Findings

The oxygen injection pilot test was performed on April 27, 2011, in accordance with the NYSDEC-approved *Oxygen Injection System Pilot Test Work Plan, Glen Cove Former MGP,* prepared by GEI, dated April 27, 2011 (GEI, 2011). The purpose of the pilot test was to collect site-specific information to optimize the design of the oxygen injection system for installation and full scale application. This information was necessary as the physical characteristics (e.g. soil type/stratification, and groundwater depth) of the Site create a unique set of conditions for the system. The pilot test measured the movement of air through the soil to collect data that was used to determine injection well spacing (radius of influence [ROI]), depth, and oxygen flow rate.

During the pilot test, air was injected into the ground continuously until a steady state pressure response was observed in nearby monitoring wells. Based on the results of the pilot test, the ROI was found to be approximately 5 feet. The results of the pilot test are presented in the oxygen injection system design report located in **Appendix B**.

1.4 Project Organizational Structure and Responsibility

National Grid will coordinate with NYSDEC, NYSDOH, and Nassau County Health Department (NCHD), and other local regulatory agencies to conduct the Phase II RA at the Site. Approval of this Work Plan by NYSDEC will be obtained prior to mobilization. Representatives of the NYSDEC and the owner will be invited to attend all regular job progress meetings, including pre-construction meetings, and it is anticipated that the NYSDEC and NYSDOH will have representatives at the Site periodically during the performance of the Phase II RA.

The Phase II RA will be performed as defined in the Contract Documents which will include the terms and conditions, drawings, specifications, and any approved change orders located in **Appendix C**.

National Grid will have final responsibility and authority for all aspects of the Phase II RA

activities at the Site. National Grid is responsible for enforcement of the terms and conditions of the Contract Documents and negotiating and approving any change orders for construction activity, if necessary. A National Grid representative will be on-site or accessible via phone throughout the Phase II RA activities. When the National Grid representative is off-site, the Engineer will act as National Grid's representative. National Grid will be responsible for all communication with regulatory agencies, members of the surrounding community, and the press.

The Contractor, under contract to National Grid, will be responsible for all on-site construction activities including, but not limited to, compliance with all applicable Occupational Safety and Health Administration (OSHA) health and safety regulations, construction personnel health and safety, implementation of odor control measures (as necessary), traffic control, site security, oxygen injection system installation, material handling, transportation and disposal activities associated with the Phase II RA, and any other specified tasks outlined in this Work Plan or the Contract Documents.

The Engineer (GEI), under contract to National Grid, will serve as the Engineer of Record for the Phase II RA. As such, the Engineer will be responsible for engineering design and oversight of the Contractor to ensure compliance with the Contract Documents and will assist National Grid in the review of Contractor proposals, Contractor remedial design submittals, and Contractor invoice and change orders (if requested). The Engineer will not direct the Contractor on specific means and methods to perform the work; however, the Engineer will advise the Contractor and National Grid of non-compliance with the Contract Documents and identify required corrective action. GEI will also be responsible for the implementation of the Community Air Monitoring Plan (CAMP).

The following are the key personnel or agencies involved with Phase II RA at the Site:

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2. Phase II RA Goals and Objectives

2.1 Remedial Action Goal

The goals for the Phase II RA of the former Glen Cove MGP property are the following:

- Provide treatment to groundwater containing MGP-related impacts that are likely to migrate off the Site, through the construction and operation of an oxygen injection system.
- Remove, where present and accessible, mobile NAPL from the Site via the use of recovery wells installed in 2012.

2.2 Remedial Action Objectives

Remedial Action Objectives (RAOs) are medium-specific or operable-unit specific objectives for the protection of human health and the environment. RAOs are developed based on contaminant-specific Standards, Criteria and Guidance (SCGs) and the intended land use.

SCGs are defined in the 2010 NYSDEC Final DER-10. Standards and Criteria are New York State regulations or statutes, which dictate the cleanup standards, standards of control and other substantive environmental protection requirements, criteria, or limitations which are generally applicable, consistently applied, officially promulgated and are directly applicable to a remedial action. Guidance is non-promulgated criteria and are not legal requirements; however, those responsible for investigation and/or remediation of the Site should consider guidance that, based on professional judgment, is determined to be applicable to the Site.

For this Phase II RA, the applicable SCG for groundwater is the NYSDEC TOGS AWQS and Guidance Values for Class GA Aquifers dated June 1998 and associated errata and addendums.

This Phase II RA focuses on addressing the following groundwater RAOs identified in the RAP:

- Prevent, to the extent practicable, contact with, or ingestion of contaminated groundwater associated with the Site.
- Prevent, to the extent practicable, the migration of contaminated groundwater from the Site.
- Remove, to the extent practicable, the source of groundwater contamination.

For the purposes of this Phase II RA, contaminated groundwater consists of groundwater located in the Upper Glacial Aquifer with MGP-related impacts that exceed the AWQS and Guidance Values for Class GA Aquifers.

3. Phase II RA Summary

The Phase II RA proposed for the Glen Cove former MGP is to treat contaminated groundwater that is likely to migrate from the Site and to remove mobile NAPL. Specifically, the Phase II RA will entail:

- **Groundwater Treatment**: An oxygen injection system will be installed in a position to treat groundwater impacted with MGP-related contaminants as it migrates off the Site.
- **Monitoring Well Installation**: Monitoring wells will be installed downgradient of the oxygen injection system to monitor system effectiveness.
- **NAPL Recovery**: Recovery wells were installed in 2012 to remove mobile NAPL from the subsurface. The recovery wells are currently monitored for NAPL accumulation on a semi-annual basis.

The locations of the proposed oxygen injection system and monitoring wells are provided in **Figure 3**. The existing monitoring wells and recovery wells are shown in **Figure 2**. These figures reflect the site conditions at the completion of the Phase I remedial work. The figure and associated design drawings will be updated with the current site conditions prior to the start of construction.

3.1 Execution of the Phase II RA

The proposed Phase II RA scope of work includes the installation of an oxygen injection system and the recovery of mobile NAPL, which will involve intrusive activities that include drilling for well installation and excavating a utility trench for the oxygen injection system supply lines. The recovery wells were previously installed in 2012. All impacted soils generated during the performance of this Phase II RA will be transported off-site for treatment at a permitted disposal facility. The utility trench for the oxygen injection system will be lined with a demarcation barrier and brought to final grade using clean backfill. The final location and alignment of the treatment system will subject to LIPA approval and may not interfere with the current or planned locations of substation equipment, subsurface conduits, or overhead utilities.

In general, site work will commence at 0730 Monday through Friday with no heavy truck traffic until 0800. All work must be completed and the work area closed for the evening at 1700 unless otherwise authorized by the on-site National Grid representative, Engineer, Contractor, LIPA/PSEG, and the City of Glen Cove. The work hours may vary depending on restrictions from the property owners or the applicable access agreement(s). During working hours, the Contractor will make every effort to minimize potential community impacts.

These include, but are not limited to, noise and traffic concerns associated with the execution of the remedy. Construction activities will not be conducted on weekends or holidays without prior approval of National Grid.

3.2 Special Procedures

Electrical hazards (EH) are typically the most serious physical hazards associated with working on or near an electric substation. While most RA activities at the Site are conducted outside of the substation perimeter, work will be performed in close proximity to the active substation and below active transmission lines. Therefore, measures to mitigate exposure to overhead and subsurface electrical transmission and distribution lines will be adhered to. These measures include:

- When working within the perimeter of the LIPA substation, EH-rated footwear, a hardhat, rubber gloves, and flame resistant clothing that meet National Fire Protection Association (NFPA) 70E standards is to be worn. See the Health and Safety Plan (HASP) in Appendix D for information regarding personal protective equipment (PPE).
- Use non-sparking hand digging tools specifically designed for use on substation property (i.e., insulated digging bar, long-handled spoon shovel, etc.). In addition, rubber gloves and Fire-Resistant clothing are required if hand digging in a substation in/or around energized conductors, which is not anticipated to be the case.
- Use insulated lineman's gloves when handling equipment that may come into contact with underground utilities.
- Avoid carrying tools/equipment above waist height if overhead electric hazards exist.
- Ground Fault Indicator-equipped circuits will be used for all power tools.
- Ground vehicles or equipment within the substation perimeter using 4-aught gauge grounding cable.
- Maintain a minimum clearance of 16 feet from bus bars, transformer/capacitor electrodes and overhead transmission/distribution lines.
- Maintain a minimum offset of 5 feet from marked underground transmission/ distribution lines.
- Avoid working within the perimeter of the LIPA substation in conditions of high humidity or rain or thunderstorms.
- Stop work immediately and vacate the work area in the event lightning is observed.
- Conduct work under the supervision of a LIPA Health and Safety representative as required.

3.3 Mobilization and Site Access

Prior to mobilization, the Contractor will prepare and submit all required documents identified in the Contract Documents for review and approval by National Grid, the Engineer, and the NYSDEC. The Engineer will review final Contractor submittals to ensure conformance with the Contract Documents.

The Contractor, Engineer and/or National Grid will apply for and obtain all necessary Federal, State, and local permits associated with the Phase II RA work plan. These permits may include, but are not limited to, traffic routing, construction, air emissions, noise, etc.

The Contractor will contact New York City-Long Island One Call to request that all utilities on the Site are located and marked. LIPA will conduct a survey of the property to locate and mark underground utilities associated with the active substation. In addition, the Contractor will contract a private utility locator service to identify any utilities on private properties and confirm the LIPA survey. Any underground utility protection and/or relocation will be the responsibility of the Contractor prior to mobilization.

The Engineer will conduct a pre-construction office and site meeting, after the project is awarded, with the Contractor, National Grid, and NYSDEC prior to the commencement of Phase II RA. The meeting will be conducted to review specified construction requirements and schedules, as well as to review the responsibilities of the Contractor, the Engineer, and National Grid with respect to the Phase II RA implementation.

Prior to the award of the project, a New York State licensed surveyor will be contracted to establish benchmarks for the Phase II remedial work.

The benchmarks will be established in English Units (feet) in the following datums:

- Horizontal: New York State Plane Coordinate System Long Island NAD83.
- Vertical: North American Vertical Datum 1988, NAVD88.

Surveyors will return as needed to establish other reference points, layout work, and survey record information such as the locations of monitoring wells and injection wells. Other site personnel may perform additional intermediate surveys as needed.

The Contractor will mobilize all necessary labor, equipment, supplies, and materials to complete the Phase II RA upon being given notice to proceed by National Grid.

3.4 Site Preparation

The Contractor will be responsible for preparing the Site for the Phase II RA. Site preparation activities necessary to provide support for the work include, but are not limited to, the establishment of work zones, support facilities, decontamination facilities, the clearing of vegetation, the installation of erosion control measures and temporary security fencing around the work area, and drum/roll-off box staging area.

The Contractor will be required to obtain approval from a properly-licensed and National Grid-approved disposal facility for all material requiring off-site disposal prior to beginning any intrusive work.

The appropriate exclusion zone(s) (EZ), contaminant reduction zone(s) (CRZ), and support zone (SZ) will be established to conduct the planned activities safely and effectively.

The Contractor will be responsible for removing/preserving existing trees, fences, and structures/appurtenances, prior to the start of the Phase II RA.

Soil erosion and sediment control measures will be installed prior to the start of work and maintained throughout the project in accordance with the Erosion and Sediment Control Plan in Section 5, and the Contract Documents.

The Contractor will install decontamination/anti-traction pad in accordance with Section 7 of this report.

3.5 Oxygen Injection System

The oxygen injection system will require the installation of injection wells, oxygen supply piping, and system controls to deliver oxygen gas into the groundwater to create a treatment zone that will enhance the biodegradation of the constituent of concern. **Figure 3** and **Drawing 6 of Appendix C** show the layout of the proposed treatment line. **Drawing 7 of Appendix C** shows subsurface cross sections of the treatment zone.

The Oxygen Injection System Design Report which contains the design rationale and calculations is included as **Appendix B**.

3.5.1 Injection Points

Oxygen injection wells will be installed at the locations specified on **Figure 3** and **Drawing 6 of Appendix C**. The oxygen injection well construction details are summarized on **Table 1** and the specifications are provided on **Drawing 9 of Appendix C**. In general, the oxygen injection wells will be constructed as follows:

- Injection points will be constructed of Schedule 40 polyvinyl chloride (PVC) risers.
- Injection point screens will be constructed of a 1-foot-long, 1-inch-diameter PVC sump fitted to a 1-inch-diameter, 1-foot-long 0.010 slot PVC screen, fitted to 1-inch-diameter PVC riser.
- The 1-inch PVC riser will be attached to a 1-inch to ¾-inch threaded tee at approximately 1.5-feet below grade surface.
- The ¾-inch threaded tee will be attached to a ¾-inch threaded barb.
- The 1-inch tee will be fitted with a 1-inch-diameter riser to grade.
- The annular space will be filled with #00 Silica Sand to at least 2-foot above the screen interval (3 feet maximum), a minimum 2-foot-thick bentonite seal, Portland cement/bentonite grout to 3-feet below grade, and native material to grade.

- The top of the well will be equipped with an air release valve to allow for depressurization of the well during maintenance.
- The wellheads will be completed with flush mount valve boxes or well housings large enough to allow access for cleaning, adjustment or measurement within their respective road boxes.
- Toning wire, utility marker balls, and warning tape that states "DANGER GAS LINES BELOW" will be placed in the utility trench between the wells.

3.5.2 Trenching

In order to distribute oxygen to the system, a utility trench will be excavated parallel to the line of injection wells. The trench construction details are provided in **Drawing 9 of Appendix C**. The trench will be approximately 3 feet in width by 2.5 feet in depth and will be entirely above the water table. The majority of the material that will be removed in the area of the trench is clean backfill placed at the site during the previous Phase I excavation or during subsequent LIPA construction activities and can be reused as backfill. Material located outside of those boundaries will be sampled and pre-characterized for disposal or potential reuse prior to the contractor mobilizing to the site. The Contractor will place any excavated material that must be disposed of off-site in lined and covered roll offs until a sufficient quantity is generated to warrant pickup and removal to an approved disposal facility. In the event that the material does not meet the disposal facility moisture content limitations due to heavy rain or runoff, the Contractor will be responsible for providing amendments, as necessary, to ensure that the material meets the disposal facility acceptance criteria for moisture content prior to being loaded out for off-site disposal. Any amendments proposed by the Contractor will be pre-approved by the NYSDEC and meet the NYSDEC restrictions on the use of quick lime or other similar materials.

3.5.3 Backfill

Trenches will be excavated between the system enclosure and the injection wells. The trenches will be backfilled with materials meeting the Unrestricted Use Soil Cleanup Objective (SCOs). The majority of the materials that will be excavated are previously imported backfill meeting the Unrestricted Use SCOs and will be reused as backfill. Additional backfill materials will be imported and placed in accordance with the Contract Documents, as needed. Prior to backfilling a filter fabric will be installed along the base and sidewalls of the trench. A demarcation barrier made of highly visible material will be placed approximately 6 inches above the HDPE lines. In addition, toning wire, utility marker balls, and warning tape that states "DANGER GAS LINES BELOW" will be placed above the demarcation barrier. Backfill is to be placed in 6-inch lifts and compacted with a minimum four passes of a vibratory plate compacter.

3.5.4 Plumbing

Each of the ¾-inch threaded barbs will be connected to ¾-inch inside diameter (ID) 100 pounds per square inch (psi) high density polyethylene (HDPE) tubing. The tubing will be secured to each barb with two stainless steel hose clamps. The HDPE tubing will be run through the trench and connected to the oxygen injection manifold at the system enclosure. Each HDPE line will be labeled with its corresponding injection point, for identification purposes. The exact location of the trench and applicable construction details are provided in **Appendix C**.

3.5.5 Odor and Fugitive Dust Control

The odor and fugitive duct control plan described in Section 4 will be implemented during intrusive activities.

3.5.6 Material Handling

Material handling procedures are detailed in Section 8.

3.5.7 Oxygen Injection Equipment

Matrix Environmental Technologies, Inc. (Matrix) will provide an oxygen injection system in accordance with the minimum specifications outlined in the system design report (**Appendix C**). The system will be a fully integrated remediation system with all plumbing, electrical, and mechanical components installed. The system will include the following equipment.

- AirSep Oxygen Generator
- Kaeser rotary screw air compressor with air dryer, pressure tank with auto drain, low sound enclosure, and programmable logic controller
- Manifold for injection points to include individual pressure gauge (0-60 psi) and Dwyer variable area flow meter (10-100 Standard Cubic Feet per Hour)
- Adjustable programmable logic controller timers and solenoid valves to control oxygen flow for pulse injection
- All pressure tanks will be (American Society of Mechanical Engineers) ASME National Board Certified for compressed gas storage (200 psi rating)
- The pressure relief valve will be muffled for noise reduction.
- U.L. certification
- Operations manual with plumbing and instrumentation diagrams

The Contractor shall provide sufficient electrical service to the system. The Contractor shall provide appropriate safety signs to be mounted on the fence to include: No Smoking, Oxygen in Use, and Hearing Protection Required.

3.5.8 Utility Requirements

An electrical service is already in place at the site for the active construction trailer. Pending final requirements of the constructed system, this service may be transferred for use for the treatment system.

3.6 Monitoring Wells

3.6.1 Monitoring Well Construction

Twelve groundwater monitoring wells will be installed to monitor the effectiveness of the oxygen injection system. This includes replacement of six monitoring wells that were abandoned or destroyed during the completion of the Phase I excavation or the subsequent LIPA construction. The proposed monitoring well locations are provided in **Figure 3**. The monitoring well construction details are summarized in **Table 2** and the specifications are provided on **Drawing 9 of Appendix C**. In general, the monitoring wells will be constructed as follows:

- Monitoring wells will be constructed of Schedule 40 PVC risers.
- Monitoring wells screens will be constructed of a 2-foot-long, 2-inch-diameter PVC sump fitted to a 2-inch-diameter, 10-foot-long 0.020 slot PVC screen, fitted to 2-inch-diameter PVC riser.
- The annular space will be filled with #2 Morie Sand to at least 2-foot above the screen interval (3 feet maximum), a minimum 2-foot-thick bentonite seal, Portland cement/bentonite grout to 3-feet below grade, and native material to grade.
- The wellheads will be completed with flush mount road boxes.

Monitoring wells will be developed after completion. Development will be performed by alternately surging and pumping, utilizing a centrifugal or piston pump, peristaltic pump, or an alternative method approved by GEI for a maximum of 1 hour or until the turbidity of the development water is less than 50 nephelometric turbidity units. A field turbidity meter will be used to monitor NTU levels.

Continuous split spoon samples will be collected from three borings completed during the installation of selected monitoring wells as identified in **Table 2**. A single boring will be completed at the location of the deepest well in each of the three new monitoring well clusters. Split spoon samples will not be collected at locations where monitoring wells are being replaced and soil was sampled during previous investigations. No more than three soil samples from each boring will be selected for chemical analysis to evaluate soil quality.

- One sample will be collected at the groundwater interface.

- If impacts are present in the boring, one sample will be collected at the depth interval exhibiting the greatest degree of contamination, based on field screening and observations. The greatest degree of contamination will be identified by field screening of the borings with a PID, and by visual and olfactory inspection.
- If impacts are identified, an additional sample will be collected from the zone immediately beneath the noted contamination.
- If no impacted material is encountered, a sample will be collected from the proposed screen interval for each monitoring well in the cluster as noted on **Table 2**.

Each soil sample will be analyzed for volatile organic compounds (VOCs) by Environmental Protection Agency (EPA) Method 8260 and semi-volatile organic compounds (SVOCs) by EPA Method 8270. In addition, 10% of the samples will be analyzed for Target Analyte List metals according to EPA Method 6000/7000 series, and cyanide by EPA Method 335.2.

3.7 Construction Oversight

A representative of National Grid or the Engineer will be on-site during all Phase II RA activities. The Engineer will be responsible for oversight of the Phase II RA with respect to conformance with the Contract Documents. The specific responsibilities of the Engineer, Contractor, and National Grid are discussed in subsection 1.4.

Representatives of LIPA/PSEG, NYSDEC, NYSDOH, and NCHD may be present during construction and restoration activities.

3.8 Oxygen Injection System Startup

3.8.1 Baseline Groundwater Monitoring

Newly installed and existing monitoring wells will be monitored prior to startup of the system and at quarterly intervals during system operation. The analytical results and field measurements will be used in evaluating the performance of the groundwater treatment system. Specifically, the data collected is focused on monitoring the aerobic environments created by the system; the bioactivity of the aquifer; and the ability of the bioactivity to reduce dissolved phase MGP-related constituent concentrations in the area. National Grid will present the results of future sampling events in the Operation, Maintenance and Monitoring (OM&M) reports.

3.8.2 System Startup

System startup activities will begin after the completion of baseline groundwater sampling, installation of the oxygen injection system, and final tubing and electrical interconnections. A Matrix representative will be on-site for the startup and initial system checkout. Oxygen injection system equipment will be properly checked out and energized to start the system.

The startup period may require up to two weeks of daily visits to the site to optimize injection rates and bank cycle times.

3.8.3 System Operation, Maintenance and Monitoring

Following system startup period, normal maintenance and operation of the system will occur on a bi-monthly basis. This includes performing system inspections, routine maintenance on the system equipment, and groundwater monitoring to evaluate the performance of the technology. System maintenance will be in accordance with the manufacturer's recommendations and monitored in accordance with the OM&M Plan. The OM&M Plan will be incorporated into the Interim Site Management Plan and submitted under separate cover.

4. Air Monitoring and Vapor/Odor Management Plan

A site-specific CAMP has been prepared for the site and is included in **Appendix E**. The CAMP is designed to provide monitoring procedures, Alert Levels, Response Levels, and Action Levels, and contingency measures if Response Levels or Action Levels are approached. An Alert Level is a National Grid internally established concentration levels for TVOC only. An Alert Level is set below the levels established by the NYSDOH so that action can be taken prior to exceeding a NYSDOH threshold. An Alert Level serves as a preemptive screening tool for TVOC to trigger contingent measures if necessary, to assist in minimizing off-site transport of contaminants during remedial ground intrusive activities. A Response Level is a contaminant concentration that triggers a temporary work stoppage, continued monitoring, reporting, and/or potential contingent measures. An Action Level is a contaminant concentration that triggers work stoppage, continued monitoring, reporting, and implementation of contingent measures to mitigate potential airborne contaminants prior to resuming ground intrusive activities. .

During times of ground intrusive activities, air monitoring stations will be placed upwind and downwind of each intrusive work area (i.e., boring locations for well installations). VOCs and respirable particulates will be monitored at the upwind and downwind stations on a continuous basis. The CAMP includes a Response Plan that defines Alert Levels, Response Levels, Action Levels, and specific response activities to be implemented during working hours if an exceedance of an Alert Level or Action Level for a measured parameter occurs. The response actions, potentially including work stoppage, are intended to prevent or significantly reduce the migration of airborne contaminants from the site.

If the real-time perimeter Action Levels are exceeded or significant nuisance odors are noted, National Grid, the Engineer, and the Contractor will consult to determine what type of emission control action is appropriate. Actions that may be taken to reduce emissions include the following:

- Spraying water on exposed soil surfaces and/or roadways to suppress windblown dust.
- Covering working areas of exposed impacted soils, trucks loaded with impacts soils, or stockpiles of impacted soils with tarpaulins with vapor suppressing foam or other vapor control agent.
- Temporarily relocating work to an area with potentially lower emission levels.
- Reduce the production rate or change the sequence of work activities.
- Change the work methods or equipment to alternatives that minimize air emissions.

In practice, these actions will typically be employed proactively to prevent action levels from being reached at the exclusion zone perimeter in the first instance. These above-mentioned Alert, Response, and Action Level Concentrations are included in the CAMP.

5. Erosion and Sediment Control Plan

The erosion and sediment controls are intended to mitigate erosion and sedimentation from the Site as indicated in the Contract Documents.

5.1 Description of Construction Activities

This project involves the installation of an oxygen injection system and monitoring wells which will require trenching and drilling. The trench depth will be approximately 2-3 feet in depth and the average groundwater depth is 8 to 10 feet bgs; therefore, construction dewatering during this Phase of the RA will not be required.

All storm water runoff from the exterior of the trench excavation area will be collected, routed, and discharged into the storm drains on site prior to contact with any impacted materials. Access areas between the work area and the adjacent public streets will contain decontamination stations for all trucks and equipment. Decontamination water will be collected and stored in Unites States Department of Transportation (USDOT)-approved 55-gal drums.

5.2 Potential Areas for Erosion and Sedimentation

The work area itself is relatively flat. However, the properties located north, south and east of the Site are at higher elevations than the Site. The property immediately to the north of the work area is at an elevation significantly higher than the Site and grades down sharply to the Site from the north. A drainage system has been installed at the site to accommodate run-off from the areas east and south of the work zone including the access road to the south of the work zone. The western edge of the property is marked by a retaining wall located parallel with Glen Cove Creek. This wall is absent in much of the work area where the property grades down and away toward the Glen Cove Creek from the work zone. The Site is composed of a gravel surface within the active substation, asphalt for the access road, and a gravel area adjacent to the Glen Cove Creek.

The potential sources for erosion and sedimentation while conducting this Phase II RA at the Site are the following:

- Trucks/equipment exiting the work zone could track soils onto traveled areas.
- Excavated soils that have been stockpiled and designated for re-use and exposed to rain or runoff could seep down towards the creek.
- Excavated soils that have been designated for re-use and exposed to rain or runoff could seep out of the roll-offs and onto public roads.

The erosion control methods detailed in the following section are specifically intended to mitigate the potential sources of erosion and sedimentation listed above.

5.3 Implementation of Erosion Control Measures

Sediment fence will be installed around the perimeter of areas where trenching and drilling will occur. Decontamination stations will act as anti-tracking pads, thereby, removing soil and sediment from all trucks/equipment exiting the Site. Roll-off containers staged on site will be lined and covered. Materials with high water content will be amended on-site prior to removal from the site to prevent excessive moisture or seepage during transit.

Erosion controls will be installed and maintained by the Contractor as indicated in the contract documents for the duration of the work. Additional erosion control measures may be needed due to unforeseen conditions, which will be installed as necessary, and as directed by National Grid.

5.4 Restoration

Upon completion of the remedy, the Contractor will remove all sediment fencing and restore the surface to pre-Phase II RA conditions. The sediment that has accumulated in the fencing will be removed and transported to an approved disposal facility. The sediment fencing located along Glen Cove Creek will remain in place following the completion of the work. The contractor is responsible for repairing and/or replacing any damaged section of this fencing and removing any accumulated sediment prior to demobilization.

6. Site Security Plan

The objectives of the Site security plan are to prevent the vandalism/destruction of construction equipment, prevent access, and minimize health and safety concerns for the surrounding residential neighborhood.

6.1 Perimeter Security

The area immediately outside the substation where the work will take place is already enclosed by an existing perimeter fence. A temporary fence or barrier will be erected around the perimeter of the open trench at the end of each workday. If the area is not otherwise lighted (i.e., building floodlights, municipal streetlights, etc.) the Contractor will provide temporary lighting on the fencing/barrier at the edge of the trench to prevent injury to LIPA employees who may enter the substation during non-working hours. The main gate for the Site on Grove Street will be secured at the end of each workday.

6.2 Equipment Security

All vehicles and/or equipment left on the Site must be secured at the end of each working day. This criterion can be met by keeping vehicles and equipment inside the perimeter fence, or at a remote secured area if left on-site overnight or during non-work days. Vehicles or equipment cannot be left overnight in an unsecured location. It is the responsibility of the Contractor to ensure that all non-essential equipment is de-energized when left on-site to prevent electrical/fire/explosive hazards. No equipment will run overnight and/or on non-working days without prior approval from National Grid.

The Contractor will make every effort to minimize the storage of equipment or materials in areas other than the Site.

7. Decontamination Plan

The objectives of the decontamination plan for the Phase II RA is to provide the procedures and tools necessary to decontaminate personnel/equipment, and to prevent cross-contamination from the Site to public areas (i.e., highways, roads, support trailer, vehicles, etc.). This plan does not replace the personnel decontamination procedures outlined in the HASP (**Appendix D)**. This plan provides additional guidelines on decontamination locations, necessary equipment, and procedures.

The Site will be divided into three primary zones: the EZ, the CRZ, and the SZ during the implementation of remedial activities. These locations will be detailed in the Contract Documents and will be further defined in the field based on work activities being conducted in an individual area as well as the results of air monitoring activities.

7.1 Decontamination Procedures

The Contractor will establish decontamination areas for the following activities.

- Personnel decontamination
- Equipment decontamination

7.1.1 Personnel Decontamination Station

Personnel field decontamination/cleanup will take place at the exit of the established EZs in the CRZs. If possible, these field decontamination facilities will be located upwind of the EZs.

Disposable PPE that has been worn in the EZ will be removed and placed in the disposal container before leaving the CRZ. Once removed, disposable PPE will be collected at the field decontamination area in a drum or large plastic bag which will then be secured to prevent the accidental spread of contamination.

The designated personnel field decontamination area will be equipped with basins for water and detergent, and trash bags or cans for containing disposable PPE and discarded materials. Once personnel have decontaminated at this station and taken off their PPE, they will proceed to a field sink or basin where they will wash themselves as a secondary means of personal hygiene (e.g., hands, face, etc.).

7.1.2 Equipment Decontamination Station

Equipment decontamination will take place on a decontamination pad that will, at a minimum, be a plastic lined, bermed, wastewater collection sump. Decontamination activities will include the removal of contaminated soil, debris, and other miscellaneous materials from all construction equipment and tools utilized within the EZ using a high-pressure, low volume cleaner. In addition, physical/mechanical agitation (scraping with hand tools) of soil may be utilized during winter months to prevent freezing and icy conditions. The decontamination pad is to be covered at the end of every day to prevent rain collection during non-work hours.

All equipment leaving the Site will be decontaminated per these guidelines. In addition, any equipment previously used to excavate the utility trench will be decontaminated prior to use in backfilling (e.g., excavator bucket).

The decontamination pad will be constructed to adequately facilitate decontamination of the largest mobile construction equipment (whole or in part) and to withstand the anticipated traffic loads throughout the duration of the project. The decontamination pad will be located and constructed as detailed in the Contract Documents. Provisions will be made to control overspray at the decontamination pad(s).

Drilling equipment, hand tools, and miscellaneous small equipment that come in contact with excavated soils or impacted groundwater will be decontaminated on the decontamination pad in buckets of water and detergent.

Wastewater from equipment decontamination will be collected and pumped into a fractionation (frac) tank(s) or USDOT approved 55-gal drums at the end of every work day, or disposed of in accordance with a discharge permit.

Soils collected from the decontamination pads will be bulked with the excavated material and sent to an approved disposal facility, as necessary.

7.1.3 Material Transport Vehicle Decontamination

Trucks transporting soil off-site will enter the excavation area as described in Section 10, the Traffic Control Plan. Care will be exercised when performing soil loading so as not to spill material on the outside of the roll offs. Upon exiting the EZ, the Contractor will stage the vehicles on the equipment decontamination/anti-traction pad. The trucks will then be visually inspected (i.e., box sidewalls, box tailgate, and tires, etc.), cleaned with brushes/brooms, and decontaminated with pressure sprayers, if necessary, prior to being allowed to leave the Site.

In addition, roll-off containers will be required to be covered with solid plastic tarp prior to departing the EZ.

7.2 Decontamination Equipment

The Contractor will be responsible for maintaining a sufficient supply of materials/ equipment required to implement decontamination procedures, which may include, but are not limited to, the following items:

- Plastic trash barrels.
- Liners for trash barrels.
- Wash basins.
- Alconox™ detergent concentrate.
- Hand pump sprayers.
- Long handled soft bristle brushes.
- Large sponges.
- Cleaning wipes for respirators.
- Stepladder(s).
- Steam generator.
- Liquid detergent and paper towels.
- Plastic trash bags.
- Supplies/equipment to construct the decontamination pads.
- All necessary hosing, connections, etc., to collect and transport decontamination fluids to the wastewater treatment system.

8. Waste Management Plan

The objective of the waste management plan at the Site is to provide the Contractor guidelines for managing each waste stream. The Contractor will dispose of all waste materials generated as a result of the Phase II RA in accordance with all applicable laws and regulations at an approved disposal facility. National Grid will prepare and submit to the treatment/disposal facility a generator profile of soils and wastes generated at the Site.

8.1 Disposal Record Keeping

Manifests and/or bills of lading for all outgoing shipments will be signed by an approved agent for National Grid and the truck driver before the material leaves the Site. A copy of the manifest will be maintained on file by the Engineer and the original will remain with the transporter of the material. After delivery to the appropriate disposal facility, the manifest will be returned to the Engineer, complete with all applicable signatures as proof of delivery. The returned manifest will then be cross checked and matched with the copy of the manifest already on file.

A log of all shipments and copies of all manifests and/or bills of lading will be maintained for reference on-site by the Engineer. Upon completion of the Phase II RA the logs, manifests, and bills of lading will be included in the Completion Report, discussed in Section 12, to create a permanent record of disposal.

8.2 Material Shipping Procedures

Waste transporters, properly permitted by the NYSDEC, will be utilized to ship the impacted soils to approved disposal facilities. The selected Contractor will manage all disposal documentation including, but not limited to, all necessary manifests, bill-of-ladings, weight tickets, and certificates of treatment/destruction.

Due to the limited access to the Site, only one material transportation vehicle is able to enter/exit the site at a time. Upon entry to the Site, the material transportation vehicle will be inspected to ensure the proper placards, decals and permits are displayed. Material transportation vehicles will utilize the approved truck route through Glen Cove and then the most direct hauling route to the disposal facility.

All roll-off containers leaving the Site must be lined, covered, and decontaminated in accordance with the Decontamination Plan prior to departing. The roll-off containers will be lined with plastic liners prior to material being placed in the container. In the event that significant odors are noted, the material may be covered with Biosolve or similar odor suppressant prior to being covered in plastic. Finally, a solid cover will be affixed to the roll

off to prevent volatilization or fugitive dust emissions during transit to the disposal facility. In the event that a roll-off container arrives at the Site without a solid tarp, plastic sheeting will be used to cover the material in the roll off while a replacement cover is sent to the Site.

Individual waste streams will be handled as follows.

8.2.1 Impacted Soils and Bulky Waste

All drill cuttings from the installation of monitoring wells and injection wells will be placed into lined and covered roll-off containers or 55-gal USDOT-approved drums and transported to an approved disposal facility. The Contractor will have a facility designated to receive the impacted soils prior to the start of work.

Impacted soils that contain too high a water content to be transported safely (e.g., without risk of a liquid spill off-site) must be amended by the Contractor prior to shipment off-site. All amendments used at the Site will meet NYSDEC requirements.

Impacted bulky waste (i.e., concrete, debris, etc.) will be separated from source material upon excavation, and transported for treatment/disposal as regulated waste at an approved facility.

8.2.2 Impacted Groundwater and Decontamination Water

Liquids from the decontamination of equipment and personnel and monitoring well development water will be pumped into frac tank(s) or USDOT-approved 55-gal drums and disposed of off-site. The Contractor will retain a licensed liquid waste hauler to remove this liquid from the Site and properly dispose of the material in accordance with all applicable regulations. The Contractor will be responsible for obtaining any appropriate Federal, State, and/or local permits that may be required.

Solid material collected in the frac tank(s), as a result of settlement, will be bulked with the MGP-impacted material and sent to an approved disposal facility, as necessary.

8.3 Soil Disposal Characterization Analyses

Samples collected from MGP-impacted materials for disposal will be analyzed in accordance with the receiving facilities' guidelines.

9. Water Management Plan

The objective of the groundwater management plan at the Site is to establish requirements for the collection and off-site disposal of decontamination wastewater, and the collection and discharge of stormwater.

9.1 Decontamination Wastewater

Wastewater associated with decontamination can be stored in USDOT-approved 55-gal drums. All drums are to be properly labeled at the end of every day and stored at an area designated by National Grid or the Engineer.

9.2 Off-Site Disposal of Wastewater

The Contractor will arrange for the off-site disposal of all generated wastewater. All generated wastewater requiring disposal will be handled in accordance with Section 8, the Waste Management Plan.

A licensed liquid waste hauler will remove this liquid from the Site and properly dispose of the material in accordance with all applicable regulations and codes. The Contractor will have a primary and an alternate properly permitted, National Grid-approved receiving facility prepared to receive all liquid wastes generated.

In addition, the Contractor will ensure that off-site disposal and/or on-site storage volumes are adequate to avoid construction delays.

9.3 Storm Water Runoff Control

Stormwater drainage on the-Site is handled primarily through surface runoff to Glen Cove Creek, on-site drainage, and infiltration into non-paved areas. In preparation for, and throughout the duration of the Phase II RA, the control and diversion of stormwater runoff is essential to reduce the potential for impacted material discharges off-Site. The Contractor will be required to use appropriate control measures to route the runoff from the areas of intrusive work to an appropriate outlet. Stormwater runoff control measures may include the installation of berms, barriers, and a sump for the collection and discharge of the storm water.

10. Traffic Control Plan

The Traffic Control Plan in the Contract Documents provided in **Appendix C** identifies the traffic route to and from the Site. The traffic control plan applies for the items listed below.

- Trucking soil, wastewater, and bulky waste off-site.
- Importing clean fill to the Site.
- Contractor access and parking.
- Equipment access and storage.

The route presented in the Traffic Control Plan was determined from a traffic survey that was completed by Nelson, Pope & Voorhis, LLC of Melville, New York, and with input from town officials.

Vehicles hauling contaminated soil, fill materials, and supplies shall enter Glen Cove from Cedar Swamp Road (RT 107). The vehicles will then continue right on Cedar Swamp Road where it splits with RT 107. Vehicles should then take a left onto Grove Street. From Grove Street, a right should be made to the substation's access road. Vehicles will then retrace the Site entry route to exit Glen Cove.

The Contractor will provide traffic control personnel when all trucks are exiting the Site onto Grove Street. Traffic control personnel shall also direct traffic as needed upon delivery of equipment, trailers, etc. To maintain access and ensure that lines of sight are maintained, the Contractor shall arrange for and coordinate with the appropriate local authorities to ensure that on-street parking nearest to the entrance/exit gate is limited throughout the duration of the Phase II RA.

The Contractor will provide a detailed traffic route for all vehicles transporting waste materials to the specific disposal facilities as well as maintain all signage and traffic controls required until the completion of the project.

11. Completion of Remedial Activities

Upon completion of the Phase II RA, the Site will be returned to the pre-Phase II RA conditions. Restoration actions may include, but will not be limited to, the following:

- Backfill and compaction of the excavated areas.
- Removal, restoration, or replacement of erosion control measures as indicated on the Contract Drawings.
- Restoration of the Site grading in the work areas.
- Removal of the decontamination pads.
- Restoration of any site features that have been damaged or removed.
- Post restoration survey to document conditions following restoration.

12. RA Completion Report

Following the completion of Phase II RA a Final Engineering Report will be developed and stamped by an engineer licensed to practice in the State of New York. As part of the report the activities of the Phase I and Phase II RA will be documented. This documentation will include a summary of the field programs, documentation of any changes to the Work Plans, documentation of the final disposal of solid and hazardous waste, contract drawings, specifications, and any approved changes to those documents. The portion of the report that details the Phase I RA will contain a summation of the contaminant distribution observed beneath the floor of the excavation.

Specific components of the Final Engineering Report will include:

- Record drawings, specifications, addenda, and approved changes.
- The actual volumes of excavated material and treated wastewater.
- The results of documentation analyses.
- Other plans and figures (if required), photographs, cross sections, data summary tables, and appendices that will provide National Grid with an accurate accounting of the remedial measures implemented at the Site.
- Approval and Closure documents from the NYSDEC.
- Approved permits.
- Summary of construction work, meetings, and changes in work scope.
- Shipping manifests and bills of lading (contaminated soil, clean fill, and construction dewatering liquids).
- Summary of Air Monitoring Data collected during the remedial activities.
- Certification that material transported off site was disposed of at a properly-licensed National Grid-approved disposal or treatment facility.
- “As-Built” survey drawings documenting the final site conditions prepared by a New York State-licensed land surveyor.

13. References

Fechner-Levy, E., Hemond, H., 2000. *Chemical Fate and Transport in the Environment*, Academic Press, San Diego. 2000.

Fetter, C., 2001. *Applied Hydrogeology*, Prentice-Hall, Inc., Upper Saddle River. 2001.

GEI Consultants, Inc., 2008. *Qualitative Human Exposure Assessment and Fish and Wildlife Resources Impact Analysis, Glen Cove Former Manufactured Gas Plant Site.* September 2008.

GEI Consultants, Inc., 2010a, *Final Phase 1 Remedial Action Work Plan, Glen Cove Former Manufactured Gas Plant Site, Glen Cove, New York*, May 26, 2010.

GEI Consultants, Inc., 2010b, *Remedial Action Plan, Glen Cove Former Manufactured Gas Plant, Glen Cove, New York*, March 10, 2010.

GEI Consultants, Inc., 2010c, *Soil Pre-Characterization Investigation Work Plan, Orchard Substation, Glen Cove Former MGP Site*, January 12, 2010.

GEI Consultants, Inc., 2010d, *Quarterly Groundwater Monitoring Report First and Second Quarters (Q1 & Q2) 2010, Glen Cove Former MGP Site, Glen Cove, New York*, September 2010.

GEI Consultants, Inc., 2011. *Oxygen Injection Pilot Test Work Plan, Glen Cove Former Manufactured Gas Plant, Glen Cove, New York*, April 27, 2011.

GEI Consultants, Inc., 2012a. *Notice of Intrusive Activities, Orchard Substation – DNAPL Recovery Well Installation, Glen Cove Former MGP Site, Site No. 1-30-089P*, February 10, 2012.

GEI Consultants, Inc., 2012b. *Phase I Construction Completion Report, Glen Cove Former MGP*, September 28, 2012.

Matrix Environmental Technologies, Inc., "O_2 Injection." Matrix Environmental Technologies, Inc., 2010. Web. 21 October 2010. <http://www.matrixbiotech.com/injection/default.aspx>.

New York State Department of Environmental Conservation. May 2010. *Final DER-10* [Department of Environmental Remediation] *Technical Guidance for Site Investigation and Remediation*, May 2010.

Paulus, Sokolowski, and Sartor Engineering, PC, 2008. *Final Remedial Investigation Report, Glen Cove Former Manufactured Gas Plant Site, Glen Cove, New York*, November 2008.

Tables

Table 1. Injection Well Construction Details
Glen Cove Former MGP Site
National Grid
Glen Cove, New York

Proposed Injection Well	Screen Interval (feet bgs)	Approximate Surface Elevation (ft)	Filter Pack (feet bgs)	Bentonite Seal (feet bgs)	Total Depth (feet bgs)
IP-01I	31-32	55.00	29-34	27-29	34
IP-02S	18-19	55.00	16-21	14-16	21
IP-02I	31-32	55.00	29-34	27-29	34
IP-03S	18-19	55.00	16-21	14-16	21
IP-03I	31-32	55.00	29-34	27-29	34
IP-04S	18-19	55.00	16-21	14-16	21
IP-04I	31-32	55.00	29-34	27-29	34
IP-05S	18-19	55.00	16-21	14-16	21
IP-05I	31-32	55.00	29-34	27-29	34
IP-06S	18-19	55.00	16-21	14-16	21
IP-06I	31-32	55.00	29-34	27-29	34
IP-07S	18-19	55.00	16-21	14-16	21
IP-07I	31-32	55.00	29-34	27-29	34
IP-08S	18-19	55.00	16-21	14-16	21
IP-08I	31-32	55.00	29-34	27-29	34
IP-09S*	18-19	55.00	16-21	14-16	21
IP-09I*	31-32	55.00	29-34	27-29	34

Notes:

Approximate surface elevations based on 2010 Orchard Transmission Terminal Substation plan set from Paulus, Sokolowski, and Sartor Engineering (PS&S).
Final injection well construction will be based on final survey of site following completion of LIPA construction activities.
NA - Not Applicable - Soil sampling completed during previous investigations or at adjacent borings.
Each well will be constructed with the following materials:

- Sump: 1-foot deep, 1-inch diameter, threaded, Schedule 40 PVC sump
- Screen: 1-inch diameter, 1-foot long, 0.010 slot, threaded, Schedule 40 PVC screen
- Riser: 1-inch diameter, threaded, Schedule 40 PVC riser
- Wellhead Connection: 1-inch by ¾-inch Schedule 40 PVC tee connection at approximately 2 feet bgs, 1” Schedule 40 PVC riser to grade
- Wellhead Protection: 1-foot diameter flush mount well housing and road box

Annular Space:

- #00 Silica Sand to at least 2 foot above the screen interval
- 2-foot minimum thick bentonite seal
- Portland cement/bentonite grout to 3 feet bgs
- Native material to grade

bgs - below ground surface

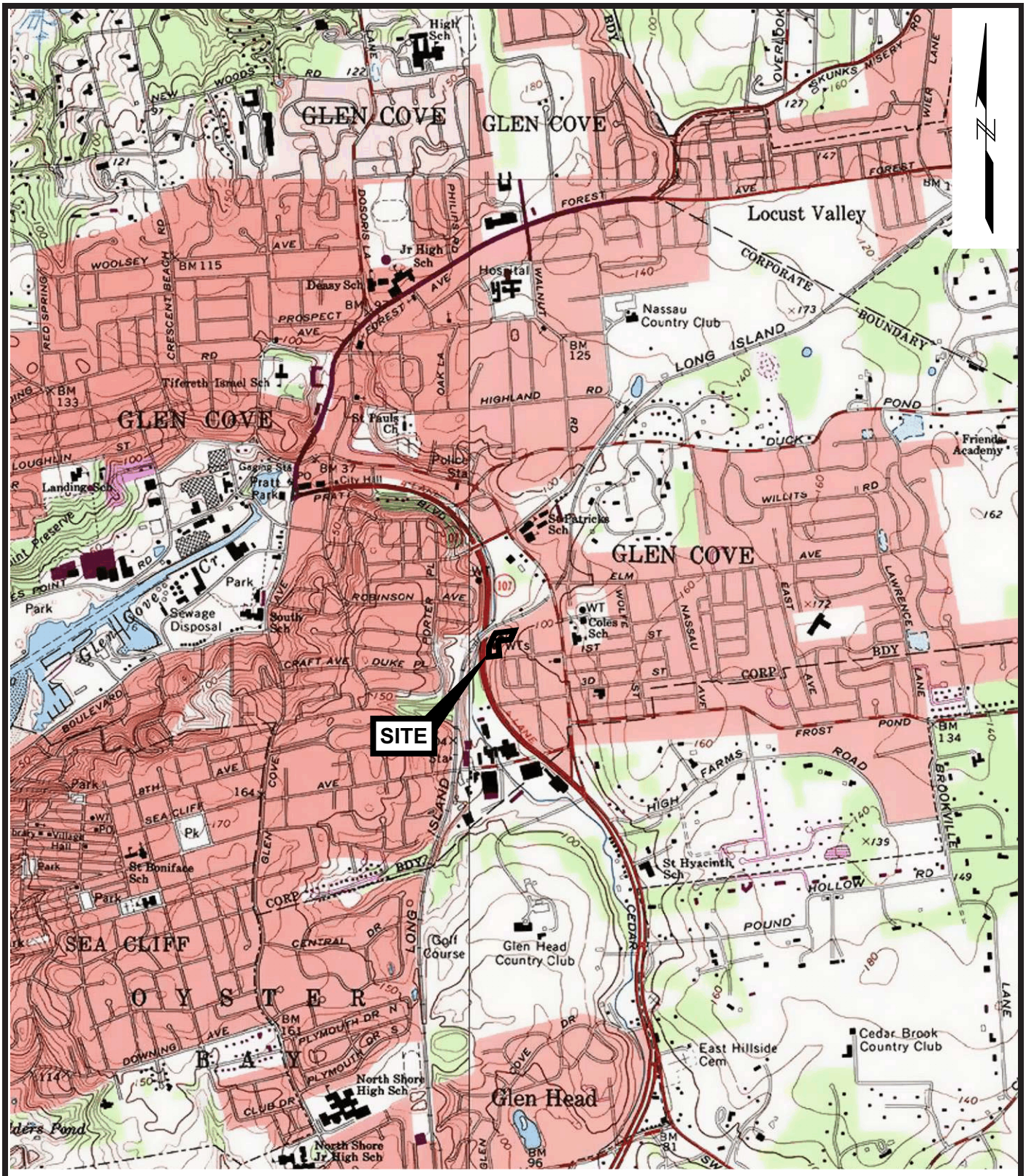
Table 2. Monitoring Well Constructions Details
Glen Cove Former MGP Site
National Grid
Glen Cove, New York

Proposed Monitoring Well	Original Screen Interval (feet bgs)	Original Surface Elevation (ft)	Proposed Surface Elevation (ft)	Revised Screen Interval (feet bgs)	Filter Pack (feet bgs)	Bentonite Seal (feet bgs)	Total Depth (feet bgs)	Soil Analysis
GCMW-09S-R	8-18	57.31	55.40	6-16	4-18	2-4	18	NA
GCMW-09I-R	26-36	57.29	55.40	24-34	22-36	20-22	36	NA
GCMW-10S-R	11-16	50.72	55.00	15-20	13-22	11-13	22	NA
GCMW-10I-R	16-26	51.13	55.00	20-30	18-32	16-18	32	NA
GCMW-14S-R	12-22	57.03	55.00	10-20	8-22	6-8	22	NA
GCMW-14I-R	25-30	57.02	55.00	23-28	21-30	19-21	30	NA
GCMW-20S	9-19	55.00	55.00	9-19	7-21	5-7	21	NA
GCMW-20I	25-35	55.00	55.00	25-35	23-37	21-23	37	NA
GCMW-20I2	45-55	55.00	55.00	45-55	43-57	41-43	57	VOC, SVOC, Metals, CN
GCMW-21I	25-35	78.00	78.00	25-35	23-37	21-23	37	NA
GCMW-21I2	45-55	78.00	78.00	45-55	43-57	41-43	57	VOC, SVOC, Metals, CN
GCMW-22I	25-35	47.00	49.00	27-37	25-39	23-25	39	NA
GCMW-22I2	45-55	47.00	49.00	47-57	45-59	43-45	59	VOC, SVOC, Metals, CN

Notes:

Proposed surface elevations based on 2010 Orchard Transmission Terminal Substation plan set from Paulus, Sokolowski, and Sartor Engineering (PS&S).
Original surface elevations based on PS&S RI Report for replacement wells and PS&S 2010 plan set for new well locations.
Final well construction will be based on final survey of site following completion of LIPA construction activities.
NA - Not Applicable - Soil sampling completed during previous investigations or at adjacent borings.
bgs - below ground surface

Figures



SOURCE: MAP CREATED WITH TOPO!™ ©2000 WILDFLOWER PRODUCTIONS (www.topo.com)

0 2000 4000

SCALE, FEET

PHASE II REMEDIAL ACTION WORK PLAN
GLEN COVE FORMER MGP SITE
GLEN COVE, NEW YORK

nationalgrid

GEI Consultants

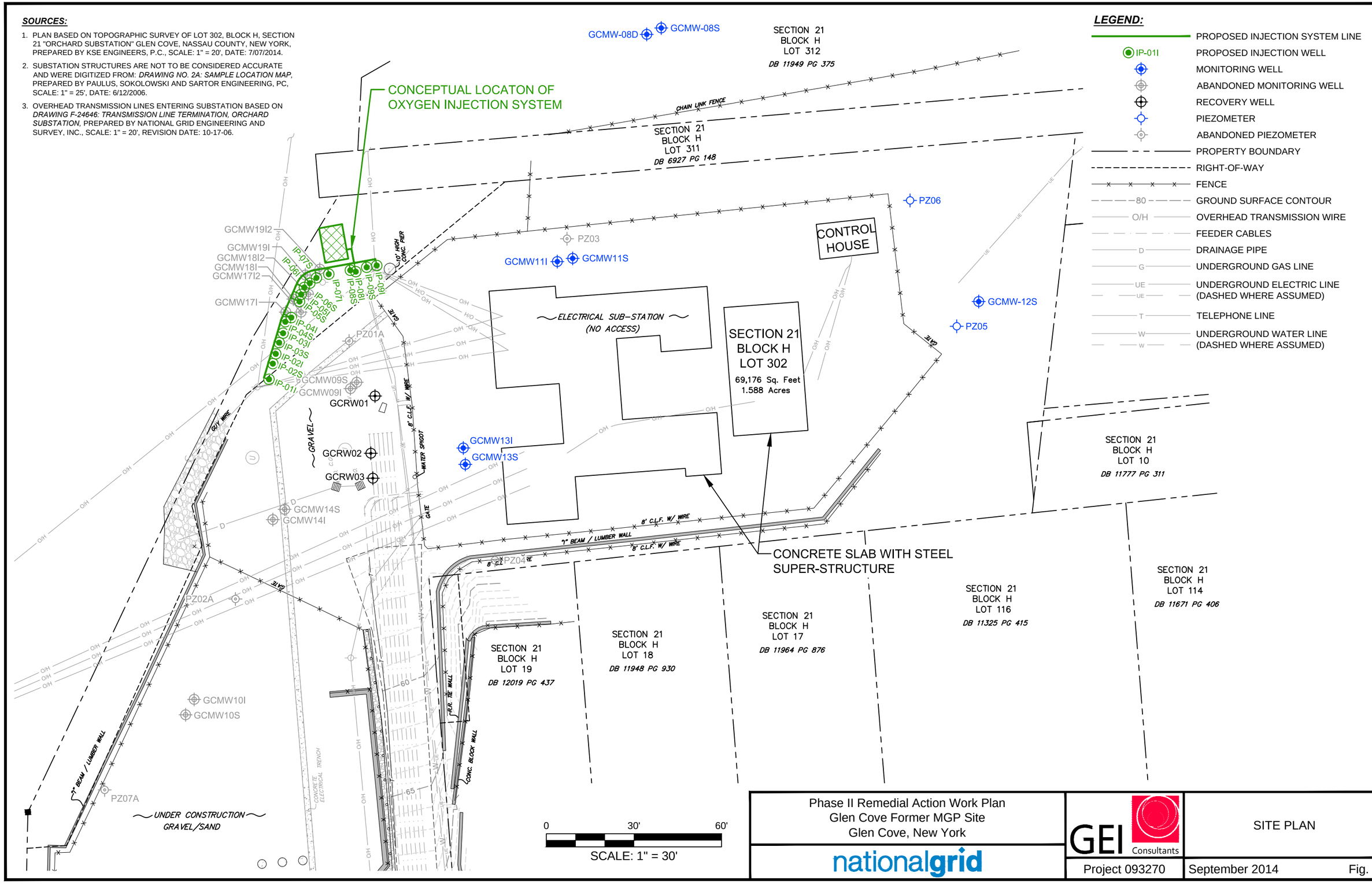
SITE LOCATION MAP

Project 093270-4-1401 | March 2014 | Figure 1

I:\Project\National Grid\GLEN COVE\RAWP - PHASE II\RAWP Figures\GLEN-PHII Location.cdr

SOURCES:

1. PLAN BASED ON TOPOGRAPHIC SURVEY OF LOT 302, BLOCK H, SECTION 21 "ORCHARD SUBSTATION" GLEN COVE, NASSAU COUNTY, NEW YORK, PREPARED BY KSE ENGINEERS, P.C., SCALE: 1" = 20', DATE: 7/07/2014.
2. SUBSTATION STRUCTURES ARE NOT TO BE CONSIDERED ACCURATE AND WERE DIGITIZED FROM: *DRAWING NO. 2A: SAMPLE LOCATION MAP*, PREPARED BY PAULUS, SOKOLOWSKI AND SARTOR ENGINEERING, PC, SCALE: 1" = 25', DATE: 6/12/2006.
3. OVERHEAD TRANSMISSION LINES ENTERING SUBSTATION BASED ON *DRAWING F-24646: TRANSMISSION LINE TERMINATION, ORCHARD SUBSTATION,* PREPARED BY NATIONAL GRID ENGINEERING AND SURVEY, INC., SCALE: 1" = 20', REVISION DATE: 10-17-06.



LEGEND:

- PROPOSED INJECTION SYSTEM LINE
- IP-01I — PROPOSED INJECTION WELL
- MONITORING WELL
- ABANDONED MONITORING WELL
- RECOVERY WELL
- PIEZOMETER
- ABANDONED PIEZOMETER
- PROPERTY BOUNDARY
- RIGHT-OF-WAY
- FENCE
- 80 — GROUND SURFACE CONTOUR
- O/H — OVERHEAD TRANSMISSION WIRE
- FEEDER CABLES
- D — DRAINAGE PIPE
- G — UNDERGROUND GAS LINE
- UE — UNDERGROUND ELECTRIC LINE (DASHED WHERE ASSUMED)
- T — TELEPHONE LINE
- W — UNDERGROUND WATER LINE (DASHED WHERE ASSUMED)

Phase II Remedial Action Work Plan
Glen Cove Former MGP Site
Glen Cove, New York

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SITE PLAN

Project 093270 | September 2014 | Fig. 2

---- I:\Project\National Grid\GLEN COVE\RAWP - PHASE II\RAWP Figures\2014-09-29\GC-RAWP Figures.dwg - 9/29/2014

SOURCES:

1. PLAN BASED ON TOPOGRAPHIC SURVEY OF LOT 302, BLOCK H, SECTION 21 "ORCHARD SUBSTATION" GLEN COVE, NASSAU COUNTY, NEW YORK, PREPARED BY KSE ENGINEERS, P.C., SCALE: 1" = 20', DATE: 7/07/2014.
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3. OVERHEAD TRANSMISSION LINES ENTERING SUBSTATION BASED ON *DRAWING F-24646: TRANSMISSION LINE TERMINATION, ORCHARD SUBSTATION,* PREPARED BY NATIONAL GRID ENGINEERING AND SURVEY, INC., SCALE: 1" = 20', REVISION DATE: 10-17-06.

LEGEND:

- PROPOSED INJECTION SYSTEM LINE
- IP-01I — PROPOSED INJECTION WELL
- GCMW10S-R — PROPOSED MONITORING WELL
- MONITORING WELL
- ABANDONED MONITORING WELL
- RECOVERY WELL
- PIEZOMETER
- ABANDONED PIEZOMETER
- PROPERTY BOUNDARY
- RIGHT-OF-WAY
- FENCE
- 80 — GROUND SURFACE CONTOUR
- O/H — OVERHEAD TRANSMISSION WIRE
- FEEDER CABLES
- D — DRAINAGE PIPE
- G — UNDERGROUND GAS LINE
- UE — UNDERGROUND ELECTRIC LINE (DASHED WHERE ASSUMED)
- T — TELEPHONE LINE
- W — UNDERGROUND WATER LINE (DASHED WHERE ASSUMED)

CONCEPTUAL LOCATON OF OXYGEN INJECTION SYSTEM

GCMW21I
GCMW21I2

GCMW-08D GCMW-08S

SECTION 21
BLOCK H
LOT 312
DB 11949 PG 375

SECTION 21
BLOCK H
LOT 311
DB 6927 PG 148

CHAIN LINK FENCE

PZ06
PZ03
GCMW11I GCMW11S
GCMW-12S
PZ05

CONTROL HOUSE

~ELECTRICAL SUB-STATION~
(NO ACCESS)

SECTION 21
BLOCK H
LOT 302
69,176 Sq. Feet
1.588 Acres

SECTION 21
BLOCK H
LOT 10
DB 11777 PG 311

GCMW19I2
GCMW19I
GCMW18I2
GCMW18I
GCMW17I2
GCMW17I
GCMW20S
GCMW20I
GCMW20I2
GCMW22I
GCMW22I2
IP-07S
IP-06I
IP-07I
IP-05I
IP-05S
IP-04I
IP-04S
IP-03I
IP-03S
IP-02I
IP-02S
IP-01I
IP-08I
IP-08S
IP-09I
IP-09S
10' HIGH CONC. PIER
GATE
PZ01A
GCMW09S
GCMW09I
GCRW01
GCMW09S-R
GCMW09I-R
GRAVEL
8' C.L.F. W/ WIRE
WATER SPIGOT
GCRW02
GCRW03
GCMW13I
GCMW13S
GCMW14S
GCMW14I
GCMW14I-R
GCMW14S-R
PZ02A
PZ04
8' C.L.F. W/ WIRE
7" BEAM / LUMBER WALL
8' C.L.F. W/ WIRE
CONCRETE SLAB WITH STEEL SUPER-STRUCTURE
R.R. TIE WALL
CONC. BLOCK WALL
GCMW10S-R
GCMW10I
GCMW10S
GCMW10I-R
7" BEAM / LUMBER WALL
PZ07A
~UNDER CONSTRUCTION~
GRAVEL/SAND
CONCRETE ELECTRICAL TRENCH

SECTION 21
BLOCK H
LOT 18
DB 11948 PG 930

SECTION 21
BLOCK H
LOT 19
DB 12019 PG 437

SECTION 21
BLOCK H
LOT 17
DB 11964 PG 876

SECTION 21
BLOCK H
LOT 116
DB 11325 PG 415

SECTION 21
BLOCK H
LOT 114
DB 11671 PG 406

0 30' 60'
SCALE: 1" = 30'

Phase II Remedial Action Work Plan
Glen Cove Former MGP Site
Glen Cove, New York

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PHASE II REMEDIAL ACTION SUMMARY

Project 093270 | September 2014 | Fig. 3

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Appendix A

Boring Logs and Monitoring Well Installation Logs (electronic only)

BORING SB-5

PROJECT: Glen Cove MGP Site
PROJECT NO: 1691-08-02
LOCATION:
DATE STARTED: 11/09/95
DATE COMPLETED: 11/09/95
DRILLING CONTRACTOR: Aquifer Drilling and Testing
DRILLER:

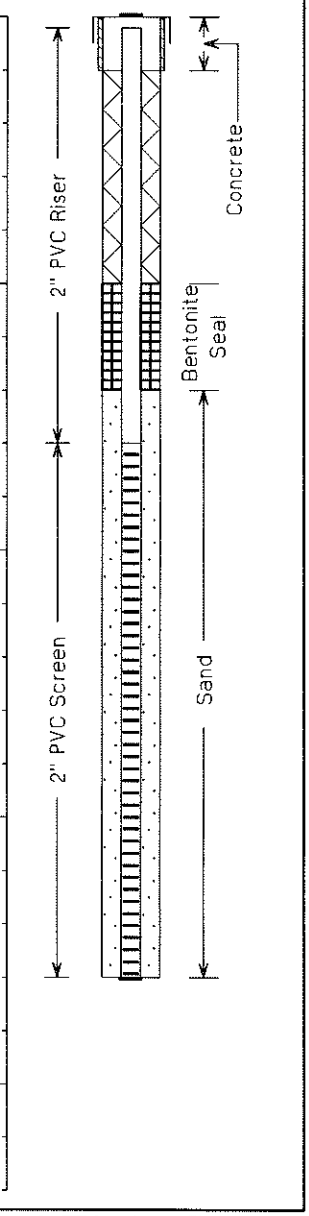
DRILLING METHOD: 4-1/4" Hollow Steam Auger
SAMPLING METHOD: 2-inch split spoon
GROUND ELEVATION: 59.34 ft MSL
WELL ELEVATION:
WATER TABLE ELEVATION:
DATUM:
INSPECTOR: Richard Mitchell

SPLIT SPOON SAMPLE DEPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION color, density, SOIL, admixture, moisture, other notes, ORIGIN	VISUAL CONTAM. NONE	STAIN	SHEEN	HEAVY	ODOR NONE	SLIGHT	MODERATE	HEAVY	SAMPLE ANALYSIS
				Augered through brown fine to coarse gravel and sand, little silt, little brick, FILL.									
				Becomes very cobbly.									
				Augered through fine to coarse SAND and GRAVEL, some silt, slight odor.									
14-16	10,12 12,16	15	0.0	Brown fine to coarse GRAVEL and SAND, little silt, slight odor, groundwater interface at 14.0.									
16-18	6,7 7,11	50	0.0										
				End of boring at 18.0 feet.									

LITHOLOGY

DEPTH (FT.)

WELL CONSTRUCTION



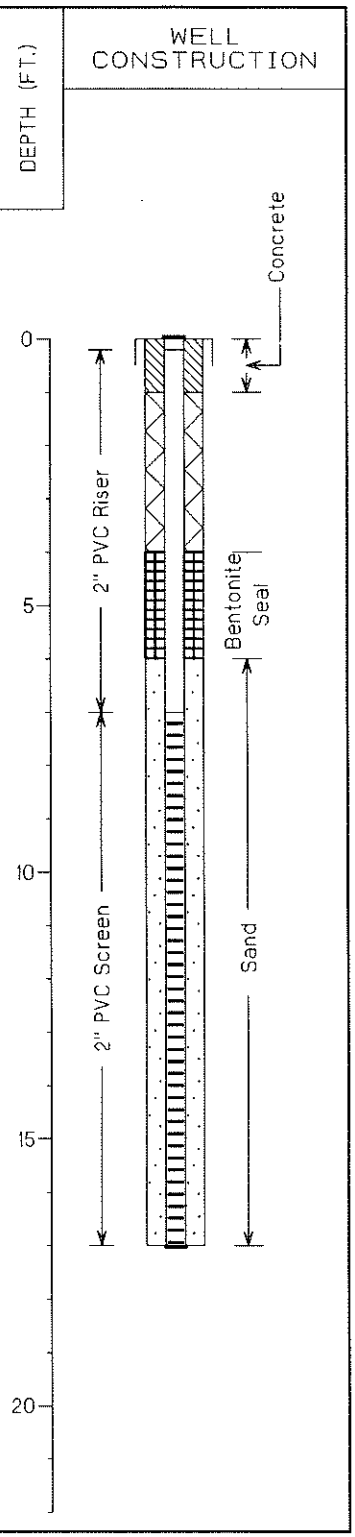
ATLANTIC

BORING SB-6

PROJECT: Glen Cove MGP Site
PROJECT NO: 1691-08-02
CATION:
DATE STARTED: 11/10/95
DATE COMPLETED: 11/10/95
ILLING CONTRACTOR: Aquifer Drilling and Testing
DRILLER:

DRILLING METHOD: 4-1/4" Hollow Steam Auger
SAMPLING METHOD: 2-inch split spoon
GROUND ELEVATION: 58.52 ft MSL
WELL ELEVATION:
WATER TABLE ELEVATION:
DATUM:
INSPECTOR: Richard Mitchell

SPLIT SPOON AMPLE EPTH (ft)	BLOWS PER 6"	% RECOVERY	HNU (ppm)	SOIL DESCRIPTION color, density, SOIL,admixture, moisture, other notes, ORIGIN	VISUAL CONTAM. NONE	STAIN	SHEEN	HEAVY	ODOR NONE	SLIGHT	MODERATE	HEAVY	SAMPLE ANALYSIS
				(Hand augered to 5 feet). Brown fine to medium sand, some fine to coarse gravel, little silt, trace coal, FILL.									
				Black coal, some fine to coarse sand and gravel, little silt, FILL.									
3-10	10,4 4,5	50		Brown fine to coarse sand and gravel, little silt, FILL, saturated, no odor.									
				Gray/brown fine sand and silt, FILL, tight, groundwater interface at 9.0.									
				Augered to 15 feet.									
15-17	38,22 22,27	50	0.0	Brown fine to coarse GRAVEL and SAND, trace silt, saturated.									
				End of boring at 17.0 feet.									



ATLANTIC

Paulus, Sokolowski, & Sartor	WELL CONSTRUCTION LOG	WELL NUMBER - GCMW-08D

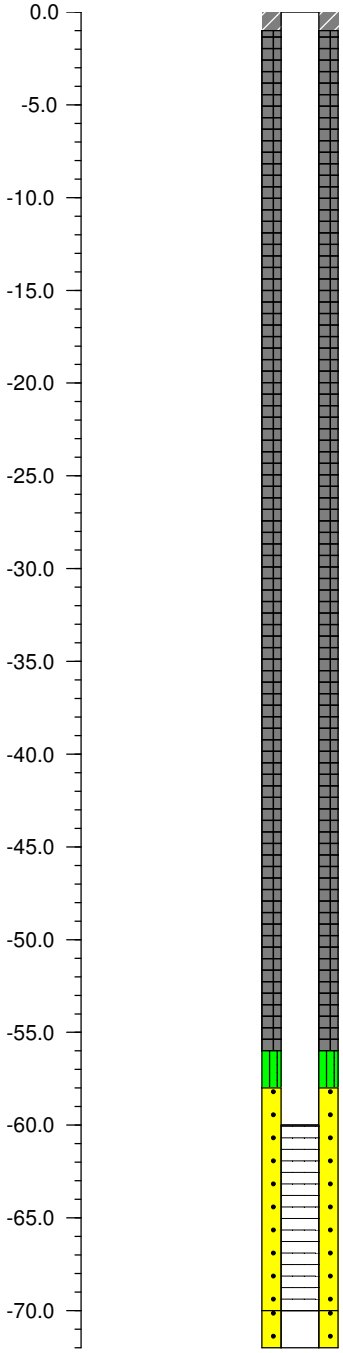
PROJECT NUMBER: **2522.012.024**
PROJECT NAME: **Glen Cove Former MGP Site**
LOCATION: **Glen Cove, Long Island, NY**
DRILLING CO: **Delta Well & Pump Co., Inc.**
DRILLING METHOD: **Hollow Stem Auger**
DRILLER/HELPER : **Michael Pellegrino/Pete Trembley**
ENVIRONMENTAL SCIENTIST: **Joseph Trocchio**

WEATHER : **Sunny**
TOTAL DEPTH: **72'**
GROUND SURFACE ELEVATION: **78.83**
DATE BEGUN: **7/09/04**
DATE COMPLETED: **7/13/04**

PVC CASING (DIA.) - 2"
SCREEN (DIA.) - 2"
PVC CASING (DIA.): 2"

MATERIAL 1 - Schedule 40 PVC — LENGTH 1 - 60'
MATERIAL 2 - Schedule 40 PVC — LENGTH 2 - 10'
MATERIAL 3 - Steel Casing with Concrete Pad — LENGTH 3 - 1'x1'

DEPTH	WELL CONSTRUCTION	WELL SCHEMATICS



CEMENT SEAL 0-1'
SOLID PVC CASING 0-60'

CONCRETE AND BENTONITE GROUT 0-56'

BENTONITE SEAL 56'-58'
SAND PACK 58'-70'
PVC 20 SLOT SCREEN 60'-70'

SOLID PVC CASING 70'-72'

Paulus, Sokolowski, & Sartor	WELL CONSTRUCTION LOG	WELL NUMBER - GCMW - 08S

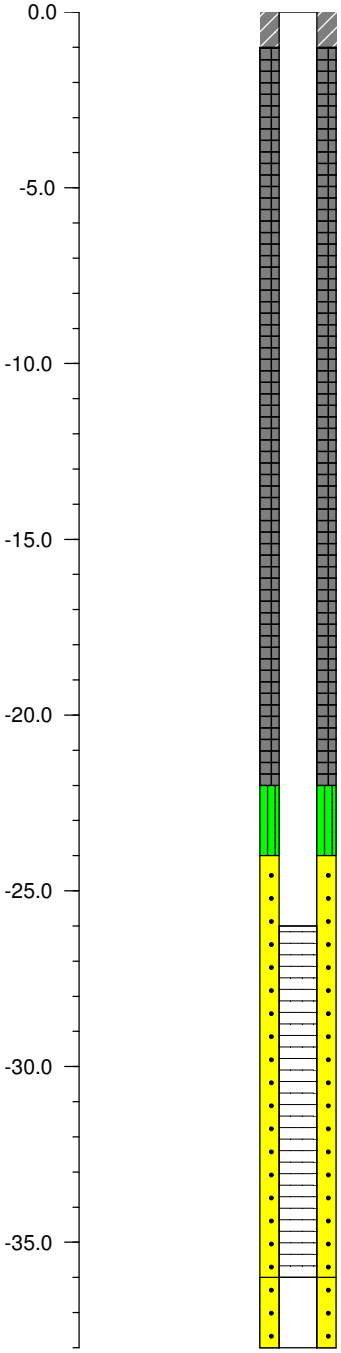
PROJECT NUMBER: **2522.012.024**
PROJECT NAME: **Glen Cove Former MGP Site**
LOCATION: **Glen Cove, Long Island, NY**
DRILLING CO: **Delta Well & Pump Co., Inc.**
DRILLING METHOD: **Hollow Stem Auger**
DRILLER/HELPER : **Michael Pellegrino/Pete Trembley**
ENVIRONMENTAL SCIENTIST: **Joseph Trocchio**

WEATHER : **Sunny**
TOTAL DEPTH: **38'**
GROUND SURFACE ELEVATION: **78.80**
DATE BEGUN: **7/14/04**
DATE COMPLETED: **7/14/04**

PVC CASING (DIA.) - 2"
SCREEN (DIA.) - 2"
PVC CASING (DIA.): 2"

MATERIAL 1 - Schedule 40 PVC LENGTH 1 - 26'
MATERIAL 2 - Schedule 40 PVC LENGTH 2 - 10'
MATERIAL 3 - Steel Casing with Concrete Pad LENGTH 3 - 1'x1'

DEPTH	WELL CONSTRUCTION	WELL SCHEMATICS



CEMENT SEAL 0-1'

SOLID PVC CASING 0-26'

CONCRETE AND BENTONITE GROUT 1'-22'

BENTONITE SEAL 22'-24'

SAND PACK 24'-38'

PVC 20 SLOT SCREEN 26'-36'

SOLID PVC CASING 36'-38'

Paulus, Sokolowski, & Sartor	WELL CONSTRUCTION LOG	WELL NUMBER - GCMW - 11I

PROJECT NUMBER: **2522.012.024**
PROJECT NAME: **Glen Cove Former MGP Site**
LOCATION: **Glen Cove, Long Island, NY**
DRILLING CO: **Delta Well & Pump Co., Inc.**
DRILLING METHOD: **Hollow Stem Auger**
DRILLER/HELPER : **Pete Trembley/Pete Kaligeris**
ENVIRONMENTAL SCIENTIST: **Joseph Trocchio**

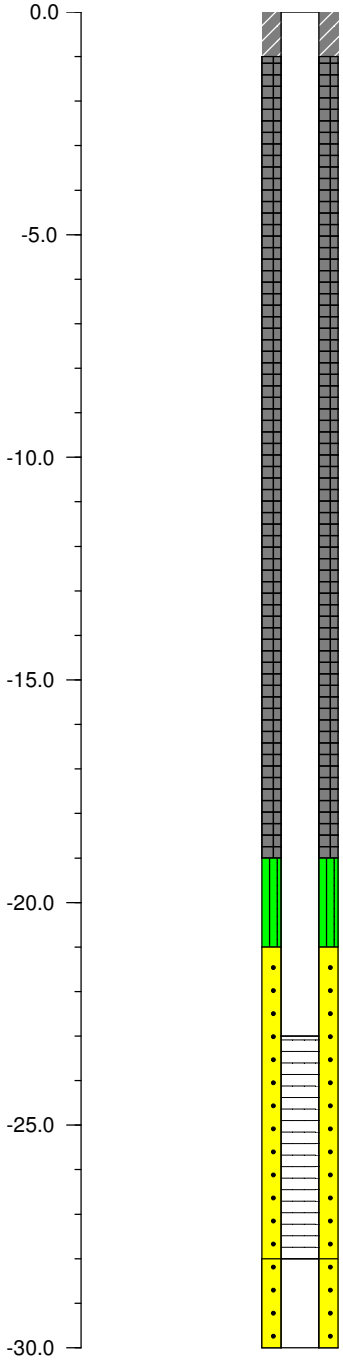
WEATHER : **Sunny**
TOTAL DEPTH: **30'**
GROUND SURFACE ELEVATION: **57.84**
DATE BEGUN: **4/19/04**
DATE COMPLETED: **4/19/04**

PVC CASING (DIA.) - 2"
SCREEN (DIA.) - 2"
PVC CASING (DIA.): 8"

MATERIAL 1 - Schedule 40 PVC
MATERIAL 2 - Schedule 40 PVC
MATERIAL 3 - Steel

LENGTH 1 - 25'
LENGTH 2 - 5'
LENGTH 3 - 1'

DEPTH | **WELL CONSTRUCTION** | **WELL SCHEMATICS**



CEMENT SEAL 0-1'

CONCRETE AND BENTONITE GROUT 1'-19'

SOLID PVC CASING 0-23'

BENTONITE SEAL 19'-21'

SAND PACK 21'-30'

PVC 20 SLOT SCREEN 23'-28'

SOLID PVC CASING 28'-30'

Paulus, Sokolowski, & Sartor	WELL CONSTRUCTION LOG	WELL NUMBER - GCMW - 11S

PROJECT NUMBER: **2522.012.024**
PROJECT NAME: **Glen Cove Former MGP Site**
LOCATION: **Glen Cove, Long Island, NY**
DRILLING CO: **Delta Well & Pump Co., Inc.**
DRILLING METHOD: **Hollow Stem Auger**
DRILLER/HELPER : **Pete Trembley/Pete Kaligeris**
ENVIRONMENTAL SCIENTIST: **Joseph Trocchio**

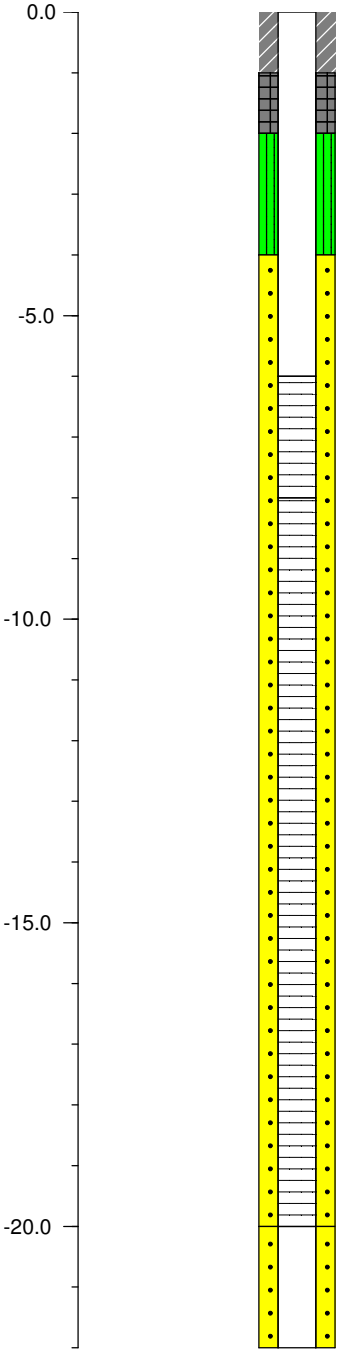
WEATHER : **Sunny**
TOTAL DEPTH: **22'**
GROUND SURFACE ELEVATION: **57.83**
DATE BEGUN: **4/16/04**
DATE COMPLETED: **4/16/04**

PVC CASING (DIA.) - 2"
SCREEN (DIA.) - 2"
PVC CASING (DIA.): 8"

MATERIAL 1 - Schedule 40 PVC
MATERIAL 2 - Schedule 40 PVC
MATERIAL 3 - Steel

LENGTH 1 - 8'
LENGTH 2 - 14'
LENGTH 3 - 1'

DEPTH | **WELL CONSTRUCTION** | **WELL SCHEMATICS**



CEMENT SEAL 0-1'

CONCRETE AND BENTONITE GROUT 1'-2'
SOLID PVC CASING 0-6'
BENTONITE SEAL 2'-4'

SAND PACK 4'-22'

PVC 10 SLOT SCREEN 6'-8'

PVC 20 SLOT SCREEN 8'-20'

SOILD PVC CASING 20'-22'

Paulus, Sokolowski, & Sartor	WELL CONSTRUCTION LOG	WELL NUMBER - GCMW - 12S

PROJECT NUMBER: **2522.012.024**
PROJECT NAME: **Glen Cove Former MGP Site**
LOCATION: **Glen Cove, Long Island, NY**
DRILLING CO: **Delta Well & Pump Co., Inc.**
DRILLING METHOD: **Hollow Stem Auger**
DRILLER/HELPER : **Pete Trembley/Pete Kaligeris**
ENVIRONMENTAL SCIENTIST: **Joseph Trocchio**

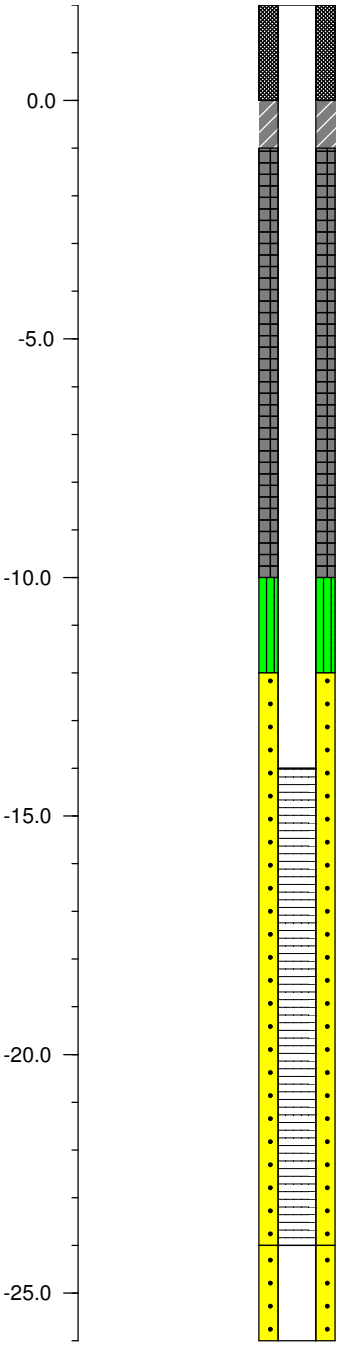
WEATHER : **Sunny**
TOTAL DEPTH: **28'**
GROUND SURFACE ELEVATION: **64.19**
DATE BEGUN: **4/08/04**
DATE COMPLETED: **4/12/04**

PVC CASING (DIA.) - 2"
SCREEN (DIA.) - 2"
PVC CASING (DIA.): 4"

MATERIAL 1 - Schedule 40 PVC
MATERIAL 2 - Schedule 40 PVC
MATERIAL 3 - Steel

LENGTH 1 - 18'
LENGTH 2 - 10'
LENGTH 3 - 4'

DEPTH | **WELL CONSTRUCTION** | **WELL SCHEMATICS**



CEMENT SEAL 0-1'

CONCRETE AND BENTONITE GROUT 1'-10'

SOLID PVC CASING +2'-14'

BENTONITE SEAL 10'-12'

SAND PACK 12'-26'

PVC 20 SLOT SCREEN 14'-24'

SOLID PVC CASING 24'-26'

Paulus, Sokolowski, & Sartor	WELL CONSTRUCTION LOG	WELL NUMBER - GCMW - 13I

PROJECT NUMBER: **2522.012.024**
PROJECT NAME: **Glen Cove Former MGP Site**
LOCATION: **Glen Cove, Long Island, NY**
DRILLING CO: **Delta Well & Pump Co., Inc.**
DRILLING METHOD: **Hollow Stem Auger**
DRILLER/HELPER : **Pete Trembley/Pete Kaligeris**
ENVIRONMENTAL SCIENTIST: **Joseph Trocchio**

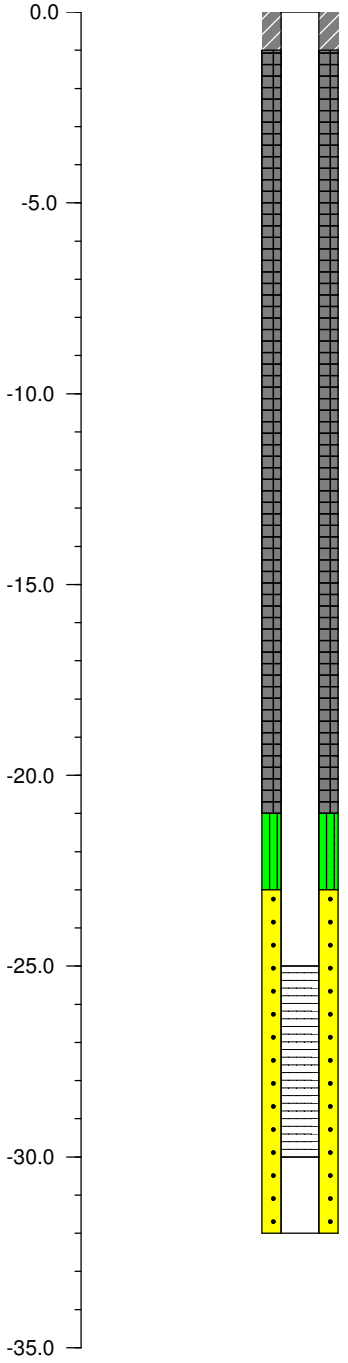
WEATHER : **Sunny**
TOTAL DEPTH: **32'**
GROUND SURFACE ELEVATION: **57.88**
DATE BEGUN: **4/21/04**
DATE COMPLETED: **4/23/04**

PVC CASING (DIA.) - 2"
SCREEN (DIA.) - 2"
PVC CASING (DIA.): 8"

MATERIAL 1 - Schedule 40 PVC
MATERIAL 2 - Schedule 40 PVC
MATERIAL 3 - Steel Flushmount

LENGTH 1 - 27'
LENGTH 2 - 5'
LENGTH 3 - 1'

DEPTH | **WELL CONSTRUCTION** | **WELL SCHEMATICS**



CEMENT SEAL 0-1'
CONCRETE AND BENTONITE GROUT 1'-21'
SOLID PVC CASING 0-25'

BENTONITE SEAL 21'-23'

SAND PACK 23'- 32'

PVC 20 SLOT SCREEN 25'-30'

SOLID PVC CASING 30'- 32'

Paulus, Sokolowski, & Sartor	WELL CONSTRUCTION LOG	WELL NUMBER - GCMW - 13S

PROJECT NUMBER: **2522.012.024**
PROJECT NAME: **Glen Cove Former MGP Site**
LOCATION: **Glen Cove, Long Island, NY**
DRILLING CO: **Delta Well & Pump Co., Inc.**
DRILLING METHOD: **Hollow Stem Auger**
DRILLER/HELPER : **Pete Trembley/Pete Kaligeris**
ENVIRONMENTAL SCIENTIST: **Joseph Trocchio**

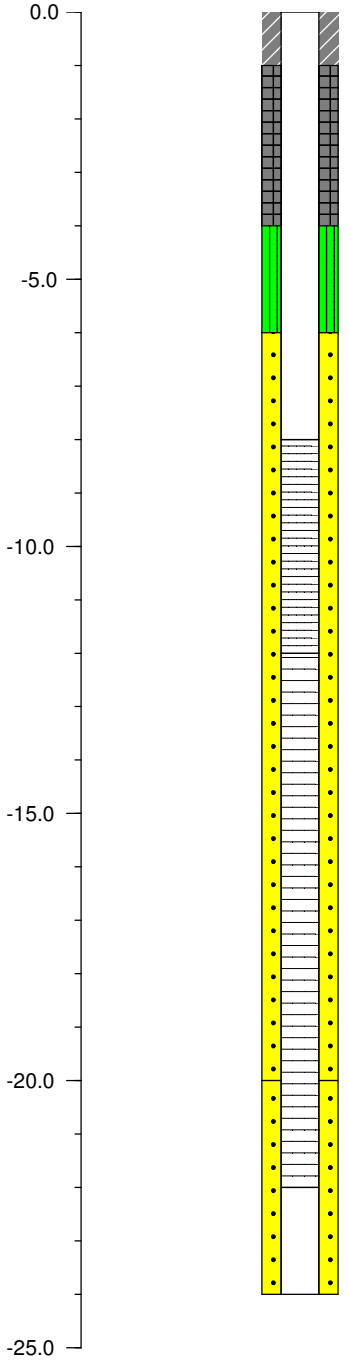
WEATHER : **Sunny**
TOTAL DEPTH: **22'**
GROUND SURFACE ELEVATION: **57.99**
DATE BEGUN: **4/22/04**
DATE COMPLETED: **4/23/04**

PVC CASING (DIA.) - 2"
SCREEN (DIA.) - 2"
PVC CASING (DIA.): 8"

MATERIAL 1 - Schedule 40 PVC
MATERIAL 2 - Schedule 40 PVC
MATERIAL 3 - Steel

LENGTH 1 - 10'
LENGTH 2 - 12'
LENGTH 3 - 1'

DEPTH | **WELL CONSTRUCTION** | **WELL SCHEMATICS**



CEMENT SEAL 0-1'

CONCRETE AND BENTONITE GROUT 1'-4'

SOLID PVC CASING 0-8'

BENTONITE SEAL 4'-6'

SAND PACK 6'-24'

PVC 10 SLOT SCREEN 8'-12'

PVC 20 SLOT SCREEN 12'-22'

SOLID PVC CASING 22'-24'

Paulus, Sokolowski, & Sartor	WELL CONSTRUCTION LOG	WELL NUMBER - GCMW - 15

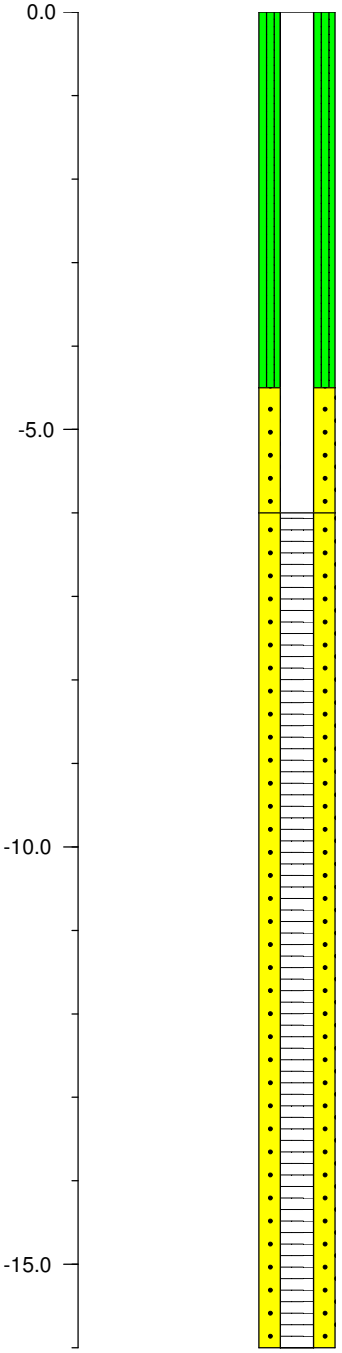
PROJECT NUMBER: **2522.012.024**
PROJECT NAME: **Glen Cove Former MGP Site**
LOCATION: **Glen Cove, Long Island, NY**
DRILLING CO: **Zebra Environmental Corporation**
DRILLING METHOD: **GeoProbe**
DRILLER/HELPER : **Bob Burawa/Luke Russ**
ENVIRONMENTAL SCIENTIST: **Jeff Diamond**

WEATHER : **Sunny, 55 deg F**
TOTAL DEPTH: **16'**
GROUND SURFACE ELEVATION: **51.57**
DATE BEGUN: **May 19, 2005**
DATE COMPLETED: **May 19, 2005**

PVC CASING (DIA.) - 1.75'
SCREEN (DIA.) - 1.75'
PVC CASING (DIA.): 2"

MATERIAL 1 - Schedule 40 PVC — LENGTH 1 - 6'
MATERIAL 2 - Stainless Steel — LENGTH 2 - 10'
MATERIAL 3 - Steel Casing with Concrete Pad — LENGTH 3 - 1'x1'

DEPTH	WELL CONSTRUCTION	WELL SCHEMATICS



BENTONITE SEAL 0 - 4.5'

SOLID PVC CASING 0 - 6'

SAND PACK (#00) 4.5' - 6'

PVC 20 SLOT SCREEN 6 '- 16'

Paulus, Sokolowski, & Sartor	WELL CONSTRUCTION LOG	WELL NUMBER - GCMW - 16

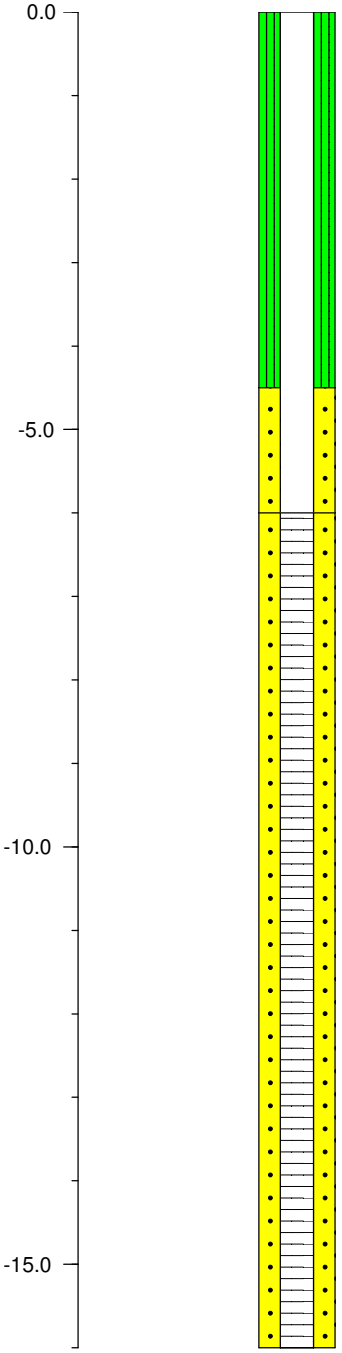
PROJECT NUMBER: **2522.012.024**
PROJECT NAME: **Glen Cove Former MGP Site**
LOCATION: **Glen Cove, Long Island, NY**
DRILLING CO: **Zebra Environmental Corporation**
DRILLING METHOD: **GeoProbe**
DRILLER/HELPER : **Bob Burawa/Luke Russ**
ENVIRONMENTAL SCIENTIST: **Jeff Diamond**

WEATHER : **Sunny, 55 deg F**
TOTAL DEPTH: **16'**
GROUND SURFACE ELEVATION: **51.03**
DATE BEGUN: **May 19, 2005**
DATE COMPLETED: **May 19, 2005**

PVC CASING (DIA.) - 1.75'
SCREEN (DIA.) - 1.75'
PVC CASING (DIA.): 2"

MATERIAL 1 - Schedule 40 PVC — LENGTH 1 - 6'
MATERIAL 2 - Stainless Steel — LENGTH 2 - 10'
MATERIAL 3 - Steel Casing with Concrete Pad — LENGTH 3 - 1'x1'

DEPTH	WELL CONSTRUCTION	WELL SCHEMATICS



BENTONITE SEAL 0 - 4.5'

SOLID PVC CASING 0 - 6'

SAND PACK (#00) 4.5' - 6'

PVC 20 SLOT SCREEN 6 '- 16'

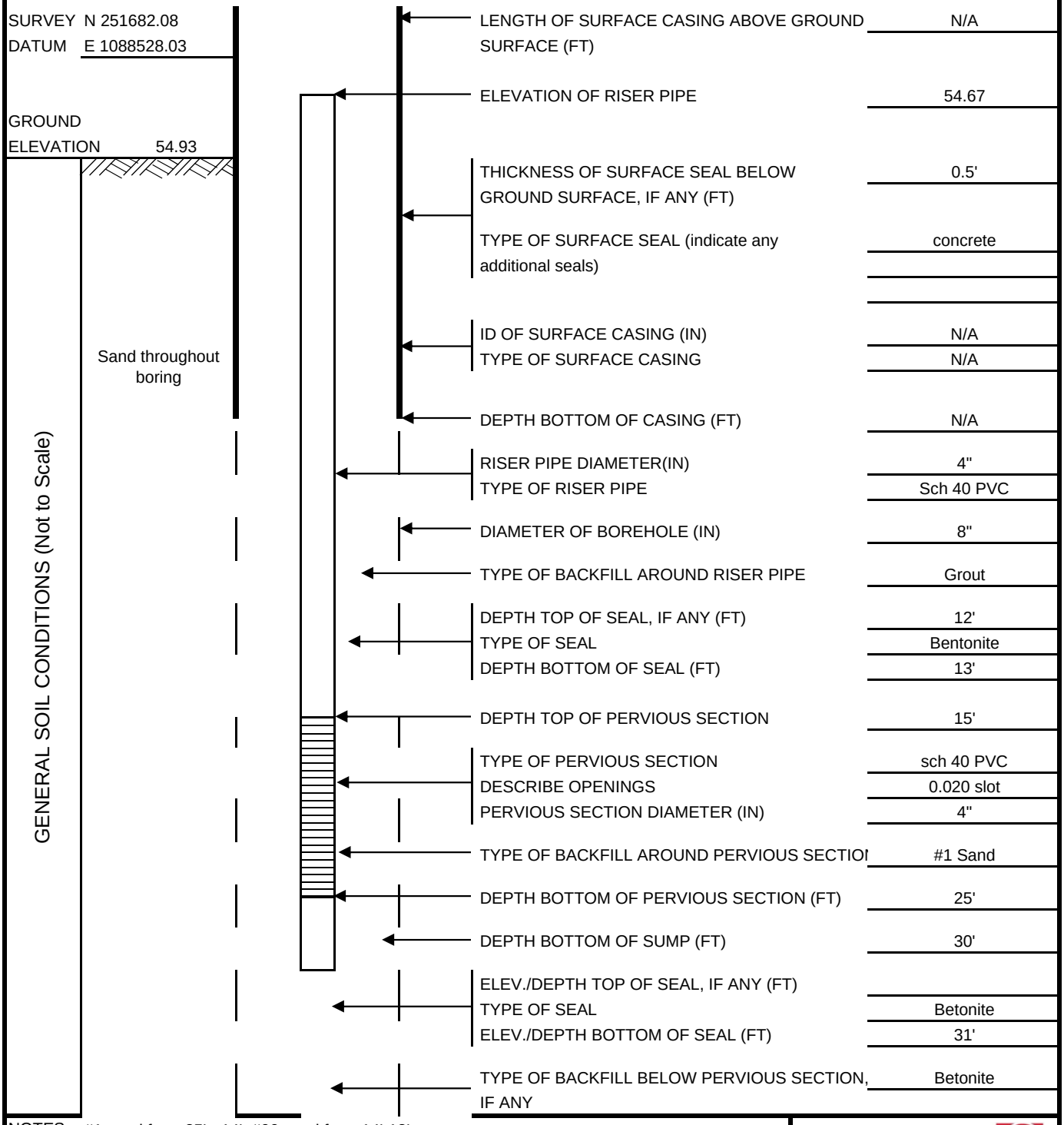
RECOVERY WELL INSTALLATION LOG

GCRW-01

Project	Glen Cove Former MGP		
Location	Orchard Substation, Glen Cove, NY	PG.	1 OF 1
Client	National Grid	Boring No.	GCSB-103
Contractor	Fenley & Nicol	Driller	Mike Mede
Location	10 feet off sub-station fence		
Inspected by	Mike Quinlan	Date Started	2/16/2012
Checked by	Mike Quinlan	Date Completed	2/16/2012
Project No.	093270-3-1303		

SURVEY N 251682.08
DATUM E 1088528.03

GROUND ELEVATION 54.93



LENGTH OF SURFACE CASING ABOVE GROUND SURFACE (FT)	N/A
ELEVATION OF RISER PIPE	54.67
THICKNESS OF SURFACE SEAL BELOW GROUND SURFACE, IF ANY (FT)	0.5'
TYPE OF SURFACE SEAL (indicate any additional seals)	concrete
ID OF SURFACE CASING (IN)	N/A
TYPE OF SURFACE CASING	N/A
DEPTH BOTTOM OF CASING (FT)	N/A
RISER PIPE DIAMETER(IN)	4"
TYPE OF RISER PIPE	Sch 40 PVC
DIAMETER OF BOREHOLE (IN)	8"
TYPE OF BACKFILL AROUND RISER PIPE	Grout
DEPTH TOP OF SEAL, IF ANY (FT)	12'
TYPE OF SEAL	Bentonite
DEPTH BOTTOM OF SEAL (FT)	13'
DEPTH TOP OF PERVIOUS SECTION	15'
TYPE OF PERVIOUS SECTION	sch 40 PVC
DESCRIBE OPENINGS	0.020 slot
PERVIOUS SECTION DIAMETER (IN)	4"
TYPE OF BACKFILL AROUND PERVIOUS SECTIOI	#1 Sand
DEPTH BOTTOM OF PERVIOUS SECTION (FT)	25'
DEPTH BOTTOM OF SUMP (FT)	30'
ELEV./DEPTH TOP OF SEAL, IF ANY (FT)	
TYPE OF SEAL	Betonite
ELEV./DEPTH BOTTOM OF SEAL (FT)	31'
TYPE OF BACKFILL BELOW PERVIOUS SECTION, IF ANY	Betonite

NOTES: #1 sand from 25' - 14'; #00 sand from 14'-13'

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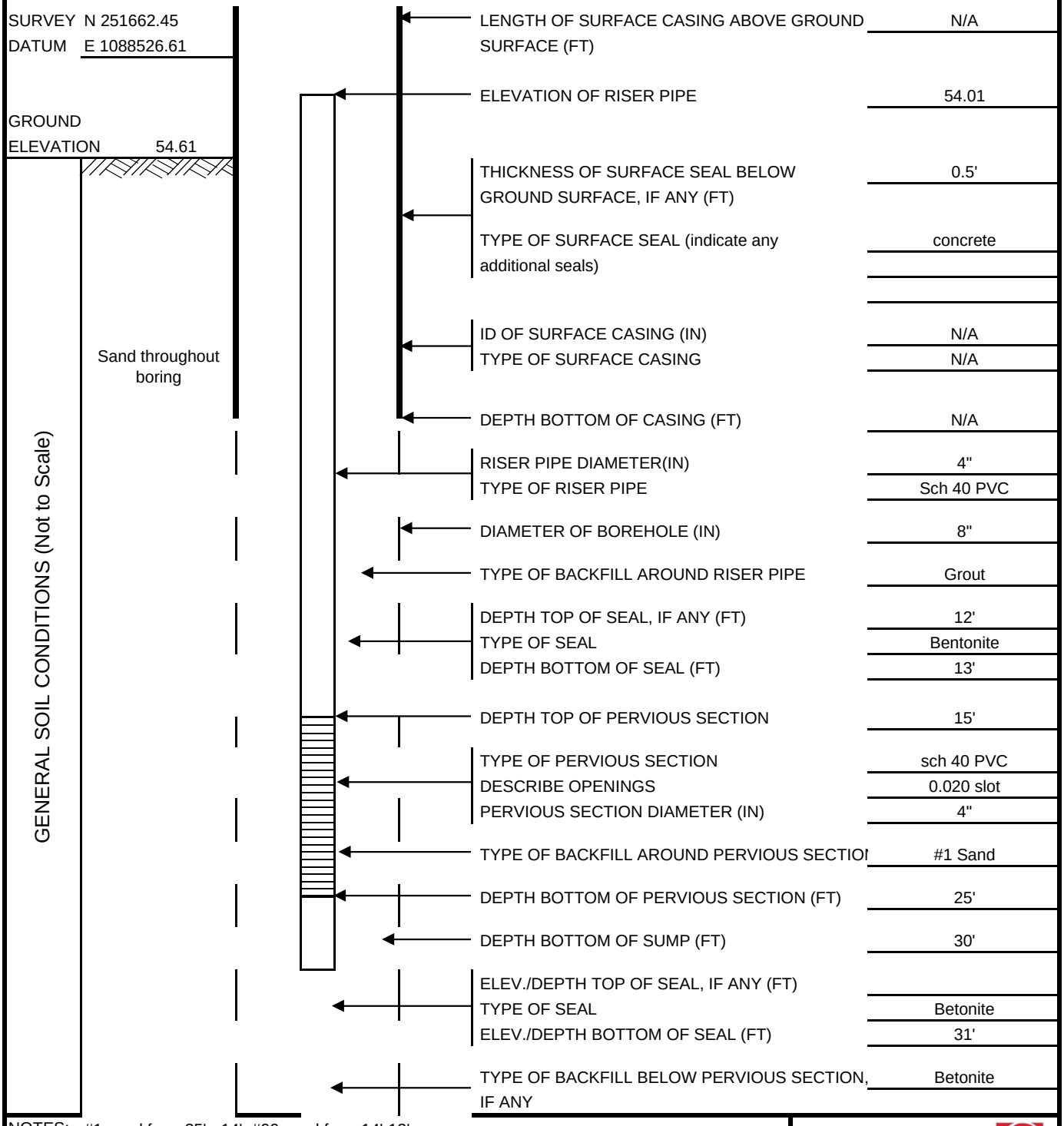
RECOVERY WELL INSTALLATION LOG

GCRW-02

Project	Glen Cove Former MGP		
Location	Orchard Substation, Glen Cove, NY	PG.	1 OF 1
Client	National Grid	Boring No.	GCSB-105
Contractor	Fenley & Nicol	Driller	Mike Mede
Location	10 feet off sub-station fence		
Inspected by	Mike Quinlan	Date Started	5/7/2012
Checked by	Mike Quinlan	Date Completed	5/8/2012
Project No.	093270-3-1303		



LENGTH OF SURFACE CASING ABOVE GROUND SURFACE (FT)	N/A
ELEVATION OF RISER PIPE	54.01
THICKNESS OF SURFACE SEAL BELOW GROUND SURFACE, IF ANY (FT)	0.5'
TYPE OF SURFACE SEAL (indicate any additional seals)	concrete
ID OF SURFACE CASING (IN)	N/A
TYPE OF SURFACE CASING	N/A
DEPTH BOTTOM OF CASING (FT)	N/A
RISER PIPE DIAMETER(IN)	4"
TYPE OF RISER PIPE	Sch 40 PVC
DIAMETER OF BOREHOLE (IN)	8"
TYPE OF BACKFILL AROUND RISER PIPE	Grout
DEPTH TOP OF SEAL, IF ANY (FT)	12'
TYPE OF SEAL	Bentonite
DEPTH BOTTOM OF SEAL (FT)	13'
DEPTH TOP OF PERVIOUS SECTION	15'
TYPE OF PERVIOUS SECTION	sch 40 PVC
DESCRIBE OPENINGS	0.020 slot
PERVIOUS SECTION DIAMETER (IN)	4"
TYPE OF BACKFILL AROUND PERVIOUS SECTIOI	#1 Sand
DEPTH BOTTOM OF PERVIOUS SECTION (FT)	25'
DEPTH BOTTOM OF SUMP (FT)	30'
ELEV./DEPTH TOP OF SEAL, IF ANY (FT)	
TYPE OF SEAL	Betonite
ELEV./DEPTH BOTTOM OF SEAL (FT)	31'
TYPE OF BACKFILL BELOW PERVIOUS SECTION, IF ANY	Betonite

NOTES: #1 sand from 25' - 14'; #00 sand from 14'-13'

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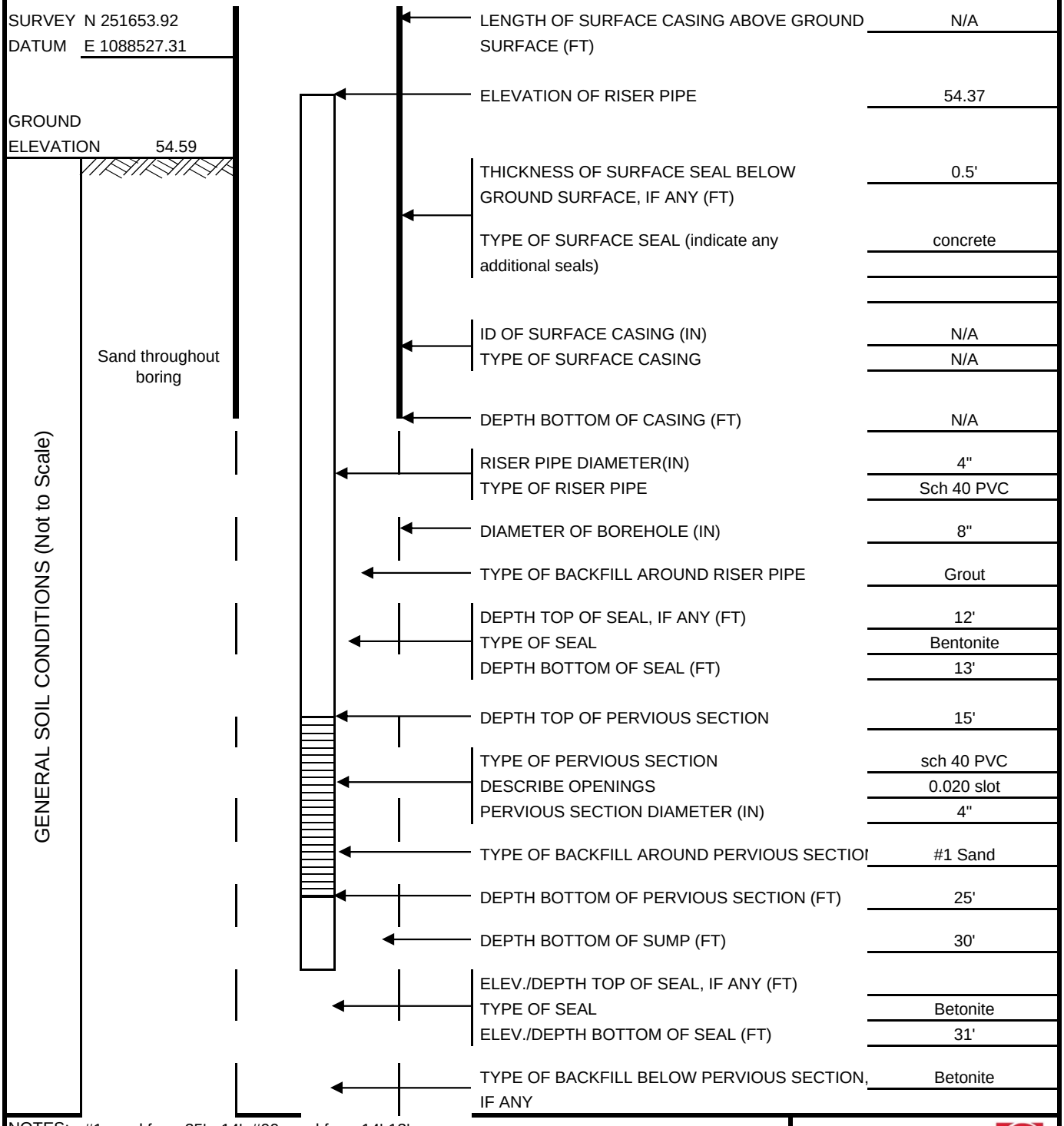
RECOVERY WELL INSTALLATION LOG

GCRW-03

Project	Glen Cove Former MGP		
Location	Orchard Substation, Glen Cove, NY	PG.	1 OF 1
Client	National Grid	Boring No.	GCSB-106
Contractor	Fenley & Nicol	Driller	Mike Mede
Location	10 feet off sub-station fence		
Inspected by	Mike Quinlan	Date Started	5/8/2012
Checked by	Mike Quinlan	Date Completed	5/8/2012
Project No.	093270-3-1303		



LENGTH OF SURFACE CASING ABOVE GROUND SURFACE (FT)	N/A
ELEVATION OF RISER PIPE	54.37
THICKNESS OF SURFACE SEAL BELOW GROUND SURFACE, IF ANY (FT)	0.5'
TYPE OF SURFACE SEAL (indicate any additional seals)	concrete
ID OF SURFACE CASING (IN)	N/A
TYPE OF SURFACE CASING	N/A
DEPTH BOTTOM OF CASING (FT)	N/A
RISER PIPE DIAMETER(IN)	4"
TYPE OF RISER PIPE	Sch 40 PVC
DIAMETER OF BOREHOLE (IN)	8"
TYPE OF BACKFILL AROUND RISER PIPE	Grout
DEPTH TOP OF SEAL, IF ANY (FT)	12'
TYPE OF SEAL	Bentonite
DEPTH BOTTOM OF SEAL (FT)	13'
DEPTH TOP OF PERVIOUS SECTION	15'
TYPE OF PERVIOUS SECTION	sch 40 PVC
DESCRIBE OPENINGS	0.020 slot
PERVIOUS SECTION DIAMETER (IN)	4"
TYPE OF BACKFILL AROUND PERVIOUS SECTIOI	#1 Sand
DEPTH BOTTOM OF PERVIOUS SECTION (FT)	25'
DEPTH BOTTOM OF SUMP (FT)	30'
ELEV./DEPTH TOP OF SEAL, IF ANY (FT)	
TYPE OF SEAL	Betonite
ELEV./DEPTH BOTTOM OF SEAL (FT)	31'
TYPE OF BACKFILL BELOW PERVIOUS SECTION, IF ANY	Betonite

NOTES: #1 sand from 25' - 14'; #00 sand from 14'-13'

GEI Consultants

Appendix B

Oxygen Injection System Design Report

GEI Consultants

Geotechnical
Environmental and
Water Resources
Engineering

Appendix B - Oxygen Injection System Design Report

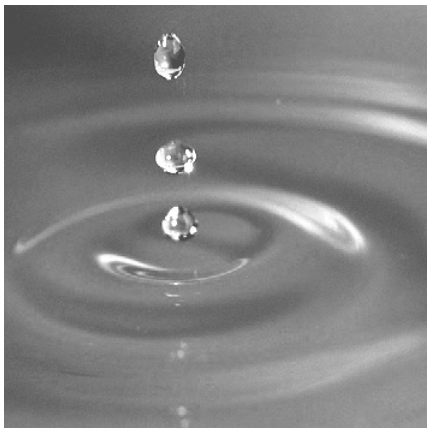
Glen Cove Former Manufactured Gas Plant

City of Glen Cove
Nassau County, New York
Order on Consent Index No. D1-001-98-11
Site No. 1-30-089P

Submitted to:
National Grid
175 East Old Country Road
Hicksville, NY 11801

Submitted by:
GEI Consultants, Inc., P.C.
400 Unicorn Park Drive
Woburn, MA 01801
781-721-4000

August 2014
093270



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Attachments

H:\WPROC\Project\NationalGrid\Glen Cove\Phase II RAWP\Final\Apendices\Appendix B - Design Report\RAWP PhII-AppB-DesignReport 082514.docx

Abbreviations and Acronyms

A_T	Total Area
AWQS	Ambient Water Quality Standards
COCs	Contaminants of Concern
FS	Factor of Safety
GEI	GEI Consultants, Inc., P.C.
K	Conductivity
LIPA	Long Island Power Authority
MGP	Manufactured Gas Plant
ND	Non Detect
n_e	Effective Porosity
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
O_{Demand}	Oxygen Demand
PCBs	Polychlorinated Biphenyls
PS&S	Paulus, Sokolowski and Sartor Engineering, PC
RA	Remedial Action
RAOs	Remedial Action Objectives
RAP	Remedial Action Plan
RAWP	Remedial Action Work Plan
RI	Remedial Investigation
RIR	Remedial Investigation Report
ROI	Radius of Influence
SVOCs	Semivolatile Organic Compounds
TOGS	Technical and Operational Guidance Series
v_x	Groundwater Velocity
VOCs	Volatile Organic Compounds
W_m	Daily Metal Contaminant Flow
W_o	Daily Organic Contaminant Flow
W_t	Daily Total Contaminant Flow

Abbreviations and Acronyms (cont.)

MEASUREMENTS

bgs	Below Ground Surface
dh/dl	Hydraulic Conductivity
ft	Feet
ft^3	Cubic feet
ft/day	Feet per Day
GPD	Gallons per Day
kg	Kilogram
L	Liter
lb/day	Pounds per Day
lb/ft^3	Pounds per cubic feet
m	Meter
Mg	Milligram
mg/L	Milligrams per Liter
psf	Pounds per Square Foot
psi	Pounds per Square Inch
°R	Degrees Rankine
SCFH	Standard Cubic Feet per Hour
sec	Second
µg/L	Micrograms Per Liter

1. Introduction

GEI Consultants, Inc., P.C. (GEI), on behalf of National Grid, has prepared this Design Report to present the system requirements and associated calculations for the oxygen injection system that will operate at the Glen Cove Former Manufactured Gas Plant (MGP) site (the Site) located in the City of Glen Cove, Nassau County, New York (Figure 1 of the Remedial Action Work Plan [RAWP]). The Site is currently occupied by an active electric system substation, owned by the Long Island Power Authority (LIPA). The Glen Cove oxygen injection system represents a portion of the overall site remedy detailed in the *Remedial Action Plan, Glen Cove Former Manufactured Gas Plant, Town of Oyster Bay, Nassau County, New York* (RAP) prepared by GEI, dated March 2010 (GEI, 2010).

The site remedy detailed in the RAP was separated into two phases. Phase I consisted of the removal of shallow and accessible MGP-related source material and subsequent treatment of the material at a thermal treatment facility. The removal of source material was done to reduce the contaminant mass and reduce the flux of contaminants into the groundwater from the Site. An oxygen injection pilot test was also performed to gather preliminary data for the design of the oxygen injection system (GEI, 2011). Phase II includes the installation of an oxygen injection system to treat the residual contaminant plume prior to its migration off Site. The purpose of this system will be to enhance the natural attenuation process currently observed in the subsurface soils (GEI, 2010b).

This design report is the basis for the oxygen injection system requirements. The construction of the system will be performed as dictated in the Contract Documents, which are contained in **Appendix C** of the *Glen Cove Phase II Remedial Action Work Plan*.

The completed system will inject oxygen into the northwestern portion of the LIPA substation, and will expedite the bioremediation of the MGP-related contaminants dissolved in the groundwater, prior to off Site migration.

1.1 Design Document Organization

This Design Document has been organized as follows:

- Section 1 the introduction, provides a summary of the purpose of the Design Report and a description of the technology.
- Section 2 presents the remedial goals and monitoring criteria of the system.
- Section 3 presents the analytical data used in the design of the system.
- Section 4 presents the development of the system requirements.

- Section 5 presents the calculations used in the design of the system.
- Section 6 presents the performance monitoring that will be completed as part of the system start-up.

1.2 Technology Description

Enhanced bioremediation by oxygen injection is a process in which oxygen gas is injected into groundwater to create an aerobic environment, that will facilitate the aerobic biodegradation of contaminants of concern (COCs) by indigenous aerobic microorganisms. Groundwater COCs associated with the Site include volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs). If properly implemented, and groundwater geochemistry permits, this treatment method can create an aerobically active treatment zone in the vicinity of the injection well. When groundwater passes through this zone, it becomes oxygenated and stimulates the growth of the aerobic microbe population in the groundwater to augment the biodegradation of the dissolved-phase impacts.

The technology utilizes patented equipment to generate 90 to 95 percent pure oxygen gas from ambient air by removing the nitrogen component. The oxygen is then injected in pulsed intervals at controlled rates into the subsurface through a series of injection wells at low flow rates. The low flow rates and pulsed injection intervals are cycled to allow for the maximum transfer of vapor-phase oxygen to dissolved-phase oxygen. Unlike other oxygen supplying techniques, it treats the entire plume by dispersing and dissolving oxygen gas into the formation, resulting in high transfer efficiency to groundwater (Matrix Environmental Technologies, Inc., 2010). The process is dissimilar from air sparging, in which the objective is to maintain the injected air in the vapor phase using high flow rates, which strips the COCs from the groundwater for collection in the vadose zone. Slowly injecting oxygen at 90 to 95 percent purity can increase dissolved oxygen concentrations in groundwater to a maximum of approximately 40 milligrams per liter (mg/L); whereas, air injected under sparge processes yields a maximum dissolved oxygen concentration of approximately 9 mg/L, and requires subsequent collection and treatment.

2. Remedial Goals

2.1 Remedial Goals

The objective of the Glen Cove oxygen injection system is to treat groundwater impacts prior to their migration off the Site. The installation of this system will help to achieve the Remedial Action Objectives (RAOs) that are discussed in Section 2 of the Phase II RAWP.

National Grid proposes to implement and maintain the system until one of the following performance-based goals is met:

- Groundwater leaving the Site meets New York State Department of Environmental Conservation (NYSDEC) Technical and Operational Guidance Series (TOGS) Ambient Water Quality Standards and Guidance Values for Class GA Aquifers dated June 1998 and associated errata and addendums for three consecutive quarters.
- Continued operation of the system produces diminishing returns as indicated by periodic sampling of groundwater wells installed up and down gradient of the oxygen injection treatment system.

2.2 System Location

The treatment zone for the oxygen injection system will be located on sections of the western and northern property boundaries as shown on the Site Plan (Figure 2 of the RAWP). This area was selected as the treatment zone because it will intersect the shallow and intermediate depth groundwater that is migrating from inaccessible source material that was not removed during the Phase I Remedial Action excavation. The decision to place the system in this area was based on the hydrogeology presented in the NYSDEC-approved *Final Remedial Investigation Report, Glen Cove Former Manufactured Gas Plant Site, Glen Cove, New York*, November 2008 (Remedial Investigation Report [RIR]) prepared by Paulus, Sokolowski and Sartor Engineering, PC (PS&S, 2008) which was submitted by National Grid to the NYSDEC on November 14, 2008.

Groundwater analytical results are depicted in Table 1. The extent of the groundwater impacts is shown in Drawing 7 of the Contract Documents (Appendix C of the RAWP).

3. Design Relevant Investigation Summary

3.1 Summary of Investigations

A groundwater sampling program has been established for the Site to monitor natural attenuation. The analytical results from the July 2014 sampling event were used in the calculations for the oxygen injection system design. An oxygen injection pilot test was performed to collect data to be used in the design of the system. The results of the pilot test are located in Table 2.

3.1.1 Summary of Oxygen Injection Pilot Test

The primary purpose of the pilot test was to provide site-specific information to optimize the design of the oxygen injection system for the installation of the full scale application. This information was necessary as the physical characteristics (e.g. soil type/stratification, and groundwater depth) of the Site create a unique set of conditions for every system. The pilot test measured the movement of air through the soil to collect site-specific data which can be used to determine injection well spacing (radius of influence [ROI]), depth, and oxygen flow rate. The results of the pilot test indicate that the ROI for the Site is approximately 5 feet. This was determined by injecting air into one monitoring well while other nearby wells, offset at various distances, were monitored for changes in pressure.

During the pilot test, air was injected into the ground continuously until a steady state pressure response had been recorded in defined nearby wells. The GCMW-17, 18, and 19 well clusters were used for the pilot test, which are located in the northwest portion of the Site (Figure 2 of the RAWP). The pilot test consisted of injecting air into GCMW-18I and GCMW-18I2, and measuring the response at the other well clusters. Injection times, pressures and flow rates are presented in Table 2.

As depicted in Table 2, when the injected air pressure into GCMW-18I2 was allowed to normalize (i.e. reach a state where the air pressure was no longer appreciably changing), pressure changes occurred in GCMW-17I2 and 19I2. Both of these wells are approximately 5 feet away from GCMW-18I2. Injected air into GCMW-18I1 that was allowed to normalize resulted in a pressure change in GCMW-17I1, which is located approximately 5 feet away from GCMW-18I1. The other wells monitored in both instances did not see any resultant pressure changes during either of the normalizing segments. These results suggest that a ROI of 5 feet is typical for the treatment zone, and this value will be used in the design of the system. Additional information about the oxygen injection pilot test can be found in the *Oxygen Injection Pilot Test Work Plan* (GEI, 2011).

3.2 Summary of Analysis Results

3.2.1 Summary of Groundwater Data

Groundwater has been sampled at the Site during several previous investigations. The groundwater analytical data found during the Remedial Investigation (RI) (PS&S, 2008) as well as from the quarterly groundwater program at the Site (GEI, 2010d) was used in the design of the oxygen injection system. The groundwater analytical data used in this design report can be found in the following tables and attachment:

- Table 1 – Q3 2014 Analytical Groundwater Data
- Table 2 – Oxygen Injection Pilot Test Results
- Attachment 1 – 2008 RIR Analytical Groundwater Data

Concentrations above the NYSDEC Division of Water TOGS Ambient Water Quality Standards and Guidance Values (AWQS) and Groundwater Effluent Limitations were observed for VOCs, SVOCs, and metals in several of the samples collected. A majority of the groundwater impacts were observed in the northwest portion of the Site between approximately 10 and 40 feet below ground surface (bgs). The data are presented in drawing 7 of the Contract Documents (Appendix C of the RAWP).

As mentioned, several metals were detected in concentrations above the AWQS. Although these concentrations are likely not MGP-related, this information will provide important design data for the site remedy. Groundwater sample locations are highlighted on the Site Plan (Figure 2 of the RAWP).

3.2.2 Soil

Work completed under the *Glen Cove Phase 1 Remedial Action Work Plan* (GEI, 2010c) focused on the excavation of shallow subsurface soils at the Site. The Phase I Remedial Action (RA) included the excavation, removal, and off-Site disposal of shallow and accessible MGP-related impacted materials to a depth of approximately 15 feet (ft) below existing grade on the former Glen Cove MGP property within the identified "hot spot" areas. Impacted materials left in place above 15 ft below existing grade were below the active substation and considered to be not accessible. More information about the Phase 1 RA can be found in the *Glen Cove Phase 1 Remedial Action Work Plan* (GEI, 2010) as well as in the *Glen Cove Phase 1 Construction Completion Report* (GEI, 2012).

4. System Requirements

4.1 Injection Well Depths

Injection wells require screening at multiple depths to efficiently treat the groundwater impacts ranging between 10 and 40 feet bgs. The deepest injection well screen will be set at 32 feet bgs. The injection well layout and the extent of the groundwater impacts are shown on the bioremediation cross sections (Appendix C of the RAWP – Contract Drawings).

4.2 Design Approach

The calculations presented below will establish the oxygen requirements based on the average contaminant mass loading in the area of treatment. The final design will include the minimum oxygen requirement and appropriate well spacing to meet the objective of the remedy.

4.3 Groundwater Volumetric Flow Rate

In order to determine the volume of groundwater that will require treatment on a daily basis, it is first necessary to estimate the cross-sectional area of the flow path. The following assumptions were used to calculate the cross sectional area:

- The total length of the treatment zone is approximately 75 feet.
- The average depth of groundwater given seasonal variations is approximately 10 feet bgs.
- The maximum depth of groundwater impacts observed in the treatment zone is approximately 40 feet bgs.

Using this information, it is possible to calculate the cross-sectional area (A_T) to receive treatment.

Equation 4.1

$$A_T := 75ft \cdot (40ft - 10ft)$$

$$A_T = 2.25 \times 10^3 \cdot ft^2$$

In order to calculate the volumetric flow rate, additional information about the subsurface is needed. The required information is available in the 2008 RIR, and is presented below:

- The average horizontal conductivity (K) for the Site is 0.75 feet per day (ft/day), and will be used as the velocity, v_x.
- The average hydraulic gradient, n_e, (*dh/dl*) in the shallow zone across the Site is 0.04 feet/foot.

The RIR presents the average shallow horizontal conductivity, 0.22 ft/day, as the horizontal conductivity for the Site. In order to be conservative, however, for the calculations below the average intermediate horizontal conductivity listed in the RIR of 0.75 ft/day will be used. The information from the 2008 RIR and the cross sectional area determined in equation 4.1 make it possible to calculate the daily volumetric flow of water through the treatment zone.

Equation 4.2

$Q := v_x \cdot n_e \cdot A_T$ (Fetter, 82)

$$Q = 67.5 \cdot \frac{ft^3}{day}$$

$GPD := Q \cdot 7.481 \frac{gal}{ft^3}$

$$GPD = 504.967 \cdot \frac{gal}{day}$$

The result of Equation 4.2 indicates that approximately 500 gallons per day (GPD) of groundwater will pass through the vertical treatment zone.

4.4 Average Contaminant Mass Loading

The contaminant load of organic compounds (total VOCs plus total SVOCs) observed in the groundwater passing through the treatment zone ranges from not detected (ND) at many wells to 926 micrograms per liter (µg/L) at GCMW-11S on July 18th, 2013, which can be written equivalently as 0.926 mg/L. It is conservatively assumed that the entire groundwater plume will have a loading of organic contaminants equal to the highest value observed.

Using the groundwater volumetric flow rate determined in Equation 4.2 and the average contaminant mass loading, it is possible to calculate the daily organic contaminant load (W_o)

moving through the system. The following abbreviations will apply to the remainder of the equations used in this Design Report.

- kg = kilogram
- L = liter
- m = meter
- mg = milligrams
- sec = second

Equation 4.3

$$W_o := 0.926 \cdot \frac{mg}{L} \cdot 1 \cdot \frac{kg}{1000000 \cdot mg} \cdot 9.82 \cdot \frac{m}{sec^2} \cdot 1 \cdot \frac{lb}{4.44 \cdot kg \cdot \frac{m}{sec^2}} \cdot 1 \frac{L}{.264gal} \cdot GPD$$

$$W_o = 3.917 \times 10^{-3} \cdot \frac{lb}{day}$$

Equation 4.3 indicates that the $W_{o,}$ that passes through the oxygen injection zone that will require treatment is approximately 0.004 pounds per day (lb/day).

A portion of the dissolved metals will also react with the dissolved oxygen. Dissolved metals observed during the sampling events mentioned above ranged from ND to 114 mg/L. It is assumed that 50-percent of the total dissolved metals will contribute to the oxygen demand. Therefore, it is assumed that 50-percent of the maximum observed concentration of dissolved metals will contribute to the daily total contaminant load (W_t). Not all metals are considered to be contaminants and many are naturally occurring. However, because they will react with dissolved oxygen, their presence must be accounted for in order to appropriately calculate the daily oxygen demand of the system.

Following a similar approach to Equation 4.3, it is possible to calculate the contribution of dissolved metals (W_m) likely to react with the dissolved oxygen.

Equation 4.4

$$W_m := 57 \cdot \frac{mg}{L} \cdot 1 \cdot \frac{kg}{1000000 \cdot mg} \cdot 9.82 \cdot \frac{m}{sec^2} \cdot 1 \cdot \frac{lb}{4.44 \cdot kg \cdot \frac{m}{sec^2}} \cdot 1 \frac{L}{.264gal} \cdot GPD$$

$$W_m = 0.241 \cdot \frac{lb}{day}$$

The results of Equation 4.4 show that the W_m is equal to approximately 0.24 lb/day.

The W_t, is the summation of the two contributing loads, W_o and W_m.

Equation 4.5

$$W_t := W_o + W_m$$

$$W_t = 0.245 \cdot \frac{lb}{day}$$

The results of Equation 4.5 indicate that the oxygen injection system will be required to provide sufficient oxygen to accept a W_t of approximately 0.25 lb/day.

4.5 Oxygen Demand

As determined in subsection 4.4, the W_t entering the treatment zone is approximately 0.25 lb/day. The ratio of W_t, to the amount of oxygen needed to treat it is estimated from the reaction of oxygen with an organic compound contaminant. For simplicity of calculation, naphthalene was chosen for this purpose based on its relatively high concentration in the groundwater, and its high demand for oxygen when biodegrading under aerobic conditions.

Aerobic Biodegradation of Naphthalene

$$C_{10}H_8 + 12O_2 \rightarrow 10CO_2 + 4H_2O$$

As noted in the reaction above, 12 mol of oxygen are required for the oxidation of 1 mol of naphthalene. This information can then be used to create a ratio of molecular weights for the reaction.

Equation 4.6

$$O_2 := 12mol \cdot \left(2 \cdot 16 \frac{lb}{mol}\right)$$

$$O_2 = 384 \cdot lb$$

$$Nap := 1 \cdot mol \cdot \left[\left(10 \cdot 12 \cdot \frac{lb}{mol}\right) + \left(8 \cdot 1 \cdot \frac{lb}{mol}\right)\right]$$

$$Nap = 128 \cdot lb$$

$$\text{Ratio} := \frac{O_2}{\text{Nap}}$$

$$\text{Ratio} = 3$$

The result of Equation 4.6 concludes that 3 pounds of oxygen are required to effectively biodegrade 1 pound of contaminant. However, a small percentage of injected oxygen will likely not enter the dissolved phase or will be consumed by other organic processes. In order to account for this loss of oxygen, a factor of safety (FS) of 2 will be applied in the final step of calculating the oxygen demand (O_{Demand}) for the system.

Equation 4.7

$$FS := 2$$

$$O_{Demand} := W_t \cdot \text{Ratio} \cdot FS$$

$$O_{Demand} = 1.47 \cdot \frac{lb}{day}$$

Equation 4.7 concludes that the oxygen system must inject approximately 1.5 pounds per day to biodegrade the daily contaminant load.

5. System Design

5.1 System Details

The injection well spacing is based off the findings of the oxygen injection system pilot test completed on April 27 2011, the results of which indicated that the ROI was approximately 5 feet. Injection well clusters will be spaced 7.5 feet apart in order to allow for the overlapping of consecutive ROIs. Injection well locations and depths are presented in Drawing 7 of the Contract Documents (Appendix C of the RAWP).

5.2 System Equipment Capacity

The oxygen generating equipment used on the Site must be able to provide the required O_{Demand} calculated in Section 4. The system's generation capacity is rated in terms of Standard Cubic Feet per Hour (SCFH), which is the number of cubic feet of air, at standard temperature and pressure, injected in an hour. Standard temperature and pressure is generally 2,117 pounds per square foot (psf), and 520 degrees Rankine (°R). In order to determine the minimum system rating for the Site, it is necessary to convert the daily O_{Demand} into a flow rate in SCFH. It will also be necessary to account for the Matrix system filtering the ambient air to an approximately 95% pure oxygen gas.

Equation 5.1

$$n := O_{Demand} \cdot 1 \cdot lb \cdot \frac{mol}{32 \cdot lb} \cdot 1day$$

$$P := 2117 \frac{lb}{ft^2}$$

$$T := 520R$$

$$R_{air} := 1545.4ft \cdot \frac{lb}{lb \cdot mol \cdot R}$$

$$V_O := \frac{\frac{n \cdot R_{air} \cdot T}{P}}{\frac{.95}{24hr}}$$ (Fechner-Levy, Hemond, 42)

$$V_O = 0.765 \cdot \frac{ft^3}{hr}$$

Rounding up to the nearest whole number, the results of Equation 5.1 indicate that the minimum rating for the system at the Site must be at least 1 SCFH.

The oxygen will be created and injected in pulses, i.e. system will inject oxygen for a period of time, and then cease injection so it can replenish its onboard supply of oxygen. The pulse-gap cycle for the system will need to be set such that at least an average of 1.0 cubic feet (ft^3) of oxygen at standard-temperature-pressure is injected into the subsurface per hour before the injection cycle ceases. The length of time required to inject that amount of oxygen into the subsurface will vary with the SCFH rating of the system.

One operational advantage of this system is that larger amounts of oxygen mass can be routed to any particular section of the impacted groundwater zone. Therefore, if monitoring activities during system operation indicates that a specific section of the approaching impacted groundwater has a higher carbon loading relative to the rest of the groundwater, then higher amounts of oxygen mass can be directed to this section without disturbing the lower oxygen demand across the rest of the system.

5.3 Injection Pressure

In order to inject oxygen gas into the subsurface, the system will be required to displace the groundwater that will accumulate in the injection wells. To displace the non-oxygenated groundwater, the injection pressure of the oxygen gas in the wells must be enough to overcome the hydrostatic pressure head of the groundwater.

Given that a unit weight of water is generally taken to be 62.4 pounds per cubic feet (lb/ft^3), the groundwater table is approximately 10 feet bgs, and that the deepest injection point possible will be approximately 32 feet bgs, the minimum injection pressure that will be required for the system can be calculated.

Equation 5.2

$$P_{Inj} := (32 \cdot ft - 10 \cdot ft) \cdot 62.4 \cdot \frac{lb}{ft^3} \cdot \frac{1 \cdot ft^2}{144 in^2}$$

$$P_{Inj} = 9.533 \cdot \frac{lb}{in^2}$$

The results of Equation 5.2 indicate that the system must be able to generate a minimum pressure of approximately 10 pounds per square inch (psi) at each well in order to inject oxygen into the subsurface.

5.4 Special Design Considerations

The oxygen injection system is limited to its proposed location due to site constraints. There is a steep grade with retaining wall along the northern edge of the Site that makes construction in that area difficult. Additionally, the Site contains newly installed substation structures that have not been surveyed. Accordingly, the precise location of the injection points will be determined once a survey is performed to determine the location of the underground structures.

5.5 Summary

The key elements of the design for the Glen Cove oxygen injection system are summarized below:

- The total volume of groundwater that will pass through the oxygen injection system is approximately 500 GPD.
- The total amount of contaminants and incidental metals reacting with the dissolved oxygen that will require treatment in a day is approximately 0.25 lbs.
- The oxygen system must inject approximately 1.5 pounds per day to biodegrade the daily contaminant load.
- In order to treat the daily flux of contaminants, the Glen Cove oxygen injection system must be capable of delivering oxygen gas with an average purity of 95 percent, at a rate of 1.0 SCFH.
- The system must be able to generate pressure greater than 10 psi in the wells in order to inject oxygen into the subsurface.

6. Performance Monitoring

A series of monitoring wells have already been installed at the Site as part of the RI. National Grid requested that groundwater sampling be performed on a quarterly basis in June 2010. In May 2011, National Grid requested that GEI begin semi-annual groundwater monitoring in July 2011 (Third Quarter 2011) at the completion of the Phase I Remedial Action and LIPA feeder cable relocation. This sampling schedule is to continue until the installation of the oxygen injection system is complete.

6.1 Groundwater Monitoring

A number of monitoring wells were abandoned or destroyed during the Phase I remedial action or during the subsequent LIPA construction activities. A number of these wells were reinstalled and sampled in July 2014. The groundwater data generated from this sampling event represents the current site conditions post excavation. This data set was used to modify the treatment system design as noted in this report. The specific locations of the newly installed wells are presented on the design drawings. In some cases these locations were modified based on the actual conditions of the site following the LIPA construction.

The well clusters will be monitored prior to start-up of the system and at quarterly intervals during system operation. The analytical results and field measurements will be used in evaluating the performance of the groundwater treatment system. Specifically, the data collected is focused on monitoring the aerobic environments created by the system; the bioactivity of the aquifer; and the ability of the bioactivity to reduce dissolved phase MGP-related constituent concentrations in the area. All analytical testing will be performed by a laboratory that holds a current New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program certification, and will be validated to ensure data quality. National Grid will present the results of future sampling events in the Quarterly Operations, Maintenance, and Monitoring reports.

Schedule of Performance Monitoring

Monitoring Well	Screen Interval	Property	Sampling Frequency/Parameters
PZ-05	8-18	LIPA	Quarterly/VOCs & SVOCs
PZ-06	7-17	LIPA	Quarterly/VOCs & SVOCs
GCMW-08S	26-36	Private Property	Quarterly/VOCs & SVOCs
GCMW-08D	60-70	Private Property	Quarterly/VOCs & SVOCs
GCMW-09S-R	6-16	LIPA	Quarterly/VOCs & SVOCs, Delineation Parameters
GCMW-09I-R	24-34	LIPA	Quarterly/VOCs & SVOCs, Delineation Parameters
GCMW-10S-R	10-15	LIPA	Quarterly/VOCs & SVOCs, Delineation Parameters
GCMW-10I-R	20-30	LIPA	Quarterly/VOCs & SVOCs, Delineation Parameters
GCMW-11S	8-20	LIPA	Quarterly/VOCs & SVOCs
GCMW-11I	23-28	LIPA	Quarterly/VOCs & SVOCs
GCMW-12S	14-24	LIPA	Quarterly/VOCs & SVOCs
GCMW-13S	12-22	LIPA	Quarterly/VOCs & SVOCs
GCMW-13I	25-30	LIPA	Quarterly/VOCs & SVOCs
GCMW-14S-R	10-20	LIPA	Quarterly/VOCs & SVOCs
GCMW-14I-R	23-28	LIPA	Quarterly/VOCs & SVOCs
GCMW-15	6-16	Rt 107 ROW	Quarterly/VOCs & SVOCs, Delineation Parameters
GCMW-16	6-16	Rt 107 ROW	Quarterly/VOCs & SVOCs, Delineation Parameters
GCMW-20I	35-45	LIPA	Quarterly/VOCs & SVOCs, Delineation Parameters
GCMW-20S	9-19	LIPA	Quarterly/VOCs & SVOCs, Delineation Parameters
GCMW-20I2	45-50	LIPA	Quarterly/VOCs & SVOCs, Delineation Parameters
GCMW-21I	45-55	Private Property	Quarterly/VOCs & SVOCs, Delineation Parameters
GCMW-21I2	45-55	Private Property	Quarterly/VOCs & SVOCs, Delineation Parameters
GCMW-22I	27-37	LIPA	Quarterly/VOCs & SVOCs, Delineation Parameters
GCMW-22I2	47-57	LIPA	Quarterly/VOCs & SVOCs, Delineation Parameters
GCRW-01		LIPA	Quarterly/VOCs & SVOCs if No DNAPL in Well
GCRW-02		LIPA	Quarterly/VOCs & SVOCs if No DNAPL in Well
GCRW-03		LIPA	Quarterly/VOCs & SVOCs if No DNAPL in Well

Delineation Parameters include Total Cyanide, Metals, and Polychlorinated Biphenyls (PCBs).

7. References

Fechner-Levy, E., Hemond, H., 2000. *Chemical Fate and Transport in the Environment*, Academic Press, San Diego, 2000.

Fetter, C., 2001. *Applied Hydrogeology*, Prentice-Hall, Inc., Upper Saddle River, 2001.

GEI Consultants, Inc., 2010, *Soil Pre-Characterization Investigation Work Plan, Orchard Substation, Glen Cove Former MGP Site*, January 12, 2010.

GEI Consultants, Inc., 2010, *Remedial Action Plan, Glen Cove Former Manufactured Gas Plant, Glen Cove, New York*, March 10, 2010.

GEI Consultants Inc., 2010, *Final Phase 1 Remedial Action Work Plan, Glen Cove Former Manufactured Gas Plant Site, Glen Cove, New York*, May 26, 2010.

GEI Consultants, Inc., 2010, *Quarterly Groundwater Monitoring Report First and Second Quarters (Q1 & Q2) 2010, Glen Cove Former MGP Site, Glen Cove, New York*, September 2010.

GEI Consultants Inc., 2011. *Oxygen Injection Pilot Test Work Plan, Glen Cove Former Manufactured Gas Plant, Glen Cove, New York*, April 27, 2011.

GEI Consultants Inc., 2012. *Phase I Construction Completion Report, Glen Cove Former MGP Site, Glen Cove, New York*, September 28, 2012.

Matrix Environmental Technologies, Inc. "O_2 Injection." Matrix Environmental Technologies, Inc., 2010. Web. 21 October 2010 <http://www.matrixbiotech.com/injection/default.aspx>.

Paulus, Sokolowski, and Sartor Engineering, PC, 2008. *Final Remedial Investigation Report, Glen Cove Former Manufactured Gas Plant Site, Glen Cove, New York*, November 2008.

Tables

Table 1. Q3 2014 Groundwater Analytical Results
Appendix B - Oxygen Injection System Design Report
Phase II RAWP
Glen Cove Former MGP Site
Glen Cove, New York

Sample Name	NYS AWQS	GCMW-22I2	GCMW-22I	GCMW-09IR	GCMW-11I	GCMW-11S	GCMW-13I	GCMW-20I2	GCMW-20I	GCRW-01	GCMW-09S	GCRW-02	GCRW-03
Sample Date		7/8/2014	7/8/2014	7/8/2014	7/9/2014	7/9/2014	7/9/2014	7/9/2014	7/9/2014	7/11/2014	7/11/2014	7/11/2014	7/11/2014
BTEX (µg/L)													
Benzene	1	1 U	1 U	1 U	**2.6**	**63**	1 U	1 U	1 U	1 U	**6.1**	**2**	1 U
Toluene	5	1 U	1 U	1 U	1 U	**18**	1 U	1 U	1 U	**2.7**	**49**	**14**	1 U
Ethylbenzene	5	1 U	1 U	**1.1**	1 U	**340 D**	1 U	1 U	1 U	**32**	**150**	**39**	**6.6**
Total Xylene	5	1 U	**4.2**	**4.7**	**1.3**	**290**	1 U	1 U	**1.5**	**27**	**180**	**45**	**3.9**
Total BTEX	NE	ND	**4.2**	**5.8**	**3.9**	**711**	ND	ND	**1.5**	**61.7**	**385.1**	**100**	**10.5**
Other VOCs (µg/L)													
Acetone	50*	1 U	1 U	**7**	1 U	1 U	1 U	1 U	1 U	1 U	**4.4 J**	**10**	1 U
Bromodichloromethane	50*	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromoform	50*	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromomethane	5	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Carbon disulfide	60*	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Carbon tetrachloride	5	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chlorobenzene	5	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloroethane	5	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloroform	7	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloromethane	5	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Dibromochloromethane	50*	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethane	5	1 U	1 U	1 U	1 U	**2**	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	0.6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Total 1,2-Dichloroethene	NE	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene	0.07	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloropropane	1	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
cis-1,3-Dichloropropene	0.4	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,3-Dichloropropene	0.4	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
2-Hexanone	50*	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Methyl ethyl ketone (2-Butanone)	50*	1 U	1 U	**4.3 J**	1 U	1 U	1 U	1 U	1 U	1 U	**1.4 J**	**19**	1 U
Methyl tert-butyl ether (MTBE)	10*	1 U	1 U	1 U	**48**	1 U	1 U	**5.6 J**	1 U	**2.3 J**	**1.5 J**	**3.5 J**	**1.8 J**
4-Methyl-2-pentanone (MIBK)	NE	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Methylene chloride	5	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Styrene	5	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	**5.6**	1 U	1 U
1,1,2,2-Tetrachloroethane	5	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene (PCE)	5	**4.3**	**5.8**	**2.7**	**1.1**	1 U	**3.4**	**1.6**	**2.7**	1 U	1 U	1 U	1 U
1,1,1-Trichloroethane	5	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2-Trichloroethane	1	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Trichloroethene (TCE)	5	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Vinyl chloride	2	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Total VOCs	NE	**4.3**	**10**	**19.8**	**54.1**	**713**	**3.4**	**7.2**	**4.2**	**64**	**393.6**	**132.5**	**12.3**
NYSDEC PAH17 (µg/L)													
Acenaphthene	20*	1 U	**1.1 J**	**16**	**7.5 J**	**240 E**	1 U	1 U	**12**	**92 DJ**	**140 DJ**	**21**	**11**
Acenaphthylene	NE	1 U	**1.3 J**	1 U	1 U	**13**	1 U	1 U	**160 E**	**3.1 J**	**3.2 J**	**3.5 J**	**1.5 J**
Anthracene	50*	1 U	**1.1 J**	**4.8 J**	1 U	**14**	1 U	1 U	**14**	**6.4 J**	**14**	**3.3 J**	**2.2 J**
Benzo(a)anthracene	0.002*	1 U	1 U	1 U	1 U	1 U	1 U	1 U	**4.5 J**	**1.8 J**	**1.2**	1 U	1 U
Benzo(b)fluoranthene	0.002*	1 U	1 U	1 U	1 U	1 U	1 U	1 U	**2.4 J**	1 U	1 U	1 U	1 U
Benzo(k)fluoranthene	0.002*	1 U	1 U	1 U	1 U	1 U	1 U	1 U	**1.4 J**	1 U	1 U	1 U	1 U
Benzo(g,h,i)perylene	NE	1 U	1 U	1 U	1 U	1 U	1 U	1 U	**1.9 J**	1 U	1 U	1 U	1 U
Benzo(a)pyrene	ND	1 U	1 U	1 U	1 U	1 U	1 U	1 U	**3.5 J**	**1.4 J**	1 U	1 U	1 U
Chrysene	0.002*	1 U	1 U	1 U	1 U	1 U	1 U	1 U	**2.9 J**	**1.9 J**	**1.1**	1 U	1 U
Dibenz(a,h)anthracene	NE	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Fluoranthene	50*	1 U	1 U	**5.3 J**	1 U	**6.4 J**	**2.1 J**	1 U	**23**	**6.5 J**	**9.1 J**	**2.2 J**	**1.7 J**
Fluorene	50*	1 U	1 U	**10**	1 U	**75**	1 U	1 U	**53**	**39**	**70**	**17**	**6.5 J**
Indeno(1,2,3-cd)pyrene	0.002*	1 U	1 U	1 U	1 U	1 U	1 U	1 U	**1.4 J**	1 U	1 U	1 U	1 U
2-Methylnaphthalene	NE	1 U	1 U	**16**	**2.7 J**	**220 E**	1 U	1 U	**100 E**	**44**	**250 DJ**	**26**	1 U
Naphthalene	10*	1 U	**21**	**68**	**150 E**	**860 E**	1 U	1 U	**260 E**	**400 D**	**1900 D**	**250 D**	**1.4 J**
Phenanthrene	50*	1 U	**2.4 J**	**31**	**2.2 J**	**87 E**	1 U	1 U	**110 E**	**47**	**84 DJ**	**23**	**9.7 J**
Pyrene	50*	1 U	1 U	**6.4 J**	1 U	**7.5 J**	**1.5 J**	1 U	**27**	**8.3 J**	**10**	**2.3 J**	**1.8 J**
Total PAH (17)	NE	**ND**	**26.9**	**157.5**	**162.4**	**1522.9**	**3.6**	**ND**	**777**	**651.4**	**2412.6**	**348.3**	**35.8**

Table 1. Q3 2014 Groundwater Analytical Results
Appendix B - Oxygen Injection System Design Report
Phase II RAWP
Glen Cove Former MGP Site
Glen Cove, New York

Sample Name	NYS AWQS	GCMW-22I2	GCMW-22I	GCMW-09IR	GCMW-11I	GCMW-11S	GCMW-13I	GCMW-20I2	GCMW-20I	GCRW-01	GCMW-09S	GCRW-02	GCRW-03
Sample Date		7/8/2014	7/8/2014	7/8/2014	7/9/2014	7/9/2014	7/9/2014	7/9/2014	7/9/2014	7/11/2014	7/11/2014	7/11/2014	7/11/2014
Other SVOCs (µg/L)													
Bis(2-chloroethoxy)methane	5	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bis(2-chloroethyl)ether	1	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bis(chloroisopropyl)ether	5	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bis(2-ethylhexyl)phthalate	5	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	**4.8 J**	1 U
4-Bromophenyl phenyl ether	NE	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Butyl benzyl phthalate	50*	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Carbazole	NE	1 U	1 U	1 U	**1.4 J**	**33**	1 U	1 U	**1.5 J**	**4.7 J**	**2.5**	1 U	1 U
4-Chloro-3-methylphenol	NE	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
4-Chloroaniline	5	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
2-Chloronaphthalene	10*	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
2-Chlorophenol	NE	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
4-Chlorophenyl phenyl ether	NE	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Dibenzofuran	NE	1 U	**1.3 J**	**1.8 J**	1 U	**14**	1 U	1 U	**9.1 J**	**7.7 J**	**13**	**3.0 J**	**1.1 J**
1,2-Dichlorobenzene	3	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,3-Dichlorobenzene	3	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,4-Dichlorobenzene	3	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
3,3-Dichlorobenzidine	5	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
2,4-Dichlorophenol	5	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Diethyl phthalate	50*	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Dimethyl phthalate	50*	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
2,4-Dimethylphenol	50*	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Di-n-butyl phthalate	50	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
4,6-Dinitro-2-methylphenol	NE	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
2,4-Dinitrophenol	10*	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
2,4-Dinitrotoluene	5	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
2,6-Dinitrotoluene	5	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Di-n-octyl phthalate	50*	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Hexachlorobenzene	0.04	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Hexachlorobutadiene	0.5	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Hexachlorocyclopentadiene	5	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Hexachloroethane	5	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	**2.5 J**	1 U
Isophorone	50*	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
2-Methylphenol (o-Cresol)	1	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
4-Methylphenol (p-Cresol)	1	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	**11**	1 U
2-Nitroaniline	5	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
3-Nitroaniline	5	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
4-Nitroaniline	5	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Nitrobenzene	0.4	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
2-Nitrophenol	NE	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
4-Nitrophenol	NE	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
N-Nitrosodi-n-propylamine	NE	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
N-Nitrosodiphenylamine	50*	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Pentachlorophenol	1	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Phenol	1	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2,4-Trichlorobenzene	5	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
2,4,5-Trichlorophenol	NE	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
2,4,6-Trichlorophenol	NE	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Total SVOCs (ND=0)	NE	**ND**	**28.2**	**159.3**	**163.8**	**1569.9**	**3.6**	**ND**	**787.6**	**663.8**	**2428.1**	**369.6**	**36.9**
PCB Aroclors (µg/L)													
Aroclor 1016	NE	1 U	1 U	1 U	NA	NA	NA	1 U	1 U	NA	1 U	NA	NA
Aroclor 1221	NE	2 U	2 U	2 U	NA	NA	NA	2 U	2 U	NA	2 U	NA	NA
Aroclor 1232	NE	1 U	1 U	1 U	NA	NA	NA	1 U	1 U	NA	1 U	NA	NA
Aroclor 1242	NE	1 U	1 U	1 U	NA	NA	NA	1 U	1 U	NA	1 U	NA	NA
Aroclor 1248	NE	1 U	1 U	1 U	NA	NA	NA	1 U	1 U	NA	1 U	NA	NA
Aroclor 1254	NE	1 U	1 U	1 U	NA	NA	NA	1 U	1 U	NA	1 U	NA	NA
Aroclor 1260	NE	1 U	1 U	1 U	NA	NA	NA	1 U	1 U	NA	1 U	NA	NA
Total PCB Aroclors	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 1. Q3 2014 Groundwater Analytical Results
Appendix B - Oxygen Injection System Design Report
Phase II RAWP
Glen Cove Former MGP Site
Glen Cove, New York

Sample Name	NYS AWQS	GCMW-22I2	GCMW-22I	GCMW-09IR	GCMW-11I	GCMW-11S	GCMW-13I	GCMW-20I2	GCMW-20I	GCRW-01	GCMW-09S	GCRW-02	GCRW-03
Sample Date		7/8/2014	7/8/2014	7/8/2014	7/9/2014	7/9/2014	7/9/2014	7/9/2014	7/9/2014	7/11/2014	7/11/2014	7/11/2014	7/11/2014
Total Metals (µg/L)													
Aluminum	NE	**4020**	**1480**	**3160**	NA	NA	NA	**259**	**2200**	NA	**1680**	NA	NA
Antimony	3	1.6 U	1.6 U	1.6 U	NA	NA	NA	1.6 U	1.6 U	NA	**2.1 B**	NA	NA
Arsenic	25	1.5 U	1.5 U	1.5 U	NA	NA	NA	1.5 U	1.5 U	NA	**5.0 B**	NA	NA
Barium	1000	**167 B**	**90.1 B**	**123 B**	NA	NA	NA	**102 B**	**133 B**	NA	**122 B**	NA	NA
Beryllium	3*	**0.30 B**	**0.10 B**	**0.20 B**	NA	NA	NA	**0.10 B**	**0.10 B**	NA	0.14 U	NA	NA
Cadmium	5	0.14 U	0.14 U	0.14 U	NA	NA	NA	0.14 U	0.14 U	NA	0.11 U	NA	NA
Calcium	NE	**53600**	**51500**	**48000**	NA	NA	NA	**39100**	**42700**	NA	**59300**	NA	NA
Chromium	50	**13**	**5.3 B**	**8.8 B**	NA	NA	NA	**1.7 B**	**4.8 B**	NA	**3.1 B**	NA	NA
Cobalt	NE	**4.0 B**	**1.3 B**	**2.6 B**	NA	NA	NA	0.16 U	**2.8 B**	NA	**1.5 B**	NA	NA
Copper	200	**8.2 B**	**2.6 B**	**6.5 B**	NA	NA	NA	**0.80 B**	**4.1 B**	NA	**7.8 B**	NA	NA
Iron	300	**5230**	**1630**	**5520**	NA	NA	NA	**298**	**2410**	NA	**16700**	NA	NA
Lead	25	**36.6**	**22.8**	**31.7**	NA	NA	NA	**20.3**	**28**	NA	**21.8**	NA	NA
Magnesium	35000*	**23900**	**22800**	**22900**	NA	NA	NA	**15500**	**20200**	NA	**9480**	NA	NA
Manganese	300	**826**	**2130**	**990**	NA	NA	NA	**42.7**	**779**	NA	**6100**	NA	NA
Mercury	0.7	0.10 U	0.10 U	0.10 U	NA	NA	NA	0.10 U	0.10 U	NA	0.10 U	NA	NA
Nickel	100	**16.3 B**	**4.5 B**	**6.1 B**	NA	NA	NA	**3.4 B**	**10.4 B**	NA	**1.2 B**	NA	NA
Potassium	NE	**6270**	**8900**	**9350**	NA	NA	NA	**4160 B**	**5380**	NA	**5030**	NA	NA
Selenium	10	**2.0 B**	1.4 U	**2.3 B**	NA	NA	NA	**1.6 B**	**2.2 B**	NA	1.1 U	NA	NA
Silver	50	0.37 U	0.37 U	0.37 U	NA	NA	NA	0.37 U	0.37 U	NA	**0.92 B**	NA	NA
Sodium	20000	**37000**	**56200**	**31900**	NA	NA	NA	**41100**	**31900**	NA	**12400**	NA	NA
Thallium	0.5*	3.5 U	3.5 U	3.5 U	NA	NA	NA	3.5 U	3.5 U	NA	**309 B**	NA	NA
Vanadium	NE	**9.3 B**	**3.3 B**	**8.7 B**	NA	NA	NA	**1.4 B**	**5.5 B**	NA	**3.3 B**	NA	NA
Zinc	2000*	**69.5**	**42.1**	**32.3**	NA	NA	NA	**9.5 B**	**19.7 B**	NA	**38.8**	NA	NA
Total Cyanide (µg/L)													
Total Cyanide	200	10.0 U	10.0 U	10.0 U	NA	NA	NA	NA	NA	NA	**56**	NA	NA

Table 1. Q3 2014 Groundwater Analytical Results
Apendix B - Oxygen Injection System Design Reprot
Phase II RAWP
Glen Cove Former MGP Site
Glen Cove, New York

Notes:

µg/L - micrograms per liter or parts per billion (ppb)
BTEX - benzene, toluene, ethylbenzene, and xylenes
VOCs - volatile organic compounds
PAHs - polycyclic aromatic hydrocarbons
PCBs - polychlorinated biphenyls
SVOCs - semivolatile organic compounds

Total BTEX, Total VOCs, Total PAHs, Total SVOCs, and Total PCBs are calculated using detects only.
Total PAH16 is calculated using the EPA16 list of analytes: Acenaphthene, Acenaphthylene, Anthracene, Benz[a]anthracene, Benzo[a]pyrene, Benzo[b]fluoranthene, Benzo[g,h,i]perylene, Benzo[k]fluoranthene, Chrysene, Dibenz[a,h]anthracene, Fluoranthene, Fluorene, Indeno[1,2,3-cd]pyrene, Naphthalene, Phenanthrene, and Pyrene
Total PAH17 is calculated using the EPA16 list of analytes plus 2-Methylnaphthalene

NYS AWQS - New York State Ambient Water Quality Standards and Guidance Values for GA groundwater
* indicates the value is a guidance value and not a standard

NYSDEC- New York State Department of Environmental Conservation
CAS no. - Chemical Abstracts Service number
NE - not established
NA - not analyzed
ND - not detected; total concentration is listed as ND because no compounds were detected in the group

Bolding indicates a detected concentration
Gray shading indicates that the detected result value exceeds NYS AWQS

Data Qualifiers:

* - Duplicate analysis not within control limits
B - Analyte detected in the associated method blank
BE - Value above quantitation range and analyte detected in the associated method blank
BJ - Value above quantitation range and is an estimated value
D - Results for dilution
DJ - Results for dilution and is estimated value
E - Value above quantitation range
J - Estimated value
U - Indicates not detected to the reporting limit
UJ - Not detected at or above the reporting limit shown and the reporting limit is estimated

Table 2. Oxygen Injection Pilot Test Results
Appendix B - Oxygen Injection System Design Report
Phase II RAWP
Glen Cove Former MGP Site
Glen Cove, New York

Injection Well MW18I2						Injection Well MW18I1					
Time	MW17I1	MW17I2	MW19I	MW19I2	Injection Pressure	Time	MW17I1	MW17I2	MW19I	MW19I2	Injection Pressure
(hh:mm)	(inches H_2O)	(inches H_2O)	(inches H_2O)	(inches H_2O)	(psi-SCFH)	(hh:mm)	(inches H_2O)	(inches H_2O)	(inches H_2O)	(inches H_2O)	(psi-SCFH)
9:04	0.18	0.00	0.00	0.00	11.5-60	10:32	0.08	-0.06	0.00	0.00	11.5-60
9:07	0.21	0.00	0.00	0.00		10:37	-0.15	0.00	0.00	0.00	
9:10	0.00	0.00	0.00	0.00		10:43	2.20	0.00	0.00	0.00	18-90
9:13	0.00	0.00	0.00	0.20	16-80	10:49	0.12	0.00	0.00	0.00	16-90
9:16	0.00	0.00	0.00	0.11		10:51	0.21	0.00	0.00	0.00	
9:27	0.00	0.00	0.00	0.15	20-120	10:53	-0.07	0.00	0.00	0.00	
9:30	0.05	0.00	0.00	0.09		10:55	-0.05	0.00	0.00	0.00	
9:52	0.00	0.00	0.00	0.00	11-60	11:00	-3.10	0.00	0.00	0.00	8-60
Set to 90 SCFH and allowed pressure to normalize						Shut system down and allowed pressure to equalize					
10:01	0.00	0.00	0.00	0.21	26-90	11:35	0.25	0.00	0.00	0.00	12-60
10:04	0.00	0.08	0.00	0.16		11:37	0.11	0.00	0.00	0.00	
10:10	0.00	0.07	0.00	0.15		11:39	0.10	0.00	0.00	0.00	
10:12	0.00	0.06	0.00	0.14		11:41	0.15	0.00	0.00	0.00	
						11:43	0.17	0.00	0.00	0.00	

Attachment 1

2008 RIR Analytical Groundwater Data

TABLE 11
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

Sample Number:	**NYSDEC Ambient Water Quality Standards**	**GCGWP-1 (16-20)**	**GCGWP-01 (32-36)**	**GCGWP-01 (48-52)**	**GCGWP-02 (16-20)**	**GCGWP-02 (32-36)**	**GCGWP-02 (48-52)**
Lab Sample ID No:		**0401483-003**	**0401483-001A**	**0401483-002A**	**0401483-004A**	**0401483-005A**	**0401483-006A**
Depth(ft):		**16 - 20**	**32 - 36**	**48 - 52**	**16 - 20**	**32 - 36**	**48 - 52**
Sample Type:		**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**
Sample Date:		**1/20/2004**	**1/20/2004**	**1/20/2004**	**1/19/2004**	**1/19/2004**	**1/19/2004**
Units:		**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**
Benzene	1	10 U	10 U	10 U	10 U	10 U	10 U
Toluene	5	10 U	10 U	10 U	10 U	10 U	10 U
Ethylbenzene	5	2 J	10 U	10 U	10 U	10 U	10 U
Xylene (total)	5	10 U	10 U	10 U	10 U	10 U	10 U
Total VOCs		2 J	U	U	U	U	U
Total BTEX		2 J	U	U	U	U	U
Total TICs		NA	NA	NA	NA	NA	NA

NOTES:

U = Indicates a compound was analyzed for, but not detected. For results marked U, the numerical value is the compound MDL or PQL.

J = Indicates an estimated value.

E = Concentration exceeds calibrated range of instrument. Concentrations in diluted sample are lower.

B = Indicates that the analyte was found in the blank as well as the sample. It indicates possible/probable blank contamination.

* = Indicates compound is commonly found as laboratory contaminant.

D = Indicates sample was Diluted.

NA = Not Analyzed.

NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 11 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

Sample Number:	NYSDEC Ambient Water Quality Standards	GCGWP-03 (16-20)	GCGWP-03 (32-36)	GCGWP-03 (48-52)	GCGWP-04 (16-20)	GCGWP-04 (32-36)	GCGWP-04 (48-52)
Lab Sample ID No:		**0401483-007**	**0401483-008**	**0401483-009**	**0401483-010**	**0401483-011**	**0401483-012**
Depth(ft):		**16 - 20**	**32 - 36**	**48 - 52**	**16 - 20**	**32 - 36**	**48 - 52**
Sample Type:		**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**
Sample Date:		**1/19/2004**	**1/19/2004**	**1/19/2004**	**1/20/2004**	**1/20/2004**	**1/20/2004**
Units:		**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**
Benzene	1	**1 J**	10 U	10 U	**110**	**6 J**	**20**
Toluene	5	4 J	10 U	10 U	**21**	**7 J**	**36**
Ethylbenzene	5	**50**	10 U	10 U	**360 D**	**9 J**	**60**
Xylene (total)	5	**95**	3 J	10 U	**360**	**7 J**	**49**
Total VOCs		150 J	3 J	U	851 D	29 J	165
Total BTEX		150 J	3 J	U	851 D	29 J	165
Total TICs		NA	NA	NA	NA	NA	NA

NOTES:

U = Indicates a compound was analyzed for, but not detected. For results marked U, the numerical value is the compound MDL or PQL.

J = Indicates an estimated value.

E = Concentration exceeds calibrated range of instrument. Concentrations in diluted sample are lower.

B = Indicates that the analyte was found in the blank as well as the sample. It indicates possible/probable blank contamination.

* = Indicates compound is commonly found as laboratory contaminant.

D = Indicates sample was Diluted.

NA = Not Analyzed.

NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 11 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

Sample Number:		**GCGWP-04 (60-64)**	**GCGWP-04 (68-72)**	**GCGWP-05 (16-20)**	**GCGWP-05 (32-36)**	**GCGWP-05 (48-52)**
Lab Sample ID No:	**NYSDEC**	**0402180-001A**	**0402180-002A**	**0403204-001A**	**0403204-002A**	**0403204-003A**
Depth(ft):	**Ambient Water**	**60 - 64**	**68 - 72**	**16 - 20**	**32 - 36**	**48 - 52**
Sample Type:	**Quality**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**
Sample Date:	**Standards**	**2/4/2004**	**2/5/2004**	**3/3/2004**	**3/3/2004**	**3/3/2004**
Units:		**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**
Benzene	1	**2 J**	ND @ 10	**15 J**	ND @ 10	ND @ 10
Toluene	5	2 J	ND @ 10	**6 J**	ND @ 10	ND @ 10
Ethylbenzene	5	**9 J**	2 J	**130**	2 J	2 J
Xylene (total)	5	**35**	**6 J**	**120**	1 J	2 J
Total VOCs		48 J	8 J	271 J	3 J	4 J
Total BTEX		48 J	8 J	271 J	3 J	4 J
Total TICs		NA	NA	NA	NA	NA

NOTES:

NA - Indicates Sample Was Not Analyzed For That Parameter.
ND - Indicates Sample Was Not Detected At The Method Detection Limit.
D - Indicates Sample Was Diluted.
J - Indicates Sample Was Detected At A Concentration Below The Method Detection Limit.
B - Indicates Compound Was Also Reported In Quality Assurance/Quality Control Blanks.
NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 11 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

Sample Number:	**NYSDEC Ambient Water Quality Standards**	**GCGWP-06 (16-20)**	**GCGWP-06 (32-36)**	**GCGWP-06 (48-52)**	**GCGWP-37 (36-40)**	**GCGWP-37 (62-66)**	**GCGWP-37 (70-74)**
Lab Sample ID No:		**0403204-004**	**0403204-005**	**0403204-006**	**0407165-001**	**0407165-002**	**0407165-003**
Depth(ft):		**16 - 20**	**32 - 36**	**48 - 52**	**36 - 40**	**62 - 66**	**70 - 74**
Sample Type:		**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**
Sample Date:		**3/2/2004**	**3/2/2004**	**3/2/2004**	**7/2/2004**	**7/2/2004**	**7/2/2004**
Units:		**µg/L**	**µg/L**	**µg/L**	**ug/L**	**ug/L**	**ug/L**
1,1-Dichloroethane	5	NA	10 U	10 U	1 J	10 U	10 U
Tetrachloroethene	5	NA	10 U	10 U	10 U	10 U	1 J
Benzene	1	**160**	10 U	10 U	**7 J**	10 U	10 U
Toluene	5	**130**	1 J	10 U	3 J	10 U	10 U
Ethylbenzene	5	**900 D**	**5 J**	**13**	**36**	10 U	10 U
Xylene (total)	5	**1000 D**	**6 J**	**16**	**28**	10 U	10 U
Total VOCs		2190 D	12 J	29	75 J	U	1 J
Total BTEX		2190 D	12 J	29	74 J	U	U
Total TICs		NA	NA	NA	173	16 NJ	U

NOTES:

U = Indicates a compound was analyzed for, but not detected. For results marked U, the numerical value is the compound MDL or PQL.

J = Indicates an estimated value.

E = Concentration exceeds calibrated range of instrument. Concentrations in diluted sample are lower.

B = Indicates that the analyte was found in the blank as well as the sample. It indicates possible/probable blank contamination.

* = Indicates compound is commonly found as laboratory contaminant.

D = Indicates sample was Diluted.

TABLE 11 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

Sample Number:	FB012004	TB 1/19	FB020404	TB020404	FB030204	TB030204	FB070204	TB070204
Lab Sample ID No:	0401483-013	0401483-014	0402180-003	0402180-004	0403204-007	0403204-008	0407165-004	0407165-005
Depth(ft):	NA	NA	NA	NA	NA	NA	NA	NA
Sample Type:	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
Sample Date:	1/20/2004	1/19/2004	2/4/2004	2/4/2004	3/2/2004	3/2/2004	7/2/2004	7/2/2004
Units:	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	ug/L	ug/L
Benzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Toluene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Ethylbenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Xylene (total)	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Total VOCs	U	U	U	U	U	U	U	U
Total BTEX	U	U	U	U	U	U	U	U
Total TICs	NA	NA	NA	NA	NA	NA	U	U

NOTES:

U = Indicates a compound was analyzed for, but not detected. For results marked U, the numerical value is the compound MDL or PQL.

J = Indicates an estimated value.

E = Concentration exceeds calibrated range of instrument. Concentrations in diluted sample are lower.

B = Indicates that the analyte was found in the blank as well as the sample. It indicates possible/probable blank contamination.

* = Indicates compound is commonly found as laboratory contaminant.

D = Indicates sample was Diluted.

NA = Not Analyzed.

NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 11 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

Sample Number	**NYSDEC Ambient Water Quality Standards**	**GCGWP08 (18-22)**	**GCGWP08 (BD)**	**GCGWP08 (36-40)**	**GCGWP08 (46-50)**	**GCGWP09 (12-16)**	**GCGWP09 (32-36)**	**GCGWP09 (48-52)**
Lab Sample ID		**0504686-002**	**0504686-001**	**0504686-003**	**0504686-004**	**0504609-001**	**0504609-002**	**0504609-003**
Sample Interval (ft)		**18 - 22**	**18 - 22**	**36 - 40**	**46 - 50**	**12 - 16**	**32 - 36**	**48 - 52**
Sample Matrix		**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**
Sample Date		**4/20/2005**	**4/21/2005**	**4/21/2005**	**4/21/2005**	**4/19/2005**	**4/19/2005**	**4/19/2005**
Units		**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
Benzene	1	**2 J**	**6 J**	10 U	10 U	**1 J**	10 U	10 U
Ethylbenzene	5	3 J	**8 J**	10 U	10 U	10 U	10 U	10 U
Methyl tertiary butyl ether	10	6 J	3 J	3 J	**10**	10 U	10 U	**89**
Toluene	5	1 J	3 J	10 U	10 U	10 U	10 U	10 U
Xylenes (Total)	5	**19**	**43**	10 U	10 U	10 U	10 U	10 U
Total VOCs		31	63	3	10	1	U	89
Total BTEX		25	60	U	U	1	U	U

NOTES:

U = Indicates a compound was analyzed for, but not detected. For results marked U, the numerical value is the compound MDL or PQL.

J = Indicates an estimated value.

E = Concentration exceeds calibrated range of instrument. Concentrations in diluted sample are lower.

B = Indicates that the analyte was found in the blank as well as the sample. It indicates possible/probable blank contamination.

* = Indicates compound is commonly found as laboratory contaminant.

D = Indicates sample was Diluted.

NA = Not Analyzed.

NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 11 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

Sample Number	NYSDEC Ambient Water Quality Standards	GCGWP10 (12-16)	GCGWP10 (32-36)	GCGWP10 (43-47)	GCGWP10 (BD)	GCGWP11 (14-18)	GCGWP11 (32-36)	GCGWP11 (48-52)	GCGWP11 (BD)	GCGWP11 (64-68)
Lab Sample ID		**0505105-002**	**0505105-003**	**0505105-004**	**0505105-001**	**0504791-002**	**0504888-001**	**0504791-003**	**0504791-001**	**0504791-004**
Sample Interval (ft)		**12 - 16**	**32 - 36**	**43 - 47**	**43 - 47**	**14 - 18**	**32 - 36**	**48 - 52**	**48 - 52**	**64 - 68**
Sample Matrix		**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**
Sample Date		**5/2/2005**	**5/3/2005**	**5/3/2005**	**5/3/2005**	**4/26/2005**	**4/27/2005**	**4/26/2005**	**4/26/2005**	**4/26/2005**
Units		**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
Benzene	1	**210 D**	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Ethylbenzene	5	**730 D**	**23**	**12**	**15**	10 U	10 U	10 U	10 U	10 U
Methyl tertiary butyl ether	10	10 U	10 U	10 U	1 J	7 J	**18**	10 U	10 U	10 U
Toluene	5	**76**	2 J	1 J	1 J	10 U	10 U	10 U	10 U	10 U
Xylenes (Total)	5	**600 D**	**22**	**13**	**15**	10 U	10 U	10 U	10 U	10 U
Total VOCs		1,616	47	26	32	7	18	U	U	U
Total BTEX		1,616	47	26	31	U	U	U	U	U

NOTES:

U = Indicates a compound was analyzed for, but not detected. For results marked U, the numerical value is the compound MDL or PQL.

J = Indicates an estimated value.

E = Concentration exceeds calibrated range of instrument. Concentrations in diluted sample are lower.

B = Indicates that the analyte was found in the blank as well as the sample. It indicates possible/probable blank contamination.

* = Indicates compound is commonly found as laboratory contaminant.

D = Indicates sample was Diluted.

NA = Not Analyzed.

NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 11 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

Sample Number	NYSDEC Ambient Water Quality Standards	GCGWP12 (14-18)	GCGWP12 (32-36)	GCGWP12 (48-52)	GCGWP12 (64-68)	GCGWP13(14-18)	GCGWP13BD	GCGWP13(28-32)	GCGWP13(46-50)
Lab Sample ID		**0504888-002**	**0504888-003**	**0504888-004**	**0504888-005**	**0504452-002**	**0504452-001**	**0504452-003**	**0504452-004**
Sample Interval (ft)		**14 - 18**	**32 - 36**	**48 - 52**	**64 - 68**	**14 - 18**	**14 - 18**	**28 - 32**	**46 - 50**
Sample Matrix		**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**
Sample Date		**4/28/2005**	**4/28/2005**	**4/28/2005**	**4/29/2005**	**4/14/2005**	**4/14/2005**	**4/14/2005**	**4/14/2005**
Units		**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
Benzene	1	10 U	10 U	10 U	10 U	10 U	10 U	10 UJ	10 U
Ethylbenzene	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Methyl tertiary butyl ether	10	**16**	9 J	3 J	10 U	10 U	10 U	1 J	10 U
Toluene	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Xylenes (Total)	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Total VOCs		16	9	3	U	U	U	1	U
Total BTEX		U	U	U	U	U	U	U	U

NOTES:

U = Indicates a compound was analyzed for, but not detected. For results marked U, the numerical value is the compound MDL or PQL.

J = Indicates an estimated value.

E = Concentration exceeds calibrated range of instrument. Concentrations in diluted sample are lower.

B = Indicates that the analyte was found in the blank as well as the sample. It indicates possible/probable blank contamination.

* = Indicates compound is commonly found as laboratory contaminant.

D = Indicates sample was Diluted.

NA = Not Analyzed.

NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 11 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

Sample Number	NYSDEC Ambient Water Quality Standards	GCGWP14 (15-19)	GCGWP14 (33-37)	GCGWP14 (49-53)	GCGWPBD	GCGWP15 (15-19)	GCGWP15 (31-35)	GCGWP15 (46-50)
Lab Sample ID		**0508019-002**	**0508019-003**	**0508019-004**	**0508019-001**	**0507978-001**	**0507978-002**	**0507978-003**
Sample Interval (ft)		**15 - 19**	**33 - 37**	**49 - 53**	**49 - 53**	**15 - 19**	**31 - 35**	**46 - 50**
Sample Matrix		**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**
Sample Date		**8/1/2005**	**8/1/2005**	**8/1/2005**	**8/1/2005**	**7/28/2005**	**7/28/2005**	**7/28/2005**
Units		**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
Benzene	1	10 U	10 U	10 U	NA	10 U	10 U	10 U
Ethylbenzene	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Methyl tertiary butyl ether	10	10 U	1 J	10 U	1 J	2 J	1 J	4 J
Toluene	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Xylenes (Total)	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Total VOCs		U	1	U	1	2	1	4
Total BTEX		U	U	U	U	U	U	U

NOTES:

U = Indicates a compound was analyzed for, but not detected. For results marked U, the numerical value is the compound MDL or PQL.

J = Indicates an estimated value.

E = Concentration exceeds calibrated range of instrument. Concentrations in diluted sample are lower.

B = Indicates that the analyte was found in the blank as well as the sample. It indicates possible/probable blank contamination.

* = Indicates compound is commonly found as laboratory contaminant.

D = Indicates sample was Diluted.

NA = Not Analyzed.

NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 11 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

Sample Number	NYSDEC Ambient Water Quality Standards	GCGWP16 (20-24)	GCGWP16 (31-35)	GCGWP16 (48-52)	GCGWP17 (31-35)	GCGWP17 (48-52)	GCGWP17BD	GCGWP17 (64-68)
Lab Sample ID		0507978-004	0507978-005	0507978-006	0509276-002	0509276-003	0509276-001	0509276-004
Sample Interval (ft)		20 - 24	31 - 35	48 - 52	31 - 35	48 - 52	48 - 52	64 - 68
Sample Matrix		Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Date		7/29/2005	7/29/2005	7/29/2005	9/8/2005	9/8/2005	9/8/2005	9/8/2005
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Benzene	1	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Ethylbenzene	5	10 U	10 U	10 U	4 J	10 U	10 U	10 U
Methyl tertiary butyl ether	10	2 J	10 U	5 J	10 U	10 U	10 U	4 J
Toluene	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Xylenes (Total)	5	10 U	10 U	10 U	3 J	10 U	10 U	10 U
Total VOCs		2	U	5	7	U	U	4
Total BTEX		U	U	U	7	U	U	U

NOTES:

U = Indicates a compound was analyzed for, but not detected. For results marked U, the numerical value is the compound MDL or PQL.

J = Indicates an estimated value.

E = Concentration exceeds calibrated range of instrument. Concentrations in diluted sample are lower.

B = Indicates that the analyte was found in the blank as well as the sample. It indicates possible/probable blank contamination.

* = Indicates compound is commonly found as laboratory contaminant.

D = Indicates sample was Diluted.

NA = Not Analyzed.

NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 11 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

Sample Number:	GCFB041405	GCFB042105	GCFB042605	GCFB050305	FB072905	FB090705	GCFB090805
Lab Sample ID No:	0504452-006	0504686-005	0504791-005	0505105-005	0507978-007	0509279-006	0509276-006
Depth(ft):	NA	NA	NA	NA	NA	NA	NA
Sample Type:	WATER	WATER	WATER	WATER	WATER	WATER	WATER
Sample Date:	4/14/2005	4/21/2005	4/26/2005	5/3/2005	7/29/2005	9/7/2005	9/8/2005
Units:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Benzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Toluene	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Ethylbenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Xylene (total)	10 U	10 U	10 U	10 U	10 U	10 U	10 U
MTBE	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Total VOCs	U	U	U	U	U	U	U
Total BTEX	U	U	U	U	U	U	U
Total TICs	U	U	U	U	U	U	U

NOTES:

U = Indicates a compound was analyzed for, but not detected. For results marked U, the numerical value is the compound MDL or PQL.

J = Indicates an estimated value.

E = Concentration exceeds calibrated range of instrument. Concentrations in diluted sample are lower.

B = Indicates that the analyte was found in the blank as well as the sample. It indicates possible/probable blank contamination.

* = Indicates compound is commonly found as laboratory contaminant.

D = Indicates sample was Diluted.

NA = Not Analyzed.

NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 11 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

Sample Number:	TB041405	TB041905	GCTB042105	GCTB042605	TB042805	GCTB050405	TB072805	TB080105	GCTB090805
Lab Sample ID No:	0504452-007	5046090-004	0504686-006	0504791-006	0504888-006	0505105-006	0507978-008	0508019-005	0509276-007
Depth(ft):	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sample Type:	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
Sample Date:	4/14/2005	4/19/2005	4/21/2005	4/26/2005	4/28/2005	5/4/2005	7/28/2005	8/1/2005	9/8/2005
Units:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Benzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Toluene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Ethylbenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Xylene (total)	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
MTBE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Total VOCs	U	U	U	U	U	U	U	U	U
Total BTEX	U	U	U	U	U	U	U	U	U
Total TICs	U	U	U	U	U	U	U	U	U

NOTES:

U = Indicates a compound was analyzed for, but not detected. For results marked U, the numerical value is the compound MDL or PQL.

J = Indicates an estimated value.

E = Concentration exceeds calibrated range of instrument. Concentrations in diluted sample are lower.

B = Indicates that the analyte was found in the blank as well as the sample. It indicates possible/probable blank contamination.

* = Indicates compound is commonly found as laboratory contaminant.

D = Indicates sample was Diluted.

NA = Not Analyzed.

NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 12
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
SEMIVOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

Sample Number:	NYSDEC Ambient Water Quality Standards	GCGWP-01 (16-20)	GCGWP-01 (32-36)	GCGWP-01 (48-52)	GCGWP-02 (16-20)	GCGWP-02 (32-36)	GCGWP-02 (48-52)
Lab Sample ID No:		0401483-003	0401483-001	0401483-002	0401483-004	0401483-005	0401483-006
Depth(ft):		16 - 20	32 - 36	48 - 52	26 - 20	32 - 36	48 - 52
Sample Type:		Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Date:		1/20/2004	1/20/2004	1/20/2004	1/19/2004	1/19/2004	1/19/2004
Units:		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Naphthalene	10	10 U	10 U	10 U	3 J	**10**	10 U
2-Methylnaphthalene		10 U	10 U	10 U	3 J	10 U	10 U
Acenaphthylene		1 J	10 U	10 U	10 U	10	10 U
Acenaphthene	20	3 J	10 U	10 U	7 J	16	2 J
Fluorene	50	5 J	10 U	10 U	5 J	2 J	2 J
Phenanthrene	50	14	10 U	4 J	15	45	7 J
Anthracene	50	3 J	10 U	10 U	2 J	3 J	10 U
Fluoranthene	50	3 J	10 U	1 J	3 J	4 J	1 J
Pyrene	50	3 J	10 U	2 J	3 J	4 J	2 J
Benzo(a)anthracene	0.002	10 U	10 U	10 U	10 U	10 U	10 U
Chrysene	0.002	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(b)fluoranthene	0.002	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(k)fluoranthene	0.002	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(a)pyrene	ND	10 U	10 U	10 U	10 U	10 U	10 U
Indeno(1,2,3-cd)pyrene	0.002	10 U	10 U	10 U	10 U	10 U	10 U
Dibenzo(a,h)anthracene		10 U	10 U	10 U	10 U	10 U	10 U
Benzo(g,h,i)perylene		10 U	10 U	10 U	10 U	10 U	10 U
Total SVOCs		32 J	ND	7 J	41 J	94 J	14 J
Total PAHs		32	ND	7	41	94	14
Total CaPAHs		ND	ND	ND	ND	ND	ND
Total TICs		NA	NA	NA	NA	NA	NA

NOTES:

U = Indicates a compound was analyzed for, but not detected. For results marked U, the numerical value is the compound MDL or PQL.

J = Indicates an estimated value.

E = Concentration exceeds calibrated range of instrument. Concentrations in diluted sample are lower.

B = Indicates that the analyte was found in the blank as well as the sample. It indicates possible/probable blank contamination.

* = Indicates compound is commonly found as laboratory contaminant.

D = Indicates sample was Diluted.

NA = Not Analyzed.

NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 12 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
SEMIVOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

Sample Number:	NYSDEC Ambient Water Quality Standards	GCGWP-03 (16-20)	GCGWP-03 (32-36)	GCGWP-03 (48-52)	GCGWP-04 (16-20)	GCGWP-04 (32-36)	GCGWP-04 (48-52)
Lab Sample ID No:		0401483-007	0401483-008	0401483-009	0401483-010	0401483-011	0401483-012
Depth(ft):		16 - 20	32 - 36	48 - 52	16 - 20	32 - 36	48 - 52
Sample Type:		Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Date:		1/19/2004	1/19/2004	1/19/2004	1/20/2004	1/20/2004	1/20/2004
Units:		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Naphthalene	10	**4700 D**	**550 D**	4 J	**6100 D**	**43**	**1300 D**
2-Methylnaphthalene		540 DJ	160 DJ	1 J	260 DJ	9 J	190 DJ
Acenaphthylene		27	290 D	2 J	10	5 J	96 DJ
Acenaphthene	20	**510 DJ**	**22**	2 J	**390 DJ**	7 J	**89 DJ**
Fluorene	50	**170 DJ**	**66**	2 J	**110 J**	7 J	**78**
Phenanthrene	50	**420 DJ**	**210 D**	11	**240 DJ**	26	**220 DJ**
Anthracene	50	46	13	1 J	28	4 J	35
Fluoranthene	50	**110 DJ**	24	3 J	36	4 J	35
Pyrene	50	**150 DJ**	29	3 J	45	4 J	43
Benzo(a)anthracene	0.002	**32**	**4 J**	10 U	**8 J**	10 U	**6 J**
Chrysene	0.002	**20**	**2 J**	10 U	**7 J**	10 U	**7 J**
Benzo(b)fluoranthene	0.002	**14**	10 U	10 U	10 U	10 U	10 U
Benzo(k)fluoranthene	0.002	**12**	10 U	10 U	10 U	10 U	10 U
Benzo(a)pyrene	ND	**26**	**2 J**	10 U	**6 J**	10 U	**4 J**
Indeno(1,2,3-cd)pyrene	0.002	**8 J**	10 U	10 U	**2 J**	10 U	**1 J**
Dibenzo(a,h)anthracene		3 J	10 U	10 U	10 U	10 U	10 U
Benzo(g,h,i)perylene		10	10 U	10 U	2 J	10 U	2 J
Total SVOCs		6798 DJ	1372 DJ	29 J	7244 DJ	109 J	2106 DJ
Total PAH's		6798 DJ	1372 DJ	29 J	7244 DJ	109 J	2106 DJ
Total CaPAH's		115 J	8 J	U	23 J	U	18 J
Total TICs		NA	NA	NA	NA	NA	NA

NOTES:

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E = Concentration exceeds calibrated range of instrument. Concentrations in diluted sample are lower.

B = Indicates that the analyte was found in the blank as well as the sample. It indicates possible/probable blank contamination.

* = Indicates compound is commonly found as laboratory contaminant.

D = Indicates sample was Diluted.

NA = Not Analyzed.

NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 12 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
SEMIVOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

Sample Number:	NYSDEC Ambient Water Quality Standards	GCGWP-04 (60-64)	GCGWP-04 (68-72)	GCGWP-05 (16-20)	GCGWP-05 (32-36)	GCGWP-05 (48-52)	GCGWP-06 (16-20)
Lab Sample ID No:		0402180-001	0402180-002	0403204-001	0403204-002	0403204-003	0403204-004
Depth(ft):		60 - 64	68 - 72	16 - 20	32 - 36	48 - 52	16 - 20
Sample Type:		Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Date:		2/4/2004	2/5/2004	3/3/2004	3/3/2004	3/3/2004	3/2/2004
Units:		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Naphthalene	10	**1400 D**	**100 D**	10 U	10 U	10 U	**11000 D**
2-Methylnaphthalene		210 DJ	28	10 U	10 U	10 U	1900
Acenaphthylene		11	2 J	6 J	1 J	3 J	220 J
Acenaphthene	20	**200 DJ**	**41**	**110 D**	4 J	10 U	**1000**
Fluorene	50	**77**	21	**63**	10 U	10 U	**490 J**
Phenanthrene	50	**170 DJ**	**57**	**74**	10 U	10 U	**1400**
Anthracene	50	26	10	23	10 U	3 J	**880**
Fluoranthene	50	31	12	24	10 U	2 J	**430 J**
Pyrene	50	38	13	27	10 U	5 J	**590**
Benzo(a)anthracene	0.002	**8 J**	10 U	**3 J**	10 U	**2 J**	**180 J**
Chrysene	0.002	**7 J**	10 U	**3 J**	10 U	**3 J**	**190 J**
Benzo(b)fluoranthene	0.002	**6 J**	10 U	10 U	10 U	10 U	500 U
Benzo(k)fluoranthene	0.002	10 U	10 U	10 U	10 U	10 U	500 U
Benzo(a)pyrene	ND	**6 J**	10 U	**2 J**	10 U	**3 J**	**130 J**
Indeno(1,2,3-cd)pyrene	0.002	**3 J**	10 U	10 U	10 U	10 U	500 U
Dibenzo(a,h)anthracene		10 U	10 U	10 U	10 U	10 U	500 U
Benzo(g,h,i)perylene		4 J	10 U	10 U	10 U	1 J	59 J
Total SVOCs		2197 DJ	284 DJ	335 DJ	5 J	22 J	18469 DJ
Total PAH's		2197 DJ	284 DJ	335 DJ	5 J	22 J	18469 DJ
Total CaPAH's		30 J	U	8 J	U	8 J	500 J
Total TICs		NA	NA	NA	NA	NA	NA

NOTES:

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E = Concentration exceeds calibrated range of instrument. Concentrations in diluted sample are lower.

B = Indicates that the analyte was found in the blank as well as the sample. It indicates possible/probable blank contamination.

* = Indicates compound is commonly found as laboratory contaminant.

D = Indicates sample was Diluted.

NA = Not Analyzed.

NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 12 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
SEMIVOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

Sample Number:	NYSDEC Ambient Water Quality Standards	GCGWP-06 (32-36)	GCGWP-06 (48-52)	GCGWP-37 (36-40)	GCGWP-37 (62-66)	GCGWP-37 (70-74)
Lab Sample ID No:		0403204-005	0403204-006	0407165-001	0407165-002	0407165-003
Depth(ft):		32 - 36	48 - 52	36 - 40	62 - 66	70 - 74
Sample Type:		Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Date:		3/2/2004	3/2/2004	7/2/2004	7/2/2004	7/2/2004
Units:		µg/L	µg/L	µg/L	µg/L	µg/L
Naphthalene	10	10 U	10 U	**56**	10 U	10 U
2-Methylnaphthalene		10 U	10 U	10 U	10 U	10 U
Acenaphthylene		9 J	11	55	10 U	10 U
Acenaphthene	20	**31**	**33**	**130 D**	10 U	10 U
Dibenzofuran		NA	NA	15	10 U	10 U
Fluorene	50	21	24	**120 D**	10 U	10 U
Phenanthrene	50	43	**50**	**290 D**	2 J	10 U
Anthracene	50	11	11	**52**	10 U	10 U
Carbazole		NA	NA	2 J	10 U	10 U
Fluoranthene	50	7 J	10	**63**	10 U	10 U
Pyrene	50	10	12	**99 D**	1 J	10 U
Benzo(a)anthracene	0.002	10 U	**1 J**	**26**	10 U	10 U
Chrysene	0.002	10 U	**1 J**	**22**	10 U	10 U
Benzo(b)fluoranthene	0.002	10 U	10 U	**12**	10 U	10 U
Benzo(k)fluoranthene	0.002	10 U	10 U	**8 J**	10 U	10 U
Benzo(a)pyrene	ND	10 U	10 U	**23**	10 U	10 U
Indeno(1,2,3-cd)pyrene	0.002	10 U	10 U	**5 J**	10 U	10 U
Dibenzo(a,h)anthracene		10 U	10 U	2 J	10 U	10 U
Benzo(g,h,i)perylene		10 U	10 U	6 J	10 U	10 U
Total SVOCs		132 J	153 J	986 DJ	3 J	U
Total PAH's		132 J	153 J	969 DJ	3 J	U
Total CaPAH's		U	2 J	98 J	U	U
Total TICs		NA	NA	558	2	U

NOTES:

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E = Concentration exceeds calibrated range of instrument. Concentrations in diluted sample are lower.

B = Indicates that the analyte was found in the blank as well as the sample. It indicates possible/probable blank contamination.

* = Indicates compound is commonly found as laboratory contaminant.

D = Indicates sample was Diluted.

NA = Not Analyzed.

NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 12 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
SEMIVOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

Sample Number:	**FB012004**	**FB020404**	**FB030204**	**FB070204**
Lab Sample ID No:	**0401483-013**	**0402180-003**	**0403204-007**	**0407165-004**
Depth(ft):	**NA**	**NA**	**NA**	**NA**
Sample Type:	**WATER**	**WATER**	**WATER**	**WATER**
Sample Date:	**1/20/2004**	**2/4/2004**	**3/2/2004**	**7/2/2004**
Units:	**µg/L**	**µg/L**	**µg/L**	**ug/L**
Naphthalene	10 U	10 U	10 U	10 U
2-Methylnaphthalene	10 U	10 U	10 U	10 U
Acenaphthylene	10 U	10 U	10 U	10 U
Acenaphthene	10 U	10 U	10 U	10 U
Fluorene	10 U	10 U	10 U	10 U
Phenanthrene	10 U	10 U	10 U	10 U
Anthracene	10 U	10 U	10 U	10 U
Fluoranthene	10 U	10 U	10 U	10 U
Pyrene	10 U	10 U	10 U	10 U
Benzo(a)anthracene	10 U	10 U	10 U	10 U
Chrysene	10 U	10 U	10 U	10 U
Benzo(b)fluoranthene	10 U	10 U	10 U	10 U
Benzo(k)fluoranthene	10 U	10 U	10 U	10 U
Benzo(a)pyrene	10 U	10 U	10 U	10 U
Indeno(1,2,3-cd)pyrene	10 U	10 U	10 U	10 U
Dibenzo(a,h)anthracene	10 U	10 U	10 U	10 U
Benzo(g,h,i)perylene	10 U	10 U	10 U	10 U
Total SVOCs	U	U	U	U
Total PAH's	U	U	U	U
Total CaPAH's	U	U	U	U
Total TICs	NA	NA	NA	U

NOTES:

U = Indicates a compound was analyzed for, but not detected. For results marked U, the numerical value is the compound MDL or PQL.

J = Indicates an estimated value.

E = Concentration exceeds calibrated range of instrument. Concentrations in diluted sample are lower.

B = Indicates that the analyte was found in the blank as well as the sample. It indicates possible/probable blank contamination.

* = Indicates compound is commonly found as laboratory contaminant.

D = Indicates sample was Diluted.

NA = Not Analyzed.

NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 12 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
SEMIVOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

Sample Number	NYSDEC Ambient Water Quality Standards	GCGWP08 (18-22)	GCGWP08 (BD)	GCGWP08 (36-40)	GCGWP08 (46-50)	GCGWP09 (12-16)	GCGWP09 (32-36)	GCGWP09 (48-52)
Lab Sample ID		**0504686-002**	**0504686-001**	**0504686-003**	**0504686-004**	**0504609-001**	**0504609-002**	**0504609-003**
Sample Interval (ft)		**18 - 22**	**18 - 22**	**36 - 40**	**46 - 50**	**12 - 16**	**32 - 36**	**48 - 52**
Sample Matrix		**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**
Sample Date		**4/20/2005**	**4/21/2005**	**4/21/2005**	**4/21/2005**	**4/19/2005**	**4/19/2005**	**4/19/2005**
Units		**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
2-Methylnaphthalene		13	25	10 U	10 U	10 U	10 U	10 U
Acenaphthene	20	**62**	**73**	10 U	2 J	8 J	10 U	10 U
Acenaphthylene		2 J	2 J	10 U	10 U	10 U	10 U	10 U
Anthracene	50	5 J	7 J	10 U	10 U	10 U	10 U	10 U
Benzo[a]anthracene	0.002	10 U	**1 J**	10 U	10 U	10 U	10 U	10 U
Benzo[a]pyrene	ND	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo[b]fluoranthene	0.002	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo[g,h,i]perylene		10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo[k]fluoranthene	0.002	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chrysene	0.002	10 U	**1 J**	10 U	10 U	10 U	10 U	10 U
Dibenz[a,h]anthracene		10 U	10 U	10 U	10 U	10 U	10 U	10 U
Fluoranthene	50	8 J	10 U	10 U	1 J	10 U	10 U	10 U
Fluorene	50	13	18	10 U	10 U	10 U	10 U	10 U
Indeno[1,2,3-cd]pyrene	0.002	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Naphthalene	10	**300 D**	**210 D**	10 U	10 U	10 U	10 U	10 U
Phenanthrene	50	15	31	10 U	3 J	10 U	10 U	10 U
Pyrene	50	11	13	10 U	1 J	1 J	10 U	10 U
Total SVOCs		429	381	U	7	9	U	U
Total PAH		429	381	U	7	9	U	U
Total CaPAH		U	2	U	U	U	U	U

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E = Concentration exceeds calibrated range of instrument. Concentrations in diluted sample are lower.

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D = Indicates sample was Diluted.

NA = Not Analyzed.

NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 12 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
SEMIVOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

Sample Number	NYSDEC Ambient Water Quality Standards	GCGWP10 (12-16)	GCGWP10 (32-36)	GCGWP10 (43-47)	GCGWP10 (BD)	GCGWP11 (14-18)	GCGWP11 (32-36)	GCGWP11 (48-52)	GCGWP11 (BD)	GCGWP11 (64-68)
Lab Sample ID		**0505105-002**	**0505105-003**	**0505105-004**	**0505105-001**	**0504791-002**	**0504888-001**	**0504791-003**	**0504791-001**	**0504791-004**
Sample Interval (ft)		**12 - 16**	**32 - 36**	**43 - 47**	**43 - 47**	**14 - 18**	**32 - 36**	**48 - 52**	**48 - 52**	**64 - 68**
Sample Matrix		**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**
Sample Date		**5/2/2005**	**5/3/2005**	**5/3/2005**	**5/3/2005**	**4/26/2005**	**4/27/2005**	**4/26/2005**	**4/26/2005**	**4/26/2005**
Units		**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
2-Methylnaphthalene		710 DJ	100 D	53	45	1 J	10 U	10 U	10 U	10 U
Acenaphthene	20	**410 DJ**	**69**	**36**	**32**	10	3 J	10	8 J	10 U
Acenaphthylene		13	3 J	2 J	2 J	10 U	1 J	10 U	10 U	10 U
Anthracene	50	28	15	7 DJ	6 J	2 J	10 U	3 J	3 J	10 U
Benzo[a]anthracene	0.002	**9 J**	**2 J**	**6 J**	**1 J**	10 U	10 U	10 U	10 U	10 U
Benzo[a]pyrene	ND	**7 J**	**1 J**	**1 J**	10 U	10 U	10 U	10 U	10 U	10 U
Benzo[b]fluoranthene	0.002	**3 J**	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo[g,h,i]perylene		4 J	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo[k]fluoranthene	0.002	**6 J**	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chrysene	0.002	**7 J**	**2 J**	**1 J**	**2 J**	10 U	10 U	10 U	10 U	10 U
Dibenz[a,h]anthracene		10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Fluoranthene	50	35	17	6 J	6 J	4 J	1 J	5 J	5 J	10 U
Fluorene	50	2000 U	29	13	12	5 J	10 U	7 J	6 J	10 U
Indeno[1,2,3-cd]pyrene	0.002	**3 J**	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Naphthalene	10	**9700 D**	**620 D**	**380 D**	**330 D**	8 J	10 U	3 J	2 J	10 U
Phenanthrene	50	**230 DJ**	**79**	30	29	14	10 U	24	21	3 J
Pyrene	50	42	19	7 J	7 J	5 J	1 J	6 J	6 J	1 J
Total SVOCs		11,207	956	542	472	49	6	58	51	4 J
Total PAH		11,207	956	542	472	49	6	58	51	4
Total CaPAH		35	5	8	3	U	U	U	U	U

NOTES:

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J = Indicates an estimated value.

E = Concentration exceeds calibrated range of instrument. Concentrations in diluted sample are lower.

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D = Indicates sample was Diluted.

NA = Not Analyzed.

NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 12 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
SEMIVOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

Sample Number	NYSDEC Ambient Water Quality Standards	GCGWP12 (14-18)	GCGWP12 (32-36)	GCGWP12 (48-52)	GCGWP12 (64-68)	GCGWP13(14-18)	GCGWP13BD	GCGWP13(28-32)	GCGWP13(46-50)
Lab Sample ID		**0504888-002**	**0504888-003**	**0504888-004**	**0504888-005**	**0504452-002**	**0504452-001**	**0504452-003**	**0504452-004**
Sample Interval (ft)		**14 - 18**	**32 - 36**	**48 - 52**	**64 - 68**	**14 - 18**	**14 - 18**	**28 - 32**	**46 - 50**
Sample Matrix		**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**
Sample Date		**4/28/2005**	**4/28/2005**	**4/28/2005**	**4/29/2005**	**4/14/2005**	**4/14/2005**	**4/14/2005**	**4/14/2005**
Units		**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
2-Methylnaphthalene		10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Acenaphthene	20	10 U	3 J	2 J	10 U	1 J	1 J	10 U	10 U
Acenaphthylene		10 U	1 J	10 U	10 U	10 U	10 U	10 U	10 U
Anthracene	50	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo[a]anthracene	0.002	10 U	10 U	10 U	10 U	10 U	**1 J**	10 U	10 U
Benzo[a]pyrene	ND	10 U	10 U	10 U	10 U	10 U	**1 J**	10 U	10 U
Benzo[b]fluoranthene	0.002	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo[g,h,i]perylene		10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo[k]fluoranthene	0.002	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chrysene	0.002	10 U	10 U	10 U	10 U	10 U	**1 J**	10 U	10 U
Dibenz[a,h]anthracene		10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Fluoranthene	50	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Fluorene	50	10 U	1 J	10 U	10 U	10 U	10 U	10 U	10 U
Indeno[1,2,3-cd]pyrene	0.002	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Naphthalene	10	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Phenanthrene	50	2 J	2 J	10 U	10 U	2 J	2 J	10 U	10 U
Pyrene	50	10 U	1 J	10 U	10 U	10 U	1 J	10 U	10 U
Total SVOCs		2	8	2	U	3	7	U	U
Total PAH		2	8	2	U	3	7	U	U
Total CaPAH		U	U	U	U	U	3	U	U

NOTES:

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J = Indicates an estimated value.

E = Concentration exceeds calibrated range of instrument. Concentrations in diluted sample are lower.

B = Indicates that the analyte was found in the blank as well as the sample. It indicates possible/probable blank contamination.

* = Indicates compound is commonly found as laboratory contaminant.

D = Indicates sample was Diluted.

NA = Not Analyzed.

NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 12 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
SEMIVOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

Sample Number	NYSDEC Ambient Water Quality Standards	GCGWP14 (15-19)	GCGWP14 (33-37)	GCGWP14 (49-53)	GCGWPBD	GCGWP15 (15-19)	GCGWP15 (31-35)	GCGWP15 (46-50)
Lab Sample ID		0508019-002	0508019-003	0508019-004	0508019-001	0507978-001	0507978-002	0507978-003
Sample Interval (ft)		15 - 19	33 - 37	49 - 53	49 - 53	15 - 19	31 - 35	46 - 50
Sample Matrix		Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Date		8/1/2005	8/1/2005	8/1/2005	8/1/2005	7/28/2005	7/28/2005	7/28/2005
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
2-Methylnaphthalene		10 U	10 U	10 U	10 U	10 U	10 U	10 U
Acenaphthene	20	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Acenaphthylene		10 U	10 U	10 U	10 U	10 U	10 U	10 U
Anthracene	50	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo[a]anthracene	0.002	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo[a]pyrene	ND	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo[b]fluoranthene	0.002	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo[g,h,i]perylene		10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo[k]fluoranthene	0.002	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chrysene	0.002	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dibenz[a,h]anthracene		10 U	10 U	10 U	10 U	10 U	10 U	10 U
Fluoranthene	50	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Fluorene	50	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Indeno[1,2,3-cd]pyrene	0.002	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Naphthalene	10	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Phenanthrene	50	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Pyrene	50	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Total SVOCs		U	U	U	U	U	U	U
Total PAH		U	U	U	U	U	U	U
Total CaPAH		U	U	U	U	U	U	U

NOTES:

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J = Indicates an estimated value.

E = Concentration exceeds calibrated range of instrument. Concentrations in diluted sample are lower.

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* = Indicates compound is commonly found as laboratory contaminant.

D = Indicates sample was Diluted.

NA = Not Analyzed.

NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 12 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
SEMIVOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

Sample Number	NYSDEC Ambient Water Quality Standards	GCGWP16 (20-24)	GCGWP16 (31-35)	GCGWP16 (48-52)	GCGWP17 (31-35)	GCGWP17 (48-52)	GCGWP17BD	GCGWP17 (64-68)
Lab Sample ID		0507978-004	0507978-005	0507978-006	0509276-002	0509276-003	0509276-001	0509276-004
Sample Interval (ft)		20 - 24	31 - 35	48 - 52	31 - 35	48 - 52	48 - 52	64 - 68
Sample Matrix		Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Date		7/29/2005	7/29/2005	7/29/2005	9/8/2005	9/8/2005	9/8/2005	9/8/2005
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
2-Methylnaphthalene		10 U	10 U	10 U	140 D	10 U	10 U	4 J
Acenaphthene	20	10 U	10 U	10 U	**220 D**	10 U	10 U	8 J
Acenaphthylene		10 U	10 U	10 U	14	10 U	10 U	10 U
Anthracene	50	10 U	10 U	10 U	19	10 U	10 U	2 J
Benzo[a]anthracene	0.002	10 U	10 U	10 U	**3 J**	10 U	10 U	10 U
Benzo[a]pyrene	ND	10 U	10 U	10 U	**2 J**	10 U	10 U	10 U
Benzo[b]fluoranthene	0.002	10 U	10 U	10 U	**1 J**	10 U	10 U	10 U
Benzo[g,h,i]perylene		10 U	10 U	10 U	1 J	10 U	10 U	10 U
Benzo[k]fluoranthene	0.002	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chrysene	0.002	10 U	10 U	10 U	**3 J**	10 U	10 U	10 U
Dibenz[a,h]anthracene		10 U	10 U	10 U	10 U	10 U	10 U	10 U
Fluoranthene	50	10 U	10 U	10 U	13	10 U	10 U	2 J
Fluorene	50	10 U	10 U	10 U	**54**	10 U	10 U	4 J
Indeno[1,2,3-cd]pyrene	0.002	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Naphthalene	10	10 U	10 U	10 U	7 J	10 U	10 U	1 J
Phenanthrene	50	10 U	10 U	10 U	**120 D**	10 U	10 U	12
Pyrene	50	10 U	10 U	10 U	18	10 U	10 U	2 J
Total SVOCs		U	U	U	615	U	U	35
Total PAH		U	U	U	615	U	U	35
Total CaPAH		U	U	U	9	U	U	U

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D = Indicates sample was Diluted.

NA = Not Analyzed.

NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 12 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
SEMIVOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

Sample Number:	GCFB041405	GCFB042105	GCFB042605	GCFB050305	FB072905	FB090705	GCFB090805
Lab Sample ID No:	0504452-006	0504686-005	0504791-005	0505105-005	0507978-007	0509279-006	0509276-006
Depth(ft):	NA	NA	NA	NA	NA	NA	NA
Sample Type:	WATER	WATER	WATER	WATER	WATER	WATER	WATER
Sample Date:	4/14/2005	4/21/2005	4/26/2005	5/3/2005	7/29/2005	9/7/2005	9/8/2005
Units:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Naphthalene	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Methylnaphthalene	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Acenaphthylene	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Acenaphthene	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Fluorene	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Phenanthrene	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Anthracene	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Fluoranthene	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Pyrene	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(a)anthracene	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chrysene	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(b)fluoranthene	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(k)fluoranthene	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(a)pyrene	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Indeno(1,2,3-cd)pyrene	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dibenzo(a,h)anthracene	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(g,h,i)perylene	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Total SVOCs	U	U	U	U	U	U	U
Total PAH's	U	U	U	U	U	U	U
Total CaPAH's	U	U	U	U	U	U	U
Total TICs	U	U	U	U	U	U	U

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* = Indicates compound is commonly found as laboratory contaminant.

D = Indicates sample was Diluted.

NA = Not Analyzed.

NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 13
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
METALS IN GROUNDWATER

Sample Number:	NYSDEC Ambient Water Quality Standards	GCGWP-37 (36-40)	GCGWP-37 (62-66)	GCGWP-37 (70-74)	FB070204
Lab Sample ID No:		0407165-001	0407165-002	0407165-003	0407165-004
Depth(ft):		36 - 40	62 - 66	70 - 74	NA
Sample Type:		Groundwater	Groundwater	Groundwater	Water
Sample Date:		7/2/2004	7/2/2004	7/2/2004	7/2/2004
Units:		µg/L	µg/L	µg/L	µg/L
Aluminum		6550 N	20000 N	18800 N	32.4 B
Antimony	3	**5.9 B**	**10.8 B**	**8.7 B**	2.4 U
Arsenic	25	3.6 U	11.3	11.3	3.6 U
Barium	1000	582	**1590**	**1690**	4 U
Beryllium	3	1.4 B	**3.3 B**	**3.9 B**	0.2 U
Cadmium	5	0.3 U	0.3 U	0.3 U	0.3 U
Calcium		164000	90400	95200	186 B
Chromium	50	**88**	**1100**	**851**	0.62 B
Cobalt		11.7 B	153	177	1.5 U
Copper	200	19.6 B	**757**	**715**	1 U
Iron	300	**57700**	**144000**	**124000**	60 B
Lead	25	8.7	**35**	**27.7**	1.2 U
Magnesium	35000	28900	26800	26400	23.4 B
Manganese	300	**11900**	**6110**	**7080**	3.4 B
Mercury	0.7	**3.9**	**2.2**	**1.7**	**1.4**
Nickel	100	43	**450**	**435**	1.6 U
Potassium		9760 E	10200 E	11000 E	15.7 U
Selenium	10	6.6	**10.9**	9.1	2.1 U
Silver	50	0.5 U	0.5 U	0.5 U	0.5 U
Sodium	20000	**34100**	**33800**	**33600**	179 B
Thallium	0.5	2.8 U	**3.4 B**	2.8 U	2.8 U
Vanadium		25.6 B	43.6 B	45.5 B	1.7 U
Zinc	2000	216	**8500**	**7930**	7.2 B
Cyanide	200	10 U	10 U	10 U	10 U

NOTES:

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E = Indicates the reported value is estimated because of the presence of interference.

* = Indicates Duplicate analysis not within control limits.

B = Indicates reported value is less than the Contract Required Detection Limits but greater than the Instrument Detection Limit.

J = Indicates that based upon the findings of the data validation that the analyte was positively identified and the associated numerical value is an approximate (estimated) concentration. When the "J" qualifier is associated with a "U" qualifier it indicates that the sample was not detected above the reported sample quantitation limit, however the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

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D - Indicates Sample Was Diluted.

NA = Not Analyzed.

NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 13 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
METALS IN GROUNDWATER

Sample Number	NYSDEC Ambient Water Quality Standards	GCGWP08 (18-22)	GCGWP08 (BD)	GCGWP08 (36-40)	GCGWP08 (46-50)	GCGWP09 (12-16)	GCGWP09 (32-36)	GCGWP09 (48-52)
Lab Sample ID		0504686-002	0504686-001	0504686-003	0504686-004	0504609-001	0504609-002	0504609-003
Sample Interval (ft)		18 - 22	18 - 22	36 - 40	46 - 50	12 - 16	32 - 36	48 - 52
Sample Matrix		Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Date		4/20/2005	4/20/2005	4/21/2005	4/21/2005	4/19/2005	4/19/2005	4/19/2005
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Arsenic	25	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U
Barium	1,000	705	681	182 B	414	374	514	363
Cadmium	5	1.1 B	0.67 B	0.51 B	1.4 B	2.3 B	1 B	1.8 B
Chromium	50	34.9	19.6	28.5	**119**	22.9	**72.9**	**154**
Lead	25	8.3	6.5	7.9	**30**	11.9	21.9	**34**
Mercury	0.7	0.19 B	0.15 B	0.1 U	0.39	0.1 U	0.34	0.5
Selenium	10	5.4 UJ	5.4 U	5.4 U	5.4 UJ	5.4 U	5.4 U	5.4 U
Silver	50	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U

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NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 13 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
METALS IN GROUNDWATER

Sample Number	NYSDEC Ambient Water Quality Standards	GCGWP10 (12-16)	GCGWP10 (32-36)	GCGWP10 (43-47)	GCGWP10 (BD)	GCGWP11 (14-18)	GCGWP11 (32-36)	GCGWP11 (48-52)	GCGWP11 (BD)	GCGWP11 (64-68)
Lab Sample ID		0505105-002	0505105-003	0505105-004	0505105-001	0504791-002	0504888-001	0504791-003	0504791-001	0504791-004
Sample Interval (ft)		12 - 16	32 - 36	43 - 47	43 - 47	14 - 18	32 - 36	48 - 52	48 - 52	64 - 68
Sample Matrix		Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Date		5/2/2005	5/3/2005	5/3/2005	5/3/2005	4/26/2005	4/27/2005	4/26/2005	4/26/2005	4/26/2005
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Arsenic	25	3 U	3 U	3 U	3 U	5.6 U	5.6 U	5.6 U	6.1 B	5.6 U
Barium	1,000	0.98 U	136 B	157 B	162 B	58.5 B	62.9 B	296	403	222
Cadmium	5	0.65 U	0.65 U	0.65 U	0.8 B	0.37 U	0.37 U	1.6 B	3.2 B	0.61 B
Chromium	50	2.4 U	5 B	3.4 B	3.3 B	3.1 B	3.8 B	**145**	**237**	48.1
Lead	25	1.7 U	1.7 U	1.7 U	1.7 U	3.3	3.7	**47.8**	**64.5**	9.3
Mercury	0.7	0.1 U	0.1 U	0.1 U	0.1 U	0.10 U	0.10 U	0.12 B	0.22	0.10 U
Selenium	10	4.7 U	4.7 U	4.7 U	4.7 U	**11.8**	8	5.4 U	5.4	5.4 U
Silver	50	1.4 U	1.4 U	1.4 U	1.4 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U

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NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 13 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
METALS IN GROUNDWATER

Sample Number	NYSDEC Ambient Water Quality Standards	GCGWP12 (14-18)	GCGWP12 (32-36)	GCGWP12 (48-52)	GCGWP12 (64-68)	GCGWP13(14-18)	GCGWP13BD	GCGWP13(28-32)	GCGWP13(46-50)
Lab Sample ID		**0504888-002**	**0504888-003**	**0504888-004**	**0504888-005**	**0504452-002**	**0504452-001**	**0504452-003**	**0504452-004**
Sample Interval (ft)		**14 - 18**	**32 - 36**	**48 - 52**	**64 - 68**	**14 - 18**	**14 - 18**	**28 - 32**	**46 - 50**
Sample Matrix		**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**
Sample Date		**4/28/2005**	**4/28/2005**	**4/28/2005**	**4/29/2005**	**4/14/2005**	**4/14/2005**	**4/14/2005**	**4/14/2005**
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Arsenic	25	5.6 U	5.6 U	5.6 U	5.6 U	4.7 B	4.2 B	4 J	5.2 B
Barium	1,000	69 B	162 B	231	539	298	298	452	331
Cadmium	5	0.37 U	0.92 B	0.97 B	1.4 B	0.65 U	0.65 U	0.65 U	0.65 U
Chromium	50	2.7 B	**70.2**	**79**	**92.2**	28.8	42.6	40.6	**53.4**
Lead	25	1.9 B	**79.2**	**67.1**	16.6	7.7	10.7	7.9	13.2
Mercury	0.7	0.10 U	.013 B	0.10 U	0.10 U	0.1 U	0.1 U	0.1 U	0.1 U
Selenium	10	**15.2**	**10.8**	5.4 UJ	5.4 U	4.7 UN	4.7 UN	4.7 UN	4.7 UN
Silver	50	3.6 U	3.6 U	3.6 U	3.6 U	1.4 U	1.4 U	1.4 U	1.4 U

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NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 13 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
METALS IN GROUNDWATER

Sample Number	NYSDEC Ambient Water Quality Standards	GCGWP14 (15-19)	GCGWP14 (33-37)	GCGWP14 (49-53)	GCGWPBD	GCGWP15 (15-19)	GCGWP15 (31-35)	GCGWP15 (46-50)
Lab Sample ID		**0508019-002**	**0508019-003**	**0508019-004**	**0508019-001**	**0507978-001**	**0507978-002**	**0507978-003**
Sample Interval (ft)		**15 - 19**	**33 - 37**	**49 - 53**	**49 - 53**	**15 - 19**	**31 - 35**	**46 - 50**
Sample Matrix		**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**
Sample Date		**8/1/2005**	**8/1/2005**	**8/1/2005**	**8/1/2005**	**7/28/2005**	**7/28/2005**	**7/28/2005**
Units		**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
Arsenic	25	3 U	3 U	3 U	3 U	3 U	3 U	3 U
Barium	1,000	113 B	254	91.9 B	99.5 B	96.6 B	133 B	248
Cadmium	5	0.65 U	0.65 U	0.65 U	0.65 U	0.65 U	0.65 U	0.65 U
Chromium	50	2.8 B	**93.3**	2.6 B	2.4 U	3.4 B	11.1	**124**
Lead	25	1.7 U	12.4	1.7 U	1.7 U	1.7 U	1.7 U	**28.2**
Mercury	0.7	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Selenium	10	4.7 UNJ	4.7 UN	4.7 UN	4.7 UN	4.7 UN	4.7 UN	4.7 UNJ
Silver	50	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U

NOTES:

U = Indicates a compound was analyzed for, but not detected. For results marked U, the numerical value is the compound MDL or PQL.

N = Indicates Matrix Spike Sample Recovery not met.

E = Indicates the reported value is estimated because of the presence of interference.

* = Indicates Duplicate analysis not within control limits.

B = Indicates reported value is less than the Contract Required Detection Limits but greater than the Instrument Detection Limit.

J = Indicates that based upon the findings of the data validation that the analyte was positively identified and the associated numerical value is an approximate (estimated) concentration. When the "J" qualifier is associated with a "U" qualifier it indicates that the sample was not detected above the reported sample quantitation limit, however the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R = Indicates that based upon the findings of the data validation the sample result is rejected (unusable) due to deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

D - Indicates Sample Was Diluted.

NA = Not Analyzed.

NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 13 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
METALS IN GROUNDWATER

Sample Number	NYSDEC Ambient Water Quality Standards	GCGWP16 (20-24)	GCGWP16 (31-35)	GCGWP16 (48-52)	GCGWP17 (31-35)	GCGWP17 (48-52)	GCGWP17BD	GCGWP17 (64-68)
Lab Sample ID		**0507978-004**	**0507978-005**	**0507978-006**	**0509276-002**	**0509276-003**	**0509276-001**	**0509276-004**
Sample Interval (ft)		**20 - 24**	**31 - 35**	**48 - 52**	**31 - 35**	**48 - 52**	**48 - 52**	**64 - 68**
Sample Matrix		**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**
Sample Date		**7/29/2005**	**7/29/2005**	**7/29/2005**	**9/8/2005**	**9/8/2005**	**9/8/2005**	**9/8/2005**
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Arsenic	25	3 U	3 U	3 U	11.2	3 U	3.4 B	9.5 B
Barium	1,000	91.2 B	146 B	124 B	926	302	316	747
Cadmium	5	0.65 U	0.65 U	0.65 U	1.1 B	0.65 U	0.82 B	1.5 B
Chromium	50	9 B	14.7	**55.4**	**87.5**	22.5	22.7	**304**
Lead	25	2.8 B	1.7 U	4.6	17.9	20.6	22.2	**26.8**
Mercury	0.7	0.1 U	0.1 U	0.1 U	0.38	0.12 B	0.15 B	0.11 B
Selenium	10	4.7 UNJ	4.7 UN	4.7 UN	4.7 U	4.7 U	4.7 U	4.7 U
Silver	50	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U

NOTES:

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N = Indicates Matrix Spike Sample Recovery not met.

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B = Indicates reported value is less than the Contract Required Detection Limits but greater than the Instrument Detection Limit.

J = Indicates that based upon the findings of the data validation that the analyte was positively identified and the associated numerical value is an approximate (estimated) concentration. When the "J" qualifier is associated with a "U" qualifier it indicates that the sample was not detected above the reported sample quantitation limit, however the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R = Indicates that based upon the findings of the data validation the sample result is rejected (unusable) due to deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

D - Indicates Sample Was Diluted.

NA = Not Analyzed.

NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 13 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
METALS IN GROUNDWATER

Sample Number	NYSDEC Ambient Water Quality Standards	GCFB041405	GCFB042105	GCFB042605	GCFB050305	FB072905	FB090705	GCFB090805
Lab Sample ID		0504452-006	0504686-005	0504791-005	0505105-005	0507978-007	0509279-006	0509276-006
Sample Interval (ft)		NA	NA	NA	NA	NA	NA	NA
Sample Matrix		WATER	WATER	WATER	WATER	WATER	WATER	WATER
Sample Date		4/14/2005	4/21/2005	4/26/2005	5/3/2005	7/29/2005	9/7/2005	9/8/2005
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Arsenic	25	3 U	5.6 U	5.6 U	3 U	3 U	5.6 U	3 U
Barium	1,000	0.98 U	3.3 U	3.3 U	0.98 U	0.98 U	3.3 U	0.98 U
Cadmium	5	0.65 U	0.37 U	0.37 U	0.65 U	0.65 U	1.6 B	0.65 U
Chromium	50	2.4 U	0.83 U	0.83 U	2.4 U	2.4 U	1.6 B	2.4 U
Lead	25	1.7 U	1.2 U	1.2 U	1.7 U	1.7 U	1.2 U	1.7 U
Mercury	0.7	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Selenium	10	4.7 U	5.4 U	5.4 U	4.7 U	4.7 U	5.4 U	4.7 U
Silver	50	1.4 U	3.6 U	3.6 U	1.4 U	1.4 U	3.6 U	1.4 U
Cyanide	200	NA	NA	NA	NA	NA	10 U	NA

NOTES:

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R = Indicates that based upon the findings of the data validation the sample result is rejected (unusable) due to deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be veri

D - Indicates Sample Was Diluted.

NA = Not Analyzed.

NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 14
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

Sample Number:	**NYSDEC Ambient Water Quality Standards**	**PZ-01A**	**PZ-02A**	**PZ-03**	**PZ-04**	**PZ-05**
Lab Sample ID No:		**0405461-004A**	**0405461-005A**	**0408228-003A**	**0405646-005A**	**0405501-005A**
Depth(ft):		**25 - 35**	**18 - 21**	**14 - 19**	**16 - 19**	**8 - 18**
Sample Type:		**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**
Sample Date:		**5/12/2004**	**5/12/2004**	**8/4/2004**	**5/17/2004**	**5/14/2004**
Units:		**µg/L**	**µg/L**	**ug/L**	**µg/L**	**µg/L**
Acetone	50	NA	NA	NA	3 J	10 U
2-Butanone		NA	NA	NA	10 U	10 U
Benzene	1	**4 J**	10 U	**6 J**	10 U	10 U
Tetrachloroethene	5	NA	NA	NA	10 U	10 U
Toluene	5	**34**	10 U	**7 J**	10 U	10 U
Ethylbenzene	5	**100**	10 U	**160**	10 U	10 U
Styrene	5	NA	NA	NA	10 U	10 U
Xylene (total)	5	**85**	10 U	**110**	10 U	10 U
Total VOCs		223 J	U	283 J	3 J	U
Total BTEX		223 J	U	283 J	U	U
Total TICs		NA	NA	1400	9	U

NOTES:

U = Indicates a compound was analyzed for, but not detected. For results marked U, the numerical value is the compound MDL or PQL.

J = Indicates an estimated value.

E = Concentration exceeds calibrated range of instrument. Concentrations in diluted sample are lower.

B = Indicates that the analyte was found in the blank as well as the sample. It indicates possible/probable blank contamination.

* = Indicates compound is commonly found as laboratory contaminant.

D = Indicates sample was Diluted.

NA = Not Analyzed.

NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 14 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

Sample Number:	**NYSDEC Ambient Water Quality Standards**	**PZ-06**	**PZ-07**	**GCMW-08S**	**GCMW-08D**
Lab Sample ID No:		**0405501-006A**	**0405461-006A**	**0408285-001A**	**0408228-002A**
Depth(ft):		**7 - 17**	**3 - 10**	**26 - 36**	**60 - 70**
Sample Type:		**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**
Sample Date:		**5/14/2004**	**5/11/2004**	**8/4/2004**	**8/4/2004**
Units:		**µg/L**	**µg/L**	**µg/L**	**µg/L**
Acetone	50	NA	NA	NA	NA
2-Butanone		NA	NA	NA	NA
Benzene	1	10 U	10 U	**1 J**	10 U
Tetrachloroethene	5	NA	NA	NA	NA
Toluene	5	10 U	3 J	10 U	10 U
Ethylbenzene	5	10 U	10 U	10 U	10 U
Styrene	5	NA	NA	NA	NA
Xylene (total)	5	10 U	10 U	10 U	10 U
Total VOCs		U	3 J	1 J	U
Total BTEX		U	3 J	1 J	U
Total TICs		NA	NA	32	64

NOTES:

U = Indicates a compound was analyzed for, but not detected. For results marked U, the numerical value is the compound MDL or PQL.

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B = Indicates that the analyte was found in the blank as well as the sample. It indicates possible/probable blank contamination.

* = Indicates compound is commonly found as laboratory contaminant.

D = Indicates sample was Diluted.

NA = Not Analyzed.

NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 14 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

Sample Number:	NYSDEC Ambient Water Quality Standards	GCMW-09S	GCMW-09I	GCMW-10S	GCMW-10I	GCMW-11S	GCMW-11I
Lab Sample ID No:		0405501-001	0405461-001	0405461-003	0405461-002	0405646-002	0405646-001
Depth(ft):		8 - 18	26 - 36	11 - 16	16 - 26	6 - 20	23 - 28
Sample Type:		Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Date:		5/13/2004	5/12/2004	5/12/2004	5/11/2004	5/18/2004	5/18/2004
Units:		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Acetone	50	10 U	5 J	10 U	10 U	NA	NA
2-Butanone		11	10 U	10 U	10 U	NA	NA
Benzene	1	**6 J**	10 U	10 U	10 U	**96**	**500 D**
Tetrachloroethene	5	10 U	**8 J**	10 U	2 J	NA	NA
Toluene	5	4 J	10 U	10 U	10 U	**17**	**45**
Ethylbenzene	5	**11**	10 U	10 U	10 U	**540 D**	**47**
Styrene	5	10 U	10 U	10 U	10 U	NA	NA
Xylene (total)	5	**9 J**	**38**	10 U	10 U	**350**	**470**
Total VOCs		41 J	51 J	U	2 J	1003 D	1062 D
Total BTEX		30 J	38	U	U	1003 D	1062 D
Total TICs		371	416	U	U	NA	NA

NOTES:

U = Indicates a compound was analyzed for, but not detected. For results marked U, the numerical value is the compound MDL or PQL.

J = Indicates an estimated value.

E = Concentration exceeds calibrated range of instrument. Concentrations in diluted sample are lower.

B = Indicates that the analyte was found in the blank as well as the sample. It indicates possible/probable blank contamination.

* = Indicates compound is commonly found as laboratory contaminant.

D = Indicates sample was Diluted.

NA = Not Analyzed.

NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 14 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

Sample Number:	NYSDEC Ambient Water Quality Standards	GCMW-12S	GCMW-13S	GCMW-13I	GCMW-14S	GCMW-14I
Lab Sample ID No:		0405501-002	0405646-004	0405646-003	0405501-004	0405501-003
Depth(ft):		14 - 24	8 - 22	25 - 30	8 - 18	25 - 30
Sample Type:		Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Date:		5/14/2004	5/17/2004	5/17/2004	5/13/2004	5/13/2004
Units:		µg/L	µg/L	µg/L	µg/L	µg/L
Acetone	50	10 U	NA	NA	NA	NA
2-Butanone		10 U	NA	NA	NA	NA
Benzene	1	10 U	**5 J**	**4 J**	**1 J**	10 U
Tetrachloroethene	5	10 U	NA	NA	NA	NA
Toluene	5	10 U	**51**	4 J	2 J	10 U
Ethylbenzene	5	10 U	**130**	**160**	10 U	10 U
Styrene	5	10 U	NA	NA	NA	NA
Xylene (total)	5	10 U	**270**	**270**	10 U	10 U
Total VOCs		U	456 J	438 J	3 J	U
Total BTEX		U	456 J	438 J	3 J	U
Total TICs		50	NA	NA	NA	NA

NOTES:

U = Indicates a compound was analyzed for, but not detected. For results marked U, the numerical value is the compound MDL or PQL.

J = Indicates an estimated value.

E = Concentration exceeds calibrated range of instrument. Concentrations in diluted sample are lower.

B = Indicates that the analyte was found in the blank as well as the sample. It indicates possible/probable blank contamination.

* = Indicates compound is commonly found as laboratory contaminant.

D = Indicates sample was Diluted.

NA = Not Analyzed.

NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 14 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

Sample Number:	**FB051104**	**TB051104**	**TB051204**	**TB051304**	**TB051404**
Lab Sample ID No:	**0405461-008**	**0405461-009**	**0405461-010**	**0405501-007**	**0405501-008**
Depth(ft):	**NA**	**NA**	**NA**	**NA**	**NA**
Sample Type:	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**
Sample Date:	**5/11/2004**	**5/11/2004**	**5/12/2004**	**5/13/2004**	**5/14/2004**
Units:	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**
Chloromethane	10 U	10 U	10 U	10 U	10 U
Bromomethane	10 U	10 U	10 U	10 U	10 U
Vinyl chloride	10 U	10 U	10 U	10 U	10 U
Chloroethane	10 U	10 U	10 U	10 U	10 U
Methylene chloride	10 U	10 U	10 U	10 U	10 U
Acetone	10 U	10 U	10 U	10 U	10 U
Carbon disulfide	10 U	10 U	10 U	10 U	10 U
1,1-Dichloroethene	10 U	10 U	10 U	10 U	10 U
1,1-Dichloroethane	10 U	10 U	10 U	10 U	10 U
1,2-Dichloroethene (total)	10 U	10 U	10 U	10 U	10 U
Chloroform	10 U	10 U	10 U	10 U	10 U
1,2-Dichloroethane	10 U	10 U	10 U	10 U	10 U
2-Butanone	10 U	10 U	10 U	10 U	10 U
1,1,1-Trichloroethane	10 U	10 U	10 U	10 U	10 U
Carbon tetrachloride	10 U	10 U	10 U	10 U	10 U
Bromodichloromethane	10 U	10 U	10 U	10 U	10 U
1,2-Dichloropropane	10 U	10 U	10 U	10 U	10 U
cis-1,3-Dichloropropene	10 U	10 U	10 U	10 U	10 U
Trichloroethene	10 U	10 U	10 U	10 U	10 U
Dibromochloromethane	10 U	10 U	10 U	10 U	10 U
1,1,2-Trichloroethane	10 U	10 U	10 U	10 U	10 U
Benzene	10 U	10 U	10 U	10 U	10 U
trans-1,3-Dichloropropene	10 U	10 U	10 U	10 U	10 U
Bromoform	10 U	10 U	10 U	10 U	10 U
4-Methyl-2-pentanone	10 U	10 U	10 U	10 U	10 U
2-Hexanone	10 U	10 U	10 U	10 U	10 U
Tetrachloroethene	10 U	10 U	10 U	10 U	10 U
1,1,2,2-Tetrachloroethane	10 U	10 U	10 U	10 U	10 U
Toluene	10 U	10 U	10 U	10 U	10 U
Chlorobenzene	10 U	10 U	10 U	10 U	10 U
Ethylbenzene	10 U	10 U	10 U	10 U	10 U
Styrene	10 U	10 U	10 U	10 U	10 U
Xylene (total)	10 U	10 U	10 U	10 U	10 U
Total VOCs	U	U	U	U	U
Total BTEX	U	U	U	U	U
Total TICs	U	U	U	U	U

NOTES:
U = Indicates a compound was analyzed for, but not detected. For results marked U, the numerical value is the compound MDL or PQL.
J = Indicates an estimated value.
E = Concentration exceeds calibrated range of instrument. Concentrations in diluted sample are lower.
B = Indicates that the analyte was found in the blank as well as the sample. It indicates possible/probable blank contamination.
* = Indicates compound is commonly found as laboratory contaminant.
D = Indicates sample was Diluted.
NA = Not Analyzed.
NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 14 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

Sample Number:	FB051704	TB051704	TB051804	FB080404	TB080404	TB080604
Lab Sample ID No:	0405646-007	0405646-008	0405646-009	0408228-004	0408228-005	0408285-002
Depth(ft):	NA	NA	NA	NA	NA	NA
Sample Type:	WATER	WATER	WATER	WATER	WATER	Water
Sample Date:	5/17/2004	5/17/2004	5/18/2004	8/4/2004	8/4/2004	8/6/2004
Units:	µg/L	µg/L	µg/L	ug/L	ug/L	ug/L
Chloromethane	10 U	10 U	10 U	NA	NA	10 U
Bromomethane	10 U	10 U	10 U	NA	NA	10 U
Vinyl chloride	10 U	10 U	10 U	NA	NA	10 U
Chloroethane	10 U	10 U	10 U	NA	NA	10 U
Methylene chloride	10 U	10 U	10 U	NA	NA	10 U
Acetone	10 U	10 U	10 U	NA	NA	10 U
Carbon disulfide	10 U	10 U	10 U	NA	NA	10 U
1,1-Dichloroethene	10 U	10 U	10 U	NA	NA	10 U
1,1-Dichloroethane	10 U	10 U	10 U	NA	NA	10 U
1,2-Dichloroethene (total)	10 U	10 U	10 U	NA	NA	10 U
Chloroform	10 U	10 U	10 U	NA	NA	10 U
1,2-Dichloroethane	10 U	10 U	10 U	NA	NA	10 U
2-Butanone	10 U	10 U	10 U	NA	NA	10 U
1,1,1-Trichloroethane	10 U	10 U	10 U	NA	NA	10 U
Carbon tetrachloride	10 U	10 U	10 U	NA	NA	10 U
Bromodichloromethane	10 U	10 U	10 U	NA	NA	10 U
1,2-Dichloropropane	10 U	10 U	10 U	NA	NA	10 U
cis-1,3-Dichloropropene	10 U	10 U	10 U	NA	NA	10 U
Trichloroethene	10 U	10 U	10 U	NA	NA	10 U
Dibromochloromethane	10 U	10 U	10 U	NA	NA	10 U
1,1,2-Trichloroethane	10 U	10 U	10 U	NA	NA	10 U
Benzene	10 U	10 U	10 U	10 U	10 U	10 U
trans-1,3-Dichloropropene	10 U	10 U	10 U	NA	NA	10 U
Bromoform	10 U	10 U	10 U	NA	NA	10 U
4-Methyl-2-pentanone	10 U	10 U	10 U	NA	NA	10 U
2-Hexanone	10 U	10 U	10 U	NA	NA	10 U
Tetrachloroethene	10 U	10 U	10 U	NA	NA	10 U
1,1,2,2-Tetrachloroethane	10 U	10 U	10 U	NA	NA	10 U
Toluene	10 U	10 U	10 U	10 U	10 U	10 U
Chlorobenzene	10 U	10 U	10 U	NA	NA	10 U
Ethylbenzene	10 U	10 U	10 U	10 U	10 U	10 U
Styrene	10 U	10 U	10 U	NA	NA	10 U
Xylene (total)	10 U	10 U	10 U	10 U	10 U	10 U
Total VOCs	U	U	U	U	U	U
Total BTEX	U	U	U	U	U	U
Total TICs	U	U	U	NA	NA	U

NOTES:

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J = Indicates an estimated value.

E = Concentration exceeds calibrated range of instrument. Concentrations in diluted sample are lower.

B = Indicates that the analyte was found in the blank as well as the sample. It indicates possible/probable blank contamination.

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D = Indicates sample was Diluted.

NA = Not Analyzed.

NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 14 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

Sample Number	**NYSDEC Ambient Water Quality Standards**	**PZ-01A**	**PZ-02A**	**PZ-03**	**PZ-04**	**PZ-04A (BD)**	**PZ-05**	**PZ-06**	**PZ-07**
Lab Sample ID		**0506742-004**	**0506680-002**	**0506613-006**	**0506680-003**	**0506680-004**	**0506742-005**	**0506742-006**	**0506533-003**
Sample Interval (ft)		**25 - 35**	**18 - 21**	**14 - 19**	**16 - 19**	**16 - 19**	**8 - 18**	**7 - 17**	**3 - 10**
Sample Matrix		**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**
Sample Date		**6/21/2005**	**6/20/2005**	**6/16/2005**	**6/20/2005**	**6/20/2005**	**6/22/2005**	**6/22/2005**	**6/15/2005**
Units		**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
1,1-Dichloroethane	5	NA	NA	4 J	NA	1 J	NA	NA	NA
Benzene	1	10 U	10 U	**5 J**	10 U	10 U	10 U	10 U	10 U
Ethylbenzene	5	**50**	10 U	**130**	10 U	10 U	10 U	10 U	10 U
Methyl tertiary butyl ether	10	10 U	10 U	NA	3 J	NA	10 U	10 U	10 U
Toluene	5	**15**	10 U	4 J	10 U	10 U	10 U	10 U	10 U
Xylenes (Total)	5	**51**	10 U	**82**	10 U	10 U	10 U	10 U	10 U
Total VOCs		116	U	225	3	1	U	U	U
Total BTEX		116	U	221	U	U	U	U	U

NOTES:

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E = Concentration exceeds calibrated range of instrument. Concentrations in diluted sample are lower.

B = Indicates that the analyte was found in the blank as well as the sample. It indicates possible/probable blank contamination.

* = Indicates compound is commonly found as laboratory contaminant.

D = Indicates sample was Diluted.

NA = Not Analyzed.

NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 14 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

Sample Number	NYSDEC Ambient Water Quality Standards	GCMW08S	GCMW08D	GCMW08 (BD)	GCMW-09S	GCMW-09I
Lab Sample ID		**0509944-002**	**0509944-001**	**0509944-003**	**0506742-002**	**0506742-001**
Sample Interval (ft)		**26 - 36**	**60 - 70**	**60 - 70**	**8 - 18**	**26 - 36**
Sample Matrix		**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**
Sample Date		**9/28/2005**	**9/28/2005**	**9/28/2005**	**6/21/2005**	**6/21/2005**
Units		**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
Benzene	1	10 U	10 U	10 U	**4 J**	10 U
Ethylbenzene	5	10 U	10 U	10 U	**56**	10 U
Methyl tertiary butyl ether	10	2 J	8 J	7 J	10 U	NA
Tetrachloroethene	5	NA	NA	NA	NA	**14**
Toluene	5	10 U	10 U	10 U	**18**	10 U
Xylenes (Total)	5	10 U	10 U	10 U	**55**	**9 J**
Total VOCs		2	8	7	133	23
Total BTEX		U	U	U	133	9

NOTES:

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NA = Not Analyzed.

NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 14 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

Sample Number	NYSDEC Ambient Water Quality Standards	GCMW-10S	GCMW-10I	GCMW-11S	GCMW-11I	GCMW-11A	GCMW-12S
Lab Sample ID		0506533-002	0506533-001	0506613-003	0506613-002	0506613-001	0506742-003
Sample Interval (ft)		11 - 16	16 - 26	8 - 20	23 - 28	23 - 28	14 - 24
Sample Matrix		Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Date		6/15/2005	6/15/2005	6/17/2005	6/17/2005	6/17/2005	6/22/2005
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
1,1-Dichloroethane	5	NA	NA	NA	NA	4 J	NA
Benzene	1	10 U	10 U	**180 D**	**140**	**160**	10 U
Ethylbenzene	5	10 U	10 U	**740 D**	**26**	**32**	10 U
Methyl tertiary butyl ether	10	10 U	10 U	10 U	10 U	NA	4 J
Styrene	5	NA	NA	NA	NA	**5 J**	NA
Toluene	5	10 U	10 U	**46**	**9 J**	**11**	10 U
Xylenes (Total)	5	10 U	10 U	**810 D**	**100**	**120**	10 U
Total VOCs		U	U	1,776	275	328	4
Total BTEX		U	U	1,776	275	323	U

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B = Indicates that the analyte was found in the blank as well as the sample. It indicates possible/probable blank contamination.

* = Indicates compound is commonly found as laboratory contaminant.

D = Indicates sample was Diluted.

NA = Not Analyzed.

NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 14 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

Sample Number	**NYSDEC Ambient Water Quality Standards**	**GCMW-13I**	**GCMW-14I**	**GCMW-14S**	**GCMW-15**	**GCMW-16**
Lab Sample ID		**0506613-004**	**0506613-005**	**0506680-001**	**0506462-001**	**0506462-002**
Sample Interval (ft)		**25 - 30**	**25 - 30**	**8 - 18**	**6 - 16**	**6 - 16**
Sample Matrix		**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**
Sample Date		**6/17/2005**	**6/17/2005**	**6/20/2005**	**6/14/2005**	**6/14/2005**
Units		**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
Benzene	1	10 U	10 U	10 U	10 U	10 U
Ethylbenzene	5	2 J	10 U	10 U	10 U	10 U
Methyl tertiary butyl ether	10	10 U	**10**	7 J	10 U	10 U
Toluene	5	10 U	10 U	10 U	10 U	10 U
Xylenes (Total)	5	**23**	10 U	10 U	10 U	10 U
Total VOCs		25	10	7	U	U
Total BTEX		25	U	U	U	U

NOTES:

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E = Concentration exceeds calibrated range of instrument. Concentrations in diluted sample are lower.

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D = Indicates sample was Diluted.

NA = Not Analyzed.

NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 14 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

Sample Number:	**FB061605**	**FB062105**	**GCFB092805**
Lab Sample ID No:	**0506533-004**	**0506742-007**	**0509944-004**
Depth(ft):	**NA**	**NA**	**NA**
Sample Type:	**WATER**	**WATER**	**WATER**
Sample Date:	**6/16/2005**	**6/21/2005**	**9/28/2005**
Units:	**ug/L**	**ug/L**	**ug/L**
Chloromethane	10 U	10 U	NA
Bromomethane	10 U	10 U	NA
Vinyl chloride	10 U	10 U	NA
Chloroethane	10 U	10 U	NA
Methylene chloride	10 U	10 U	NA
Acetone	10 U	10 U	NA
Carbon disulfide	10 U	10 U	NA
1,1-Dichloroethene	10 U	10 U	NA
1,1-Dichloroethane	10 U	10 U	NA
1,2-Dichloroethene (total)	10 U	10 U	NA
Chloroform	10 U	10 U	NA
1,2-Dichloroethane	10 U	10 U	NA
2-Butanone	10 U	10 U	NA
1,1,1-Trichloroethane	10 U	10 U	NA
Carbon tetrachloride	10 U	10 U	NA
Bromodichloromethane	10 U	10 U	NA
1,2-Dichloropropane	10 U	10 U	NA
cis-1,3-Dichloropropene	10 U	10 U	NA
Trichloroethene	10 U	10 U	NA
Dibromochloromethane	10 U	10 U	NA
1,1,2-Trichloroethane	10 U	10 U	NA
Benzene	10 U	10 U	10 U
trans-1,3-Dichloropropene	10 U	10 U	NA
Bromoform	10 U	10 U	NA
4-Methyl-2-pentanone	10 U	10 U	NA
2-Hexanone	10 U	10 U	NA
Tetrachloroethene	10 U	10 U	NA
1,1,2,2-Tetrachloroethane	10 U	10 U	NA
Toluene	10 U	10 U	10 U
Chlorobenzene	10 U	10 U	NA
Ethylbenzene	10 U	10 U	10 U
Styrene	10 U	10 U	NA
Xylene (total)	10 U	10 U	10 U
MTBE	10 U	10 U	10 U
Total VOCs	U	U	U
Total BTEX	U	U	U
Total TICs	U	U	U

NOTES:

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J = Indicates an estimated value.

E = Concentration exceeds calibrated range of instrument. Concentrations in diluted sample are lower.

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NA = Not Analyzed.

NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 14 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

Sample Number:	**TB061505**	**TB061705**	**TB062105**	**TB062205**	**GCTB092805**
Lab Sample ID No:	**0506533-005**	**0506613-007**	**0506680-005**	**0506742-008**	**0509944-005**
Depth(ft):	**NA**	**NA**	**NA**	**NA**	**NA**
Sample Type:	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**
Sample Date:	**6/15/2005**	**6/17/2005**	**6/20/2005**	**6/22/2005**	**9/28/2005**
Units:	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
Chloromethane	10 U	10 U	10 U	10 U	NA
Bromomethane	10 U	10 U	10 U	10 U	NA
Vinyl chloride	10 U	10 U	10 U	10 U	NA
Chloroethane	10 U	10 U	10 U	10 U	NA
Methylene chloride	10 U	10 U	10 U	10 U	NA
Acetone	10 U	10 U	10 U	10 U	NA
Carbon disulfide	10 U	10 U	10 U	10 U	NA
1,1-Dichloroethene	10 U	10 U	10 U	10 U	NA
1,1-Dichloroethane	10 U	10 U	10 U	10 U	NA
1,2-Dichloroethene (total)	10 U	10 U	10 U	10 U	NA
Chloroform	10 U	10 U	10 U	10 U	NA
1,2-Dichloroethane	10 U	10 U	10 U	10 U	NA
2-Butanone	10 U	10 U	10 U	10 U	NA
1,1,1-Trichloroethane	10 U	10 U	10 U	10 U	NA
Carbon tetrachloride	10 U	10 U	10 U	10 U	NA
Bromodichloromethane	10 U	10 U	10 U	10 U	NA
1,2-Dichloropropane	10 U	10 U	10 U	10 U	NA
cis-1,3-Dichloropropene	10 U	10 U	10 U	10 U	NA
Trichloroethene	10 U	10 U	10 U	10 U	NA
Dibromochloromethane	10 U	10 U	10 U	10 U	NA
1,1,2-Trichloroethane	10 U	10 U	10 U	10 U	NA
Benzene	10 U	10 U	10 U	10 U	10 U
trans-1,3-Dichloropropene	10 U	10 U	10 U	10 U	NA
Bromoform	10 U	10 U	10 U	10 U	NA
4-Methyl-2-pentanone	10 U	10 U	10 U	10 U	NA
2-Hexanone	10 U	10 U	10 U	10 U	NA
Tetrachloroethene	10 U	10 U	10 U	10 U	NA
1,1,2,2-Tetrachloroethane	10 U	10 U	10 U	10 U	NA
Toluene	10 U	10 U	10 U	10 U	10 U
Chlorobenzene	10 U	10 U	10 U	10 U	NA
Ethylbenzene	10 U	10 U	10 U	10 U	10 U
Styrene	10 U	10 U	10 U	10 U	NA
Xylene (total)	10 U	10 U	10 U	10 U	10 U
MTBE	10 U	10 U	10 U	10 U	10 U
Total VOCs	U	U	U	U	U
Total BTEX	U	U	U	U	U
Total TICs	U	U	U	U	U

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E = Concentration exceeds calibrated range of instrument. Concentrations in diluted sample are lower.
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NA = Not Analyzed.
NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 15
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
SEMIVOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

Sample Number:	**NYSDEC Ambient Water Quality Standards**	**PZ-01A**	**PZ-02A**	**PZ-03**	**PZ-04**	**PZ-05**
Lab Sample ID No:		**0405461-004**	**0405461-005**	**0408228-003**	**0405646-005**	**0405501-005**
Depth(ft):		**25 - 35**	**18 - 21**	**14 - 19**	**16 - 19**	**8 - 18**
Sample Type:		**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**
Sample Date:		**5/12/2004**	**5/12/2004**	**8/4/2004**	**5/17/2004**	**5/14/2004**
Units:		**µg/L**	**µg/L**	**ug/L**	**µg/L**	**µg/L**
Naphthalene	10	**400 D**	10 U	**2600 D**	10 U	10 U
2-Methylnaphthalene		48	10 U	140 DJ	10 U	10 U
Acenaphthylene		3 J	10 U	4 J	10 U	10 U
Acenaphthene	20	**51**	10 U	**280 DJ**	2 J	10 U
Dibenzofuran		NA	NA	NA	NA	NA
Fluorene	50	22	10 U	**110 DJ**	2 J	10 U
Phenanthrene	50	38	10 U	**140 DJ**	3 J	10 U
Anthracene	50	7 J	10 U	15	10 U	10 U
Carbazole		NA	NA	NA	NA	NA
Fluoranthene	50	6 J	10 U	12	2 J	10 U
Pyrene	50	6 J	10 U	14	2 J	10 U
Benzo(a)anthracene	0.002	10 U	10 U	**2 J**	10 U	10 U
Chrysene	0.002	10 U	10 U	**2 J**	10 U	10 U
Benzo(b)fluoranthene	0.002	10 U	10 U	10 U	10 U	10 U
Benzo(k)fluoranthene	0.002	10 U	10 U	10 U	10 U	10 U
Benzo(a)pyrene	ND	10 U	10 U	**2 J**	10 U	10 U
Indeno(1,2,3-cd)pyrene	0.002	10 U	10 U	10 U	10 U	10 U
Dibenzo(a,h)anthracene		10 U	10 U	10 U	10 U	10 U
Benzo(g,h,i)perylene		10 U	10 U	10 U	10 U	10 U
Total SVOCs		581 J	U	3,321 DJ	11 J	U
Total PAHs		581 J	U	3,321 DJ	11 J	U
Total CAPAHs		U	U	6 J	U	U
Total TICs		NA	NA	NA	NA	NA

NOTES:

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D = Indicates sample was Diluted.

NA = Not Analyzed.

NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 15 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
SEMIVOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

Sample Number:	**NYSDEC Ambient Water Quality Standards**	**PZ-06**	**PZ-07**	**GCMW-08S**	**GCMW-08D**
Lab Sample ID No:		**0405501-006**	**0405461-006**	**0408285-001**	**0408228-002**
Depth(ft):		**7 - 17**	**3 - 10**	**26 - 36**	**60 - 70**
Sample Type:		**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**
Sample Date:		**5/14/2004**	**5/11/2004**	**8/4/2004**	**8/4/2004**
Units:		**µg/L**	**µg/L**	**µg/L**	**µg/L**
Naphthalene	10	10 U	10 U	4 J	10 U
2-Methylnaphthalene		10 U	10 U	10 U	2 J
Acenaphthylene		10 U	10 U	55	10 U
Acenaphthene	20	10 U	10 U	**50**	4 J
Dibenzofuran		NA	NA	NA	NA
Fluorene	50	10 U	10 U	**93 D**	2 J
Phenanthrene	50	10 U	10 U	**110 D**	2 J
Anthracene	50	10 U	10 U	15	10 U
Carbazole		NA	NA	NA	NA
Fluoranthene	50	10 U	10 U	8 J	10 U
Pyrene	50	10 U	10 U	11	10 U
Benzo(a)anthracene	0.002	10 U	10 U	10 U	10 U
Chrysene	0.002	10 U	10 U	10 U	10 U
Benzo(b)fluoranthene	0.002	10 U	10 U	10 U	10 U
Benzo(k)fluoranthene	0.002	10 U	10 U	10 U	10 U
Benzo(a)pyrene	ND	10 U	10 U	10 U	10 U
Indeno(1,2,3-cd)pyrene	0.002	10 U	10 U	10 U	10 U
Dibenzo(a,h)anthracene		10 U	10 U	10 U	10 U
Benzo(g,h,i)perylene		10 U	10 U	10 U	10 U
Total SVOCs		U	U	346 DJ	10 J
Total PAHs		U	U	346 DJ	10 J
Total CAPAHs		U	U	U	U
Total TICs		NA	NA	NA	NA

NOTES:

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J = Indicates an estimated value.

E = Concentration exceeds calibrated range of instrument. Concentrations in diluted sample are lower.

B = Indicates that the analyte was found in the blank as well as the sample. It indicates possible/probable blank contamination.

* = Indicates compound is commonly found as laboratory contaminant.

D = Indicates sample was Diluted.

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NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 15 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
SEMIVOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

Sample Number:	NYSDEC Ambient Water Quality Standards	GCMW-09S	GCMW-09I	GCMW-10S	GCMW-10I	GCMW-11S	GCMW-11I
Lab Sample ID No:		0405501-001	0405461-001	0405461-003	0405461-002	0405646-002	0405646-001
Depth(ft):		8 - 18	26 - 36	11 - 16	16 - 26	6 - 20	23 - 28
Sample Type:		Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Date:		5/16/2004	5/12/2004	5/12/2004	5/11/2004	5/18/2004	5/18/2004
Units:		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Naphthalene	10	**16**	**720 D**	10 U	10 U	**5700 D**	**1200 D**
2-Methylnaphthalene		10 U	230 D	10 U	10 U	320 DJ	61
Acenaphthylene		6 J	280 D	10 U	10 U	27	32
Acenaphthene	20	**110 D**	**76**	10 U	10 U	**320 DJ**	**120 DJ**
Dibenzofuran		12	17	10 U	10 U	NA	NA
Fluorene	50	**63**	**69**	10 U	10 U	**54**	18
Phenanthrene	50	**71**	**120 DJ**	10 U	10 U	**74**	35
Anthracene	50	14	18	10 U	10 U	14	8 J
Carbazole		1 J	6 J	10 U	10 U	NA	NA
Fluoranthene	50	12	18	10 U	10 U	7 J	7 J
Pyrene	50	13	20	10 U	10 U	7 J	7 J
Benzo(a)anthracene	0.002	10 U	**4 J**	10 U	10 U	10 U	10 U
Chrysene	0.002	10 U	**3 J**	10 U	10 U	10 U	10 U
Benzo(b)fluoranthene	0.002	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(k)fluoranthene	0.002	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(a)pyrene	ND	10 U	**3 J**	10 U	10 U	10 U	10 U
Indeno(1,2,3-cd)pyrene	0.002	10 U	**1 J**	10 U	10 U	10 U	10 U
Dibenzo(a,h)anthracene		10 U	10 U	10 U	10 U	10 U	10 U
Benzo(g,h,i)perylene		10 U	2 J	10 U	10 U	10 U	10 U
Total SVOCs		318 DJ	1587 DJ	U	U	6523 DJ	1488 DJ
Total PAHs		305 DJ	1564 DJ	U	U	6523 DJ	1488 DJ
Total CAPAHs		U	11 J	U	U	U	U
Total TICs		409	404	U	U	NA	NA

NOTES:

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J = Indicates an estimated value.

E = Concentration exceeds calibrated range of instrument. Concentrations in diluted sample are lower.

B = Indicates that the analyte was found in the blank as well as the sample. It indicates possible/probable blank contamination.

* = Indicates compound is commonly found as laboratory contaminant.

D = Indicates sample was Diluted.

NA = Not Analyzed.

NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 15 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
SEMIVOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

Sample Number:	**FB051104**	**FB051704**	**FB080404**
Lab Sample ID No:	**0405461-008**	**0405646-007**	**0408228-004**
Depth(ft):	**NA**	**NA**	**NA**
Sample Type:	**Water**	**Water**	**Water**
Sample Date:	**5/11/2004**	**5/17/2004**	**8/4/2004**
Units:	**µg/L**	**µg/L**	**ug/L**
Naphthalene	10 U	10 U	10 U
2-Methylnaphthalene	10 U	10 U	10 U
Acenaphthylene	10 U	10 U	10 U
Acenaphthene	10 U	10 U	10 U
Dibenzofuran	10 U	NA	NA
Fluorene	10 U	10 U	10 U
Phenanthrene	10 U	10 U	10 U
Anthracene	10 U	10 U	10 U
Carbazole	10 U	NA	NA
Fluoranthene	10 U	10 U	10 U
Pyrene	10 U	10 U	10 U
Benzo(a)anthracene	10 U	10 U	10 U
Chrysene	10 U	10 U	10 U
Benzo(b)fluoranthene	10 U	10 U	10 U
Benzo(k)fluoranthene	10 U	10 U	10 U
Benzo(a)pyrene	10 U	10 U	10 U
Indeno(1,2,3-cd)pyrene	10 U	10 U	10 U
Dibenzo(a,h)anthracene	10 U	10 U	10 U
Benzo(g,h,i)perylene	10 U	10 U	10 U
Total SVOCs	U	U	U
Total PAHs	U	U	U
Total CAPAHs	U	U	U
Total TICs	U	U	NA

NOTES:

U = Indicates a compound was analyzed for, but not detected. For results marked U, the numerical value is the compound MDL or PQL.

J = Indicates an estimated value.

E = Concentration exceeds calibrated range of instrument. Concentrations in diluted sample are lower.

B = Indicates that the analyte was found in the blank as well as the sample. It indicates possible/probable blank contamination.

* = Indicates compound is commonly found as laboratory contaminant.

D = Indicates sample was Diluted.

NA = Not Analyzed.

NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 15 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
SEMIVOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

Sample Number:		**GCMW-12S**	**GCMW-13S**	**GCMW-13I**	**GCMW-14S**	**GCMW-14I**
Lab Sample ID No:	**NYSDEC**	**0405501-002**	**0405646-004**	**0405646-003**	**0405501-004**	**0405501-003**
Depth(ft):	**Ambient Water**	**14 - 24**	**8 - 22**	**25 - 30**	**8 - 18**	**25 - 30**
Sample Type:	**Quality**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**
Sample Date:	**Standards**	**5/14/2004**	**5/17/2004**	**5/17/2004**	**5/13/2004**	**5/13/2004**
Units:		**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**
Naphthalene	10	10 U	**3800 D**	**2600 D**	5 J	10 U
2-Methylnaphthalene		10 U	490 DJ	840 DJ	1 J	10 U
Acenaphthylene		10 U	53	4 J	10 U	1 J
Acenaphthene	20	10 U	**86 J**	**180 DJ**	10 U	10 U
Dibenzofuran		10 U	NA	NA	NA	NA
Fluorene	50	1 J	**51**	47	10 U	10 U
Phenanthrene	50	3 J	**69**	**53**	1 J	10 U
Anthracene	50	1 J	15	12	10 U	1 J
Carbazole		10 U	NA	NA	NA	NA
Fluoranthene	50	10 U	8 J	6 J	10 U	4 J
Pyrene	50	1 J	8 J	6 J	2 J	4 J
Benzo(a)anthracene	0.002	10 U	**1 J**	10 U	10 U	10 U
Chrysene	0.002	10 U	10 U	10 U	10 U	10 U
Benzo(b)fluoranthene	0.002	10 U	10 U	10 U	10 U	10 U
Benzo(k)fluoranthene	0.002	10 U	10 U	10 U	10 U	10 U
Benzo(a)pyrene	ND	10 U	10 U	10 U	10 U	10 U
Indeno(1,2,3-cd)pyrene	0.002	10 U	10 U	10 U	10 U	10 U
Dibenzo(a,h)anthracene		10 U	10 U	10 U	10 U	10 U
Benzo(g,h,i)perylene		10 U	10 U	10 U	10 U	10 U
Total SVOCs		6 J	4581 DJ	3748 DJ	9 J	10 J
Total PAHs		6 J	4581 DJ	3748 DJ	9 J	10 J
Total CAPAHs		U	1 J	U	U	U
Total TICs		20	NA	NA	NA	NA

NOTES:

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J = Indicates an estimated value.

E = Concentration exceeds calibrated range of instrument. Concentrations in diluted sample are lower.

B = Indicates that the analyte was found in the blank as well as the sample. It indicates possible/probable blank contamination.

* = Indicates compound is commonly found as laboratory contaminant.

D = Indicates sample was Diluted.

NA = Not Analyzed.

NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 15 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
SEMIVOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

Sample Number	NYSDEC Ambient Water Quality Standards	PZ-01A	PZ-02A	PZ-03	PZ-04	PZ-04A (BD)	PZ-05	PZ-06	PZ-07
Lab Sample ID		0506742-004	0506680-002	0506613-006	0506680-003	0506680-004	0506742-005	0506742-006	0506533-003
Sample Interval (ft)		25 - 35	18 - 21	14 - 19	16 - 19	16 - 19	8 - 18	7 - 17	3 - 10
Sample Matrix		Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Date		6/21/2005	6/20/2005	6/16/2005	6/20/2005	6/20/2005	6/22/2005	6/22/2005	6/15/2005
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
2-Methylnaphthalene		2 J	10 U	47	10 U	10 U	10 U	10 U	10 U
Acenaphthene	20	7 J	10 U	**150 DJ**	10 U	1 J	10 U	10 U	10 U
Acenaphthylene		2 J	10 U	3 J	10 U	10 U	10 U	10 U	10 U
Anthracene	50	1 J	10 U	7 J	10 U	10 U	10 U	10 U	10 U
Benzo[a]anthracene	0.002	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo[a]pyrene	ND	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo[b]fluoranthene	0.002	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo[g,h,i]perylene		10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo[k]fluoranthene	0.002	10 U	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 U
Carbazole		NA	NA	6 J	NA	10 U	NA	NA	NA
Chrysene	0.002	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dibenz[a,h]anthracene		10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dibenzofuran		NA	NA	9 J	NA	10 U	NA	NA	NA
Fluoranthene	50	10 U	10 U	5 J	10 U	10 U	10 U	10 U	10 U
Fluorene	50	1 J	10 U	43	10 U	1 J	10 U	10 U	10 U
Indeno[1,2,3-cd]pyrene	0.002	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Naphthalene	10	**180 D**	10 U	**930 DJ**	1 J	1 J	10 UJ	3 J	10 U
Phenanthrene	50	6 J	10 U	**51**	2 J	2 J	10 U	10 U	10 U
Pyrene	50	10 U	10 U	6 J	10 U	10 U	10 U	10 U	10 U
Total SVOCs		199	U	1,257	3	5	U	3	U
Total PAH		199	U	1,242	3	5	U	3	U
Total CaPAH		U	U	U	U	U	U	U	U

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E = Concentration exceeds calibrated range of instrument. Concentrations in diluted sample are lower.

B = Indicates that the analyte was found in the blank as well as the sample. It indicates possible/probable blank contamination.

* = Indicates compound is commonly found as laboratory contaminant.

D = Indicates sample was Diluted.

NA = Not Analyzed.

NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 15 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
SEMIVOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

Sample Number	NYSDEC Ambient Water Quality Standards	GCMW08S	GCMW08D	GCMW08 (BD)	GCMW-09S	GCMW-09I
Lab Sample ID		0509944-002	0509944-001	0509944-003	0506742-002	0506742-001
Sample Interval (ft)		26 - 36	60 - 70	60 - 70	8 - 18	26 - 36
Sample Matrix		Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Date		9/28/2005	9/28/2005	9/28/2005	6/21/2005	6/21/2005
Units		ug/L	ug/L	ug/L	ug/L	ug/L
2-Methylnaphthalene		10 U	10 U	10 U	3 J	16
Acenaphthene	20	**36**	10 U	10 U	**68**	**60**
Acenaphthylene		40	10 U	10 U	7 J	190 D
Anthracene	50	13	10 U	10 U	14	22
Benzo[a]anthracene	0.002	**2 J**	10 U	10 U	10 U	10 U
Benzo[a]pyrene	ND	10 U	10 U	10 U	10 U	10 U
Benzo[b]fluoranthene	0.002	10 U	10 U	10 U	10 U	10 U
Benzo[g,h,i]perylene		10 U	10 U	10 U	10 U	10 U
Benzo[k]fluoranthene	0.002	10 U	10 U	10 U	10 U	10 UJ
Carbazole		NA	NA	NA	NA	2 J
Chrysene	0.002	**2 J**	10 U	10 U	10 U	10 U
Dibenz[a,h]anthracene		10 U	10 U	10 U	10 U	10 U
Dibenzofuran		NA	NA	NA	NA	15
Fluoranthene	50	12	10 U	10 U	10	14
Fluorene	50	**50**	10 U	10 U	43	26
Indeno[1,2,3-cd]pyrene	0.002	10 U	10 U	10 U	10 U	10 U
Naphthalene	10	2 J	10 U	10 U	**57**	**130 DJ**
Phenanthrene	50	**110 D**	10 U	10 U	**59**	**160 D**
Pyrene	50	15	10 U	10 U	11	15
Total SVOCs		282	U	U	272	650
Total PAH		282	U	U	272	633
Total CaPAH		4	U	U	U	U

NOTES:

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* = Indicates compound is commonly found as laboratory contaminant.

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NA = Not Analyzed.

NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 15 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
SEMIVOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

Sample Number	NYSDEC Ambient Water Quality Standards	GCMW-10S	GCMW-10I	GCMW-11S	GCMW-11I	GCMW-11A	GCMW-12S
Lab Sample ID		0506533-002	0506533-001	0506613-003	0506613-002	0506613-001	0506742-003
Sample Interval (ft)		11 - 16	16 - 26	8 - 20	23 - 28	23 - 28	14 - 24
Sample Matrix		Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Date		6/15/2005	6/15/2005	6/17/2005	6/17/2005	6/17/2005	6/22/2005
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
2-Methylnaphthalene		10 U	10 U	220 DJ	10 U	4 J	10 U
Acenaphthene	20	10 U	10 U	**200 DJ**	10	18	10 U
Acenaphthylene		10 U	10 U	17	10 U	10 U	10 U
Anthracene	50	10 U	10 U	10 U	10 U	1 J	10 U
Benzo[a]anthracene	0.002	10 U	10 U	**11**	10 U	10 U	10 U
Benzo[a]pyrene	ND	10 U	10 U	10 U	10 U	10 U	10 U
Benzo[b]fluoranthene	0.002	10 U	10 U	10 U	10 U	10 U	10 U
Benzo[g,h,i]perylene		10 U	10 U	10 U	10 U	10 U	10 U
Benzo[k]fluoranthene	0.002	10 U	10 U	10 UJ	10 U	10 U	10 U
Chrysene	0.002	10 U	10 U	10 U	10 U	10 U	10 U
Dibenz[a,h]anthracene		10 U	10 U	10 U	10 U	10 U	10 U
Di-n-butyl phthalate	50	NA	NA	NA	NA	1 J	NA
Fluoranthene	50	10 U	10 U	5 J	2 J	2 J	10 U
Fluorene	50	10 U	10 U	44	2 J	5 J	10 U
Indeno[1,2,3-cd]pyrene	0.002	10 U	10 U	10 U	10 U	10 U	10 U
Naphthalene	10	10 U	10 U	**3,900 DJ**	10 U	**73**	10 U
Phenanthrene	50	10 U	10 U	**53**	10 U	6 J	1 J
Pyrene	50	10 U	10 U	5 J	2 J	3 J	10 U
Total SVOCs		U	U	4,455	16	113	1
Total PAH		U	U	4,455	16	112	1
Total CaPAH		U	U	11	U	U	U

NOTES:

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* = Indicates compound is commonly found as laboratory contaminant.

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NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 15 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
SEMIVOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

Sample Number	NYSDEC Ambient Water Quality Standards	GCMW-13I	GCMW-14I	GCMW-14S	GCMW-15	GCMW-16
Lab Sample ID		0506613-004	0506613-005	0506680-001	0506462-001	0506462-002
Sample Interval (ft)		25 - 30	25 - 30	8 - 18	6 - 16	6 - 16
Sample Matrix		Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Date		6/17/2005	6/17/2005	6/20/2005	6/14/2005	6/14/2005
Units		ug/L	ug/L	ug/L	ug/L	ug/L
2-Methylnaphthalene		10 U	10 U	10 U	3 J	10 U
Acenaphthene	20	**27**	10 U	10 U	3 J	10 U
Acenaphthylene		10 U	10 U	10 U	10 U	10 U
Anthracene	50	1 J	10 U	10 U	10 U	10 U
Benzo[a]anthracene	0.002	10 U	10 U	10 U	10 U	10 U
Benzo[a]pyrene	ND	10 U	10 U	10 U	10 U	10 U
Benzo[b]fluoranthene	0.002	10 U	10 U	10 U	10 U	10 U
Benzo[g,h,i]perylene		10 U	10 U	10 U	10 U	10 U
Benzo[k]fluoranthene	0.002	10 U	10 U	10 U	10 U	10 U
Chrysene	0.002	10 U	10 U	10 U	10 U	10 U
Dibenz[a,h]anthracene		10 U	10 U	10 U	10 U	10 U
Fluoranthene	50	3 J	10 U	10 U	10 U	10 U
Fluorene	50	12	10 U	10 U	2 J	10 U
Indeno[1,2,3-cd]pyrene	0.002	10 U	10 U	10 U	10 U	10 U
Naphthalene	10	2 J	10 U	10 U	10 U	10 U
Phenanthrene	50	10 U	10 U	10 U	2 J	10 U
Pyrene	50	3 J	10 U	10 U	10 U	10 U
Total SVOCs		48	U	U	10	U
Total PAH		48	U	U	10	U
Total CaPAH		U	U	U	U	U

NOTES:

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D = Indicates sample was Diluted.

NA = Not Analyzed.

NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 15 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
SEMIVOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

Sample Number:	**FB061605**	**FB062105**	**GCFB092805**
Lab Sample ID No:	**0506533-004**	**0506742-007**	**0509944-004**
Depth(ft):	**NA**	**NA**	**NA**
Sample Type:	**WATER**	**WATER**	**WATER**
Sample Date:	**6/16/2005**	**6/21/2005**	**9/28/2005**
Units:	**ug/L**	**ug/L**	**ug/L**
Naphthalene	10 U	1 J	10 U
2-Methylnaphthalene	10 U	10 U	10 U
Acenaphthylene	10 U	10 U	10 U
Acenaphthene	10 U	10 U	10 U
Dibenzofuran	10 U	10 U	NA
Fluorene	10 U	10 U	10 U
Phenanthrene	10 U	10 U	10 U
Anthracene	10 U	10 U	10 U
Carbazole	10 U	10 U	NA
Fluoranthene	10 U	10 U	10 U
Pyrene	10 U	10 U	10 U
Benzo(a)anthracene	10 U	10 U	10 U
Chrysene	10 U	10 U	10 U
Benzo(b)fluoranthene	10 U	10 U	10 U
Benzo(k)fluoranthene	10 U	10 U	10 U
Benzo(a)pyrene	10 U	10 U	10 U
Indeno(1,2,3-cd)pyrene	10 U	10 U	10 U
Dibenzo(a,h)anthracene	10 U	10 U	10 U
Benzo(g,h,i)perylene	10 U	10 U	10 U
Total SVOCs	U	U	U
Total PAHs	U	U	U
Total CAPAHs	U	U	U
Total TICs	U	2 BJ	U

NOTES:

U = Indicates a compound was analyzed for, but not detected. For results marked U, the numerical value is the compound MDL or PQL.

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B = Indicates that the analyte was found in the blank as well as the sample. It indicates possible/probable blank contamination.

* = Indicates compound is commonly found as laboratory contaminant.

D = Indicates sample was Diluted.

NA = Not Analyzed.

NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 16
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
METALS IN GROUNDWATER

Sample Number:	NYSDEC Ambient Water Quality Standards	PZ-01A	PZ-02A	PZ-03	PZ-04	PZ-05
Lab Sample ID No:		0405461-004	0405461-005	0408228-003	0405646-005	0405501-005
Depth(ft):		25 - 35	18 - 21	14 - 19	16 - 19	8 - 18
Sample Type:		Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Date:		5/12/2004	5/12/2004	8/4/2004	5/17/2004	5/14/2004
Units:		µg/L	µg/L	µg/L	µg/L	µg/L
Arsenic	25	4.1 B	2.1 U	3.6 U	3.6 U	2.2 B
Barium	1000	269	113 B	57.3 B	167 B	175 B
Cadmium	5	0.24 B	0.2 U	0.3 U	0.67 B	1.8 B
Chromium	50	0.9 B	1.3 B	2.2 B	5.9 B	1 B
Lead	25	0.7 U	0.7 U	1.2 U	1.8 B	0.7 U
Mercury	0.7	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Selenium	10	3.6 B	9.6	2.1 U	2.8 B	4.2 B
Silver	50	0.5 U	0.5 U	0.5 U	0.71 B	0.5 U
Cyanide	200	47.8	10 U	22.1	10 U	35.8

NOTES:

U = Indicates a compound was analyzed for, but not detected. For results marked U, the numerical value is the compound MDL or PQL.

N = Indicates Matrix Spike Sample Recovery not met.

E = Indicates the reported value is estimated because of the presence of interference.

* = Indicates Duplicate analysis not within control limits.

B = Indicates reported value is less than the Contract Required Detection Limits but greater than the Instrument Detection Limit.

J = Indicates that based upon the findings of the data validation that the analyte was positively identified and the associated numerical value is an approximate (estimated) concentration. When the "J" qualifier is associated with a "U" qualifier it indicates that the sample was not detected above the reported sample quantitation limit, however the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R = Indicates that based upon the findings of the data validation the sample result is rejected (unusable) due to deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

D - Indicates Sample Was Diluted.

NA = Not Analyzed.

NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 16 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
METALS IN GROUNDWATER

Sample Number:	**NYSDEC Ambient Water Quality Standards**	**PZ-06**	**PZ-07**	**GCMW-08S**	**GCMW-08D**
Lab Sample ID No:		**0405501-006**	**0405461-006**	**0408285-001**	**0408228-002**
Depth(ft):		**7 - 17**	**3 - 10**	**26 - 36**	**60 - 70**
Sample Type:		**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**
Sample Date:		**5/14/2004**	**5/11/2004**	**8/4/2004**	**8/4/2004**
Units:		**µg/L**	**µg/L**	**µg/L**	**µg/L**
Arsenic	25	2.1 U	2.1 U	3.6 U	3.6 U
Barium	1000	35.8 B	88.2 B	260	84 B
Cadmium	5	0.2 U	0.52 B	0.3 U	0.3 U
Chromium	50	0.6 U	3.7 B	14.1	2.5 B
Lead	25	0.7 U	2.3 B	**31.1**	1.8 B
Mercury	0.7	0.1 U	0.1 U	0.1 U	0.1 U
Selenium	10	6.2	4.1 B	3.3 B	2.1 U
Silver	50	0.5 U	0.5 U	0.5 U	0.5 U
Cyanide	200	44.5	10 U	10 U	10 U

NOTES:

U = Indicates a compound was analyzed for, but not detected. For results marked U, the numerical value is the compound MDL or PQL.

N = Indicates Matrix Spike Sample Recovery not met.

E = Indicates the reported value is estimated because of the presence of interference.

* = Indicates Duplicate analysis not within control limits.

B = Indicates reported value is less than the Contract Required Detection Limits but greater than the Instrument Detection Limit.

J = Indicates that based upon the findings of the data validation that the analyte was positively identified and the associated numerical value is an approximate (estimated) concentration. When the "J" qualifier is associated with a "U" qualifier it indicates that the sample was not detected above the reported sample quantitation limit, however the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R = Indicates that based upon the findings of the data validation the sample result is rejected (unusable) due to deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

D - Indicates Sample Was Diluted.

NA = Not Analyzed.

NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 16 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
METALS IN GROUNDWATER

Sample Number:	**NYSDEC Ambient Water Quality Standards**	**GCMW-09S**	**GCMW-09I**	**GCMW-10S**	**GCMW-10I**	**GCMW-11S**	**GCMW-11I**
Lab Sample ID No:		**0405501-001**	**0405461-001**	**0405461-003**	**0405461-002**	**0405646-002**	**0405646-001**
Depth(ft):		**8 - 18**	**26 - 36**	**16 - 26**	**11 - 16**	**23 - 28**	**6 - 20**
Sample Type:		**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**	**Groundwater**
Sample Date:		**5/13/2004**	**5/12/2004**	**5/12/2004**	**5/11/2004**	**5/18/2004**	**5/18/2004**
Units:		**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**
Aluminum		1470	1090	20 B	64.7 B	NA	NA
Antimony	3	1.6 U	2.6 B	1.6 U	1.6 U	NA	NA
Arsenic	25	4.3 B	2.9 B	2.1 U	2.1 U	3.6 U	3.6 U
Barium	1000	86.4 B	198 B	54.9 B	111 B	219	139 B
Beryllium	3	0.15 B	0.68 B	0.1 U	0.1 U	NA	NA
Cadmium	5	0.51 B	0.68 B	0.2 U	0.2 U	0.3 U	0.3 U
Calcium		46600	67500	57800	51200	NA	NA
Chromium	50	4.4 B	14.7	1.4 B	1.6 B	1.2 B	0.78 B
Cobalt		3.4 B	4.9 B	0.9 U	0.9 U	NA	NA
Copper	200	8.6 B	9.4 B	3.3 B	2.2 B	NA	NA
Iron	300	**17100**	**1750**	17.4 B	85.9 B	NA	NA
Lead	25	2.1 B	5.2	0.7 U	0.7 U	2.2 B	1.6 B
Magnesium	35000	6190	31300	16500	19300	NA	NA
Manganese	300	**1600**	**5320**	11.7 B	68.7	NA	NA
Mercury	0.7	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Nickel	100	4.2 B	16.1 B	1.1 U	1.1 U	NA	NA
Potassium		4010 B	10700	4810 B	4650 B	NA	NA
Selenium	10	1.8 U	4.9 B	5.4	4.6 B	3.2 B	2.1 U
Silver	50	0.5 U	0.5 U	0.56 B	0.5 U	0.5 U	0.5 U
Sodium	20000	**20100**	**54700**	**65100**	**51600**	NA	NA
Thallium	0.5	1.9 U	1.9 U	1.9 U	1.9 U	NA	NA
Vanadium		3.3 B	4.1 B	1 U	1 U	NA	NA
Zinc	2000	68.1 *	25.9 B	66.4 *	24.1 B*	NA	NA
Cyanide	200	61.3	10 U	10 U	10 U	18.7	10 U

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NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 16 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
METALS IN GROUNDWATER

Sample Number:	NYSDEC Ambient Water Quality Standards	GCMW-12S	GCMW-13S	GCMW-13I	GCMW-14S	GCMW-14I
Lab Sample ID No:		0405501-002	0405646-004	0405646-003	0405501-004	0405501-003
Depth(ft):		14 - 24	25 - 30	8 - 22	25 - 30	8 - 18
Sample Type:		Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Date:		5/14/2004	5/17/2004	5/17/2004	5/13/2004	5/13/2004
Units:		µg/L	µg/L	µg/L	µg/L	µg/L
Aluminum		68.7 B	NA	NA	NA	NA
Antimony	3	1.6 U	NA	NA	NA	NA
Arsenic	25	2.1 U	3.6 U	3.6 U	2.1 U	2.1 U
Barium	1000	108 B	101 B	92.5 B	125 B	74.5 B
Beryllium	3	0.1 U	NA	NA	NA	NA
Cadmium	5	0.2 U	0.3 U	0.3 U	0.2 U	0.2 U
Calcium		60600	NA	NA	NA	NA
Chromium	50	0.6 U	1.5 B	0.74 B	24.6	1.1 B
Cobalt		1.7 B	NA	NA	NA	NA
Copper	200	1.4 B	NA	NA	NA	NA
Iron	300	227	NA	NA	NA	NA
Lead	25	0.7 U	1.6 B	1.2 U	2.9 B	0.72 B
Magnesium	35000	14900	NA	NA	NA	NA
Manganese	300	**1450**	NA	NA	NA	NA
Mercury	0.7	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Nickel	100	7.6 B	NA	NA	NA	NA
Potassium		7630	NA	NA	NA	NA
Selenium	10	1.8 U	2.1 U	2.2 B	**11.3**	**21.3**
Silver	50	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Sodium	20000	**25200**	NA	NA	NA	NA
Thallium	0.5	1.9 U	NA	NA	NA	NA
Vanadium		1 U	NA	NA	NA	NA
Zinc	2000	79.2 *	NA	NA	NA	NA
Cyanide	200	10 U	40.5	11.7	10 U	10 U

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NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 16 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
METALS IN GROUNDWATER

Sample Number:	**FB051104**	**FB051704**	**FB080404**
Lab Sample ID No:	**0405461-008**	**0405646-007**	**0408228-004**
Depth(ft):	**NA**	**NA**	**NA**
Sample Type:	**Water**	**Water**	**Water**
Sample Date:	**5/11/2004**	**5/17/2004**	**8/4/2004**
Units:	**µg/L**	**µg/L**	**µg/L**
Aluminum	14.3 B	NA	NA
Antimony	1.6 U	NA	NA
Arsenic	2.1 U	3.6 U	3.6 U
Barium	1.9 U	4 U	4 U
Beryllium	0.1 U	NA	NA
Cadmium	0.2 U	0.3 U	0.3 U
Calcium	58.1 B	NA	NA
Chromium	0.6 U	0.66 B	0.6 U
Cobalt	0.9 U	NA	NA
Copper	0.9 U	NA	NA
Iron	3.2 U	NA	NA
Lead	0.7 U	1.8 B	1.2 U
Magnesium	6.7 U	NA	NA
Manganese	0.4 U	NA	NA
Mercury	0.1 U	0.1 U	0.1 U
Nickel	1.1 U	NA	NA
Potassium	39.2 B	NA	NA
Selenium	1.8 U	2.1 U	2.1 U
Silver	0.5 U	0.51 B	0.5 U
Sodium	42.9 B	NA	NA
Thallium	1.9 U	NA	NA
Vanadium	1 U	NA	NA
Zinc	1.2 U	NA	NA
Cyanide	10 U	10 U	10 U

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TABLE 16 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
METALS IN GROUNDWATER

Sample Number	NYSDEC Ambient Water Quality Standards	PZ-01A	PZ-02A	PZ-03	PZ-04	PZ-04A (BD)	PZ-05	PZ-06	PZ-07
Lab Sample ID		0506742-004	0506680-002	0506613-006	0506680-003	0506680-004	0506742-005	0506742-006	0506533-003
Sample Interval (ft		25 - 35	18 - 21	14 - 19	16 - 19	16 - 19	8 - 18	7 - 17	3 - 10
Sample Matrix		Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Date		6/21/2005	6/20/2005	6/16/2005	6/20/2005	6/20/2005	6/22/2005	6/22/2005	6/15/2005
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Aluminum		NA	µg/L	NA	NA	15.7 B	NA	NA	NA
Antimony	3	NA	NA	5.8 U	NA	5.8 U	NA	NA	NA
Arsenic	25	3.1 B	3 U	3 U	3 U	3.6 B	3 U	3 U	3 U
Barium	1,000	133 B	90.2 JB	45.1 B	137 B	128 B	159 B	104 B	93.5 B
Beryllium	3	NA	NA	0.67 B	NA	0.32 B	NA	NA	NA
Cadmium	5	0.65 U	0.65 U	0.65 U	0.65 U	0.65 U	1.7 B	0.65 U	0.65 U
Calcium		NA	NA	52,700	NA	61,900	NA	NA	NA
Chromium	50	2.4 U	3.6 B	2.5 B	3.8 B	2.4 U	2.4 U	2.4 U	2.8 B
Cobalt		NA	NA	3 U	NA	3 U	NA	NA	NA
Copper	200	NA	NA	1.6 U	NA	2.8 B	NA	NA	NA
Cyanide	200	10 U	10 U	15.4	15.4	17.6	10 U	14	10 U
Iron	300	NA	NA	**12,100**	NA	40.1 B	NA	NA	NA
Lead	25	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U
Magnesium	35,000	NA	NA	9,850	NA	10,200	NA	NA	NA
Manganese	300	NA	NA	**579**	NA	**4,990**	NA	NA	NA
Mercury	0.7	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Nickel	100	NA	NA	6.6 U	NA	10.7 B	NA	NA	NA
Potassium		NA	NA	4500 B	NA	5,190	NA	NA	NA
Selenium	10	4.7 U	6.8	4.7 U	4.7 U	4.7 U	4.7 U	4.7 U	4.7 U
Silver	50	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U
Sodium	20,000	NA	NA	9,620	NA	6,140	NA	NA	NA
Thallium	0.5	NA	NA	4 U	NA	4 U	NA	NA	NA
Vanadium		NA	NA	2.4 B	NA	1.8 U	NA	NA	NA
Zinc	2,000	NA	NA	14.7 B	NA	44.5	NA	NA	NA

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NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 16 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
METALS IN GROUNDWATER

Sample Number	NYSDEC Ambient Water Quality Standards	GCMW08S	GCMW08D	GCMW08 (BD)	GCMW-09S	GCMW-09I
Lab Sample ID		0509944-002	0509944-001	0509944-003	0506742-002	0506742-001
Sample Interval (ft)		26 - 36	60 - 70	60 - 70	8 - 18	26 - 36
Sample Matrix		Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Date		9/28/2005	9/28/2005	9/28/2005	6/21/2005	6/21/2005
Units		ug/L	µg/L	ug/L	ug/L	ug/L
Aluminum		NA	NA	NA	NA	114 B
Antimony	3	NA	NA	NA	NA	5.8 U
Arsenic	25	21.8	1.7 U	1.7 U	6.4 B	3 U
Barium	1,000	478	88.9 B	94.2 B	76.7 B	148 B
Beryllium	3	NA	NA	NA	NA	0.84 B
Cadmium	5	0.26 U	0.32 B	0.26 U	0.65 U	0.8 B
Calcium		NA	NA	NA	NA	49,300
Chromium	50	**191**	0.64 U	3.3 B	3 B	4.2 B
Cobalt		NA	NA	NA	NA	3.2 B
Copper	200	NA	NA	NA	NA	2.9 B
Cyanide	200	16.5	10 U	10 U	10 U	10 U
Iron	300	NA	NA	NA	NA	179
Lead	25	**48.6**	1.3 U	2 B	1.9 B	1.7 U
Magnesium	35,000	NA	NA	NA	NA	23,900
Manganese	300	NA	NA	NA	NA	**1,200**
Mercury	0.7	0.34	0.16 B	0.17 B	0.1 U	0.1 U
Nickel	100	NA	NA	NA	NA	7 B
Potassium		NA	NA	NA	NA	5700 EB
Selenium	10	2.1 B	2 U	2 U	4.7 U	4.7 U
Silver	50	0.6 U	0.6 U	0.6 U	1.4 U	1.4 U
Sodium	20,000	NA	NA	NA	NA	**44,700**
Thallium	0.5	NA	NA	NA	NA	4 U
Vanadium		NA	NA	NA	NA	1.8 U
Zinc	2,000	NA	NA	NA	NA	32.2

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NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 16 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
METALS IN GROUNDWATER

Sample Number	NYSDEC Ambient Water Quality Standards	GCMW-10S	GCMW-10I	GCMW-11S	GCMW-11I	GCMW-11A (BD)	GCMW-12S
Lab Sample ID		0506533-002	0506533-001	0506613-003	0506613-002	0506613-001	0506742-003
Sample Interval (ft)		11 - 16	16 - 26	8 - 20	23 - 28	23 - 28	14 - 24
Sample Matrix		Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Date		6/15/2005	6/15/2005	6/17/2005	6/17/2005	6/17/2005	6/22/2005
Units		ug/L	µg/L	ug/L	ug/L	ug/L	ug/L
Aluminum		NA	NA	NA	NA	20.3 B	NA
Antimony	3	NA	NA	NA	NA	5.8 U	NA
Arsenic	25	3 U	3 U	5.7 B	3 U	3 U	3 U
Barium	1,000	55.4 B	105 B	170 B	142 B	149 B	99.7 B
Beryllium	3	NA	NA	NA	NA	0.19 U	NA
Cadmium	5	0.65 U	0.65 U	0.65 U	0.65 U	0.65 U	0.65 U
Calcium		NA	NA	NA	NA	61,100	NA
Chromium	50	2.4 U	3.3 B	3.8 B	2.4 U	2.4 U	2.4 U
Cobalt		NA	NA	NA	NA	3.9 B	NA
Copper	200	NA	NA	NA	NA	1.6 U	NA
Cyanide	200	14	10 U	31.6	10 U	10 U	147
Iron	300	NA	NA	NA	NA	26 B	NA
Lead	25	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U
Magnesium	35,000	NA	NA	NA	NA	32,900	NA
Manganese	300	NA	NA	NA	NA	**1,710**	NA
Mercury	0.7	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Nickel	100	NA	NA	NA	NA	6.6 U	NA
Potassium		NA	NA	NA	NA	5,550	NA
Selenium	10	5.7	4.7 U	4.7 U	4.7 U	4.7 U	4.7 U
Silver	50	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U
Sodium	20,000	NA	NA	NA	NA	**28600**	NA
Thallium	0.5	NA	NA	NA	NA	4 U	NA
Vanadium		NA	NA	NA	NA	1.8 U	NA
Zinc	2,000	NA	NA	NA	NA	23.9	NA

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NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 16 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
METALS IN GROUNDWATER

Sample Number	NYSDEC Ambient Water Quality Standards	GCMW-13I	GCMW-14S	GCMW-14I	GCMW-15	GCMW-16
Lab Sample ID		0506613-004	0506680-001	0506613-005	0506462-001	0506462-002
Sample Interval (ft)		25 - 30	8 - 18	25 - 30	6 - 16	6 - 16
Sample Matrix		Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample Date		6/17/2005	6/20/2005	6/17/2005	6/14/2005	6/14/2005
Units		ug/L	µg/L	ug/L	ug/L	ug/L
Aluminum		NA	NA	NA	NA	NA
Antimony	3	NA	NA	NA	NA	NA
Arsenic	25	3 U	3 U	3 U	5.6 B	4.8 B
Barium	1,000	112 B	90.3 B	79.1 B	239	160 B
Beryllium	3	NA	NA	NA	NA	NA
Cadmium	5	0.65 U	0.65 U	0.65 U	0.65 U	0.65 U
Calcium		NA	NA	NA	NA	NA
Chromium	50	2.4 U	2.4 U	2.4 U	2.8 B	6.5 B
Cobalt		NA	NA	NA	NA	NA
Copper	200	NA	NA	NA	NA	NA
Cyanide	200	10 U	10 U	10 U	10.5	19.7
Iron	300	NA	NA	NA	NA	NA
Lead	25	1.7 U	1.7 U	1.7 U	4.2	6
Magnesium	35,000	NA	NA	NA	NA	NA
Manganese	300	NA	NA	NA	NA	NA
Mercury	0.7	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Nickel	100	NA	NA	NA	NA	NA
Potassium		NA	NA	NA	NA	NA
Selenium	10	4.7 U	**13.1**	**14.3**	4.7 U	4.7 U
Silver	50	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U
Sodium	20,000	NA	NA	NA	NA	NA
Thallium	0.5	NA	NA	NA	NA	NA
Vanadium		NA	NA	NA	NA	NA
Zinc	2,000	NA	NA	NA	NA	NA

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NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 16 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
METALS IN GROUNDWATER

Sample Number:	**FB061605**	**FB062105**	**GCFB092805**
Lab Sample ID No:	**0506533-004**	**0506742-007**	**0509944-004**
Depth(ft):	**NA**	**NA**	**NA**
Sample Type:	**WATER**	**WATER**	**WATER**
Sample Date:	**6/16/2005**	**6/21/2005**	**9/28/2005**
Units:	**ug/L**	**ug/L**	**ug/L**
Aluminum	20.2 B	12.4 U	NA
Antimony	5.8 U	5.8 U	NA
Arsenic	3.1 B	3 U	1.7 U
Barium	0.98 U	0.98 U	0.92 B
Beryllium	0.19 U	0.19 U	NA
Cadmium	0.65 U	0.65 U	0.26 U
Calcium	157 B	77.1 B	NA
Chromium	2.4 U	2.4 U	0.64 U
Cobalt	3 U	3 U	NA
Copper	1.6 U	1.6 U	NA
Iron	12.8 B	24.6 B	NA
Lead	1.7 U	1.7 U	1.3 U
Magnesium	10.3 B	11.2 B	NA
Manganese	1.2 U	1.2 U	NA
Mercury	0.1 U	0.1 U	0.14 B
Nickel	6.6 U	6.6 U	NA
Potassium	39.6 U	39.6 UE	NA
Selenium	4.7 U	4.7 U	2 U
Silver	1.4 U	1.4 U	0.6 U
Sodium	92.3 B	86.3 B	NA
Thallium	4 U	4 U	NA
Vanadium	1.8 U	1.8 U	NA
Zinc	16.8 B	17.9 B	NA
Cyanide	10 U	10 U	10 U

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U = Indicates a compound was analyzed for, but not detected. For results marked U, the numerical value is the compound MDL or PQL.

N = Indicates Matrix Spike Sample Recovery not met.

E = Indicates the reported value is estimated because of the presence of interference.

* = Indicates Duplicate analysis not within control limits.

B = Indicates reported value is less than the Contract Required Detection Limits but greater than the Instrument Detection Limit.

J = Indicates that based upon the findings of the data validation that the analyte was positively identified and the associated numerical value is an approximate (estimated) concentration. When the "J" qualifier is associated with a "U" qualifier it indicates that the sample was not detected above the reported sample quantitation limit, however the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R = Indicates that based upon the findings of the data validation the sample result is rejected (unusable) due to deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

D - Indicates Sample Was Diluted.

NA = Not Analyzed.

NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 17
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
METALS IN SURFACE WATER and GROUNDWATER

Sample Number	NYSDEC Ambient Water Quality Standards	GCSW-01	GCSW-02	GCSW-03	GCSW-04	GCFB102005
Lab Sample ID		0510616-002	0510616-003	0510616-004	0510616-005	0510616-002
Sample Interval (ft)		0.5	0.5	0.5	0.5	NA
Sample Matrix		Surface Water	Surface Water	Surface Water	Surface Water	WATER
Sample Date		10/20/2005	10/20/2005	10/20/2005	10/20/2005	10/20/2005
Units		ug/L	ug/L	ug/L	ug/L	ug/L
Cyanide	5.2	10 U	10 U	10 U	10 U	10 U

NOTES:

U = Indicates a compound was analyzed for, but not detected. For results marked U, the numerical value is the compound MDL or PQL.

N = Indicates Matrix Spike Sample Recovery not met.

E = Indicates the reported value is estimated because of the presence of interference.

* = Indicates Duplicate analysis not within control limits.

B = Indicates reported value is less than the Contract Required Detection Limits but greater than the Instrument Detection Limit.

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R = Indicates that based upon the findings of the data validation the sample result is rejected (unusable) due to deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

NA = Not Analyzed.

NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1. and is the more stringent of Class SC Type A(C) and A(A) waters.

TABLE 17
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
METALS and OTHER INORGANICS IN SURFACE WATER and GROUNDWATER

Sample Number	NYSDEC Ambient Water Quality Standards	GCSW-01A	GCSW-02A	GCSW-03A	GCSWFB121207
Lab Sample ID		0714113-006	0714113-003	0714113-004	0714113-005
Sample Interval (ft)		0.5	0.5	0.5	NA
Sample Matrix		Surface Water	Surface Water	Surface Water	WATER
Sample Date		12/12/2007	12/12/2007	12/12/2007	12/12/2007
Total Free Cyanide (µg/L)	5.2	< 5	< 5	< 5	< 5
Dissolved Free Cyanide (µg/L)	5.2	< 5	< 5	< 5	< 5
Salinity (µg/L)		< 0.001	< 0.001	< 0.001	< 0.001
Hardness (mg/L)		102	106	100	< 5
Chloride (mg/L)		61.8	61.5	59.8	< 2
Total Suspended Solids (mg/L)		14	< 10	< 10	< 10

NOTES:

U = Indicates a compound was analyzed for, but not detected. For results marked U, the numerical value is the compound MDL or PQL.

N = Indicates Matrix Spike Sample Recovery not met.

E = Indicates the reported value is estimated because of the presence of interference.

* = Indicates Duplicate analysis not within control limits.

B = Indicates reported value is less than the Contract Required Detection Limits but greater than the Instrument Detection Limit.

J = Indicates that based upon the findings of the data validation that the analyte was positively identified and the associated numerical value is an approximate (estimated) concentration. When the "J" qualifier is associated with a "U" qualifier it indicates that the sample was not detected above the reported sample quantitation limit, however the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R = Indicates that based upon the findings of the data validation the sample result is rejected (unusable) due to deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be veri

NA = Not Analyzed.

NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1. and is the more stringent of Class SC Type A(C) and A(A) waters.

TABLE 17 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
METALS IN SURFACE WATER and GROUNDWATER

Sample Number	NYSDEC Ambient Water Quality Standards	GCSEEP03	GCFB102005
Lab Sample ID		0510616-001	0510616-002
Sample Interval (ft)		NA	NA
Sample Matrix		Groundwater	WATER
Sample Date		10/20/2005	10/20/2005
Units		ug/L	ug/L
Cyanide	200	43.1	10 U

NOTES:

U = Indicates a compound was analyzed for, but not detected. For results marked U, the numerical value is the compound MDL or PQL.

N = Indicates Matrix Spike Sample Recovery not met.

E = Indicates the reported value is estimated because of the presence of interference.

* = Indicates Duplicate analysis not within control limits.

B = Indicates reported value is less than the Contract Required Detection Limits but greater than the Instrument Detection Limit.

J = Indicates that based upon the findings of the data validation that the analyte was positively identified and the associated numerical value is an approximate (estimated) concentration. When the "J" qualifier is associated with a "U" qualifier it indicates that the sample was not detected above the reported sample quantitation limit, however the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R = Indicates that based upon the findings of the data validation the sample result is rejected (unusable) due to deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

NA = Not Analyzed.

NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 17 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
METALS and OTHER INOGRANICS IN SURFACE WATER and GROUNDWATER

Sample Number	**NYSDEC Ambient Water Quality Standards**	**GCSEEP03A**	**GCGW04A**
Lab Sample ID		**0714110-002**	**0714110-001**
Sample Interval (ft)		**NA**	**NA**
Sample Matrix		**Groundwater**	**Groundwater**
Sample Date		**12/12/2007**	**12/12/2007**
Total Free Cyanide (µg/L)	200	< 5	< 5
Dissolved Free Cyanide (µg/L)	200	< 5	< 5
Salinity (µg/L)	250,000	< 0.001	< 0.001
Hardness (mg/L)		170	230
Chloride (mg/L)		20.5	19.7
Total Suspended Solids (mg/L)		30	64

NOTES:

U = Indicates a compound was analyzed for, but not detected. For results marked U, the numerical value is the compound MDL or PQL.

N = Indicates Matrix Spike Sample Recovery not met.

E = Indicates the reported value is estimated because of the presence of interference.

* = Indicates Duplicate analysis not within control limits.

B = Indicates reported value is less than the Contract Required Detection Limits but greater than the Instrument Detection Limit.

J = Indicates that based upon the findings of the data validation that the analyte was positively identified and the associated numerical value is an approximate (estimated) concentration. When the "J" qualifier is associated with a "U" qualifier it indicates that the sample was not detected above the reported sample quantitation limit, however the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R = Indicates that based upon the findings of the data validation the sample result is rejected (unusable) due to deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be veri

NA = Not Analyzed.

GCGW04A- is a blind duplicate of of sample GCSEEP03A

NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 18
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
SEMIVOLATILE ORGANIC COMPOUNDS IN SURFACE WATER and GROUNDWATER

Sample Number	NYSDEC Ambient Water Quality Standards	GCSW-01	GCSW-02	GCSW-03	GCSW-04	GCFB102005
Lab Sample ID		0510616-002	0510616-003	0510616-004	0510616-005	0510616-006
Sample Interval (ft)		0.5	0.5	0.5	0.5	NA
Sample Matrix		Surface Water	Surface Water	Surface Water	Surface Water	WATER
Sample Date		10/20/2005	10/20/2005	10/20/2005	10/20/2005	10/20/2005
Units		ug/L	ug/L	ug/L	ug/L	ug/L
2-Methylnaphthalene	4.2	10 U	10 U	10 U	10 U	10 U
Acenaphthene	6.6	10 U	10 U	10 U	10 U	10 U
Acenaphthylene		10 U	10 U	10 U	10 U	10 U
Anthracene		10 U	10 U	10 U	10 U	10 U
Benzo[a]anthracene		10 U	10 U	10 U	10 U	10 U
Benzo[a]pyrene		10 U	10 U	10 U	10 U	10 U
Benzo[b]fluoranthene		10 U	10 U	10 U	10 U	10 U
Benzo[g,h,i]perylene		10 U	10 U	10 U	10 U	10 U
Benzo[k]fluoranthene		10 U	10 U	10 U	10 U	10 U
Chrysene		10 U	10 U	10 U	10 U	10 U
Dibenz[a,h]anthracene		10 U	10 U	10 U	10 U	10 U
Fluoranthene		10 U	10 U	10 U	10 U	10 U
Fluorene	2.5	10 U	10 U	10 U	10 U	10 U
Indeno[1,2,3-cd]pyrene		10 U	10 U	10 U	10 U	10 U
Naphthalene	16	10 U	10 U	10 U	10 U	10 U
Phenanthrene	1.5	10 U	10 U	10 U	10 U	10 U
Pyrene		10 U	10 U	10 U	10 U	10 U
Total SVOCs		U	U	U	U	U
Total PAH		U	U	U	U	U
Total CaPAH		U	U	U	U	U

NOTES:

U = Indicates a compound was analyzed for, but not detected. For results marked U, the numerical value is the compound MDL or PQL.

J = Indicates an estimated value.

E = Concentration exceeds calibrated range of instrument. Concentrations in diluted sample are lower.

B = Indicates that the analyte was found in the blank as well as the sample. It indicates possible/probable blank contamination.

* = Indicates compound is commonly found as laboratory contaminant.

D = Indicates sample was Diluted.

NA = Not Analyzed.

NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1. and is the more stringent of Class SC Type A(C) and A(A) waters.

TABLE 18 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
SEMIVOLATILE ORGANIC COMPOUNDS IN SURFACE WATER and GROUNDWATER

Sample Number	**NYSDEC Ambient Water Quality Standards**	**GCSEEP03**	**GCFB102005**
Lab Sample ID		**0510616-001**	**0510616-006**
Sample Interval (ft)		**NA**	**NA**
Sample Matrix		**Groundwater**	**WATER**
Sample Date		**10/20/2005**	**10/20/2005**
Units		**ug/L**	**ug/L**
2-Methylnaphthalene		10 U	10 U
Acenaphthene	20	10 U	10 U
Acenaphthylene		10 U	10 U
Anthracene	50	10 U	10 U
Benzo[a]anthracene	0.002	10 U	10 U
Benzo[a]pyrene	ND	10 U	10 U
Benzo[b]fluoranthene	0.002	10 U	10 U
Benzo[g,h,i]perylene		10 U	10 U
Benzo[k]fluoranthene	0.002	10 U	10 U
Chrysene	0.002	10 U	10 U
Dibenz[a,h]anthracene		10 U	10 U
Fluoranthene	50	10 U	10 U
Fluorene	50	10 U	10 U
Indeno[1,2,3-cd]pyrene	0.002	10 U	10 U
Naphthalene	10	10 U	10 U
Phenanthrene	50	10 U	10 U
Pyrene	50	10 U	10 U
Total SVOCs		U	U
Total PAH		U	U
Total CaPAH		U	U

NOTES:

U = Indicates a compound was analyzed for, but not detected. For results marked U, the numerical value is the compound MDL or PQL.

J = Indicates an estimated value.

E = Concentration exceeds calibrated range of instrument. Concentrations in diluted sample are lower.

B = Indicates that the analyte was found in the blank as well as the sample. It indicates possible/probable blank contamination.

* = Indicates compound is commonly found as laboratory contaminant.

D = Indicates sample was Diluted.

NA = Not Analyzed.

NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

TABLE 19
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
VOLATILE ORGANIC COMPOUNDS IN SURFACE WATER and GROUNDWATER

Sample Number	NYSDEC Ambient Water Quality Standards	GCSW-01	GCSW-02	GCSW-03	GCSW-04	GCFB102005	GCTB102005
Lab Sample ID		0510616-002	0510616-003	0510616-004	0510616-005	0510616-006	0510616-007
Sample Interval (ft)		0.5	0.5	0.5	0.5	NA	NA
Sample Matrix		Surface Water	Surface Water	Surface Water	Surface Water	WATER	WATER
Sample Date		10/20/2005	10/20/2005	10/20/2005	10/20/2005	10/20/2005	10/20/2005
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Benzene	190	10 U	10 U	10 U	10 U	10 U	10 U
Ethylbenzene	4.5	10 U	10 U	10 U	10 U	10 U	10 U
Methyl tertiary butyl ether		10 U	10 U	10 U	10 U	10 U	10 U
Toluene	92	10 U	10 U	10 U	10 U	10 U	10 U
Xylenes (Total)	19	10 U	10 U	10 U	10 U	10 U	10 U
Total VOCs		U	U	U	U	U	U
Total BTEX		U	U	U	U	U	U

NOTES:

U = Indicates a compound was analyzed for, but not detected. For results marked U, the numerical value is the compound MDL or PQL.

J = Indicates an estimated value.

E = Concentration exceeds calibrated range of instrument. Concentrations in diluted sample are lower.

B = Indicates that the analyte was found in the blank as well as the sample. It indicates possible/probable blank contamination.

* = Indicates compound is commonly found as laboratory contaminant.

D = Indicates sample was Diluted.

NA = Not Analyzed.

NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1. and is the more stringent of Class SC Type A(C) and A(A) waters.

TABLE 19 (cont.)
GLEN COVE FORMER MGP SITE
KEYSPAN CORPORATION
VOLATILE ORGANIC COMPOUNDS IN SURFACE WATER and GROUNDWATER

Sample Number	**NYSDEC Ambient Water Quality Standards**	**GCSEEP03**	**GCFB102005**	**GCTB102005**
Lab Sample ID		**0510616-001**	**0510616-006**	**0510616-007**
Sample Interval (ft)		**NA**	**NA**	**NA**
Sample Matrix		**Groundwater**	**WATER**	**WATER**
Sample Date		**10/20/2005**	**10/20/2005**	**10/20/2005**
Units		**ug/L**	**ug/L**	**ug/L**
Benzene	1	10 U	10 U	10 U
Ethylbenzene	5	10 U	10 U	10 U
Methyl tertiary butyl ether	10	10 U	10 U	10 U
Toluene	5	10 U	10 U	10 U
Xylenes (Total)	5	10 U	10 U	10 U
Total VOCs		U	U	U
Total BTEX		U	U	U

NOTES:

U = Indicates a compound was analyzed for, but not detected. For results marked U, the numerical value is the compound MDL or PQL.

J = Indicates an estimated value.

E = Concentration exceeds calibrated range of instrument. Concentrations in diluted sample are lower.

B = Indicates that the analyte was found in the blank as well as the sample. It indicates possible/probable blank contamination.

* = Indicates compound is commonly found as laboratory contaminant.

D = Indicates sample was Diluted.

NA = Not Analyzed.

NYSDEC Ambient Water Quality Standards (AWQS) Taken From The Most Current Edition Of TOGS 1.1.1.

Appendix C

Phase II Remedial Action Contract Documents

nationalgrid

SPECIFICATIONS
FOR
PHASE II REMEDIAL ACTION

GLEN COVE FORMER
MANUFACTURED GAS PLANT SITE

SPECIAL CONDITIONS
TABLE OF CONTENTS

SECTION 01 11 00
SUMMARY OF WORK

PART 1 GENERAL

1.1. PROJECT DESCRIPTION

A. The Glen Cove Phase II Remedial Action (RA) consists of the installation of an oxygen injection system. This includes, but is not limited to trenching, well drilling and construction, installing compressed gas distribution lines, and restoration. The site is an inverted L-shaped parcel of approximately 1.9 acres presently occupied by an active electrical substation which services Glen Cove and the surrounding area.

B. Contract Drawings for the Work are provided as Attachment A. Additional information on the Site conditions and history are provided in the work plan for this project.

C. All tasks, requirements, deliverables, etc. contained in the Contract Documents are the sole responsibility of the Contractor unless specifically assigned to Others in the Contract Documents. Project Work performed by the Contractor includes, but is not limited to, the following:

1. Prepare and implement a Contractor Health and Safety Plan in accordance with Section SC-34.0 (Health and Safety Plan) of the National Grid Supplemental Conditions (latest revision).
2. Prepare and implement a Site Operations Plan.
3. Install, operate, and maintain temporary facilities and controls, including:
    a. Temporary perimeter fence/barrier for excavation left open overnight.
    b. Storm water and erosion controls.
    c. Worker health and safety measures.
    d. Equipment and personnel decontamination facilities.
    e. Site roadways and traffic controls.
    f. Sanitary facilities.
    g. Signs (including but not limited to exclusion zone, site control signs, safety, speed limit, and no trespassing.
    h. Dust, odor, and vapor control.
    i. Excavated material (soil and debris) management/loading areas.
    j. Snow/ice removal in work area and access road, as necessary.
4. Obtaining all state and local permits and any other government requirements required for completion of the Work.

5. Provide contact information for all Subcontractors including transporters and disposal facilities for approval by National Grid.

6. Perform the Work

   a. Identify and protect existing utilities and Site features to remain after the Work is complete.

   b. Site preparation and clearing.

   c. Install the oxygen injection systems.

   d. Transport and dispose off-Site excavated material and debris created as a result of the utility trenching.

   e. Installation of the new oxygen injection system shed/trailer.

   f. Restore disturbed sections of the Site.

7. Provide clear pathways at all times for any Emergency Vehicles requiring access to the Site and substation facilities.

8. Provide and perform any other equipment, Work, or submittals required to facilitate items 1 through 7 above and the Work shown on the Contract Drawings.

1.2. PROJECT CONDITIONS

A. The site is owned by the Long Island Power Authority (LIPA). Access agreements are and/or will be in effect for construction to occur. It should be assumed that access will be available, and work can proceed without delay.

B. Work conducted under the existing overhead transmission lines may be subject to additional restrictions at the discretion of the LIPA representative on-site.

C. For available information concerning site conditions refer to the Contract Documents.

1.3. CONTRACTORS USE OF SITE

A. The Contractor's use of the Site shall be in accordance with the terms of the access agreements, and any additional areas negotiated for access by the Contractor.

B. Only stage equipment and materials in designated areas as approved by the Engineer. The approved staging area for this Project is as follows:

1. Equipment and waste staged overnight must be a minimum of 100 feet from Glen Cove Creek in accordance with the conditions of Freshwater Wetlands Permit ID 1-2805-00199/00001 and Modification 1 included as Attachment B.

2. With prior approval of National Grid, one roll-off container may be staged within 100 feet of Glen Cove Creek provided that is surrounded by dedicated

erosion controls such as hay bales and/or silt fencing and covered and secured during non-working hours in accordance with Freshwater Wetlands Permit ID 1-2805-00199/00001 Modification 1.

C. Consider local conditions including, but not limited to, proper use, community, and local traffic patterns when implementing the work.

1.4. CONTRACT DOCUMENTS:

A. The Contract Documents include all Specifications, Contract Drawings, figures and conditions included or referenced in the Request for Proposal package, and any subsequent approved Change Orders.

B. It is not the intent of the Contract Documents to show every pipe, wire, conduit, utility connection, detail, and appurtenance necessary to complete the Work. However, such connections and details that may be necessary to complete the Work in accordance with Contract Documents, code requirements, and to the Engineer's satisfaction shall be included in the Work.

C. The organization and division of the Work contained within the Contract shall not make the Engineer or National Grid an arbitrator to establish contract limits between the Contractor and any Subcontractor.

D. Perform Work in accordance with the concepts and intent of the Phase II Remedial Action Work Plan.

1.5. CONTRACTOR REQUIREMENTS

A. The Work will be performed on a known MGP-impacted Site.

B. Perform the scope of Work contained in the Contract Documents.

C. Comply with the requirements of the Health and Safety Plan (HASP), along with any Site specific amendments, taking precautions as necessary to protect the public and work force personnel from potential hazards.

D. Comply with the requirements of the Community Air Monitoring Plan (CAMP), taking precautions as necessary to protect the public and work force personnel from potential hazards

E. Identify plans for storage, lay down, and material handling facilities and locations with the bid submittal.

F. For any Work performed in close proximity to commercial properties, utilities or any other third party property, utilize every precaution to protect the property, utility lines, trees, walls, and other structures and related appurtenances from damage. Any damage that the Contractor may cause directly or indirectly outside the project limits shall be repaired or replaced in kind in a prompt manner as directed by National Grid, and/or the Engineer at no additional cost to National Grid.

G. Repair any damage caused directly or indirectly outside the Project limits as directed by the Engineer at no additional cost to the owner.

H. Comply with all applicable OSHA safety regulations during the performance of the Work.

I. Provide proof of the requisite insurance up to the amounts stipulated in the Terms and Conditions (latest revision).

J. Representatives of regulatory agencies from New York State, Nassau County, and the City of Glen Cove may be on-Site to observe and inspect the Work. Communications with regulatory agency personnel shall be directed to National Grid or their designee. The Contractor (including his employees) shall not communicate with third parties without a National Grid representative present.

K. Do not conduct Work outside of the permitted working hours (Monday through Friday, 8:00 am to 5:00 pm, no work on Federal holidays) without advanced approval.

1.6. CONTRACT DRAWINGS AND SPECIFICATIONS:

A. Maintain at the Site two (2) copies of all Contract Drawings, Specifications, Addenda, approved Shop Drawings, Change Orders, and all other modifications, schedules, and instructions in good order. One set shall be marked to record all changes made during construction. One set shall be kept clean of all markings. Both sets shall be available to National Grid, NYSDEC, and the Engineer at all times.

B. The Contract Drawings include notes. Refer to the Contract Drawings in conjunction with the Specifications.

1.7. CONTRACT PERIOD

A. Complete with Work within 12 calendar weeks of receiving a notice to proceed.

1.8. WORK BY OTHERS

A. Perimeter air monitoring will be performed by Others. Work zone air monitoring is the responsibility of the Contractor.

PART 2 PRODUCTS

(Not Applicable)

PART 3 EXECUTION

3.1. Project Schedule

A. The Contractor shall submit a Critical Path Method Project Schedule accordance with Specification Section 01 30 00 – Administrative Requirements that meets the following requirements:

1. One mobilization and one demobilization will occur.
2. Work will be performed continuously with no work stoppage.
3. Notify National Grid of any issues that will affect the overall project schedule.
4. All change notices will include an assessment of the effect on the project schedule.
5. Additional charges associated with an increased duration of the project, beyond 12 weeks, which are not related to an approved change will be borne by the Contractor.

END OF SECTION 01 11 00

SECTION 01 18 00
UTILITY PROTECTION

PART 1 GENERAL

1.1. SUMMARY

A. This specification contains the requirements for the location and protection of utilities affected by the performance of the Work.

1.2. UTILITY COORDINATION

A. The Contractor is solely responsible for any and all required notifications to utility companies prior to commencing the Work, and for response to any emergencies that may arise during the Work. Certain active and inactive utilities are currently present at the Site. National Grid will provide the Contractor with utility information provided by the property owner for informational purposes only. The exact location and type of utility is to be determined by the Contractor without reliance on information provided by National Grid or the Engineer. Several utilities may currently serve the Site or adjacent properties including, but not limited to, electric, natural gas, water, sanitary sewer, storm sewer, and/or telephone/other communications (e.g. fiber optic cable).

1.3. PROTECTION OF EXISTING UTILITIES

A. Maintain all utility markouts for the duration of the project. Provide copies of all one call numbers/tickets/utilities plates/private utility location information/test pit logs to the Engineer prior to beginning intrusive activities. The Engineer will maintain copies on site in a clearance package

B. Comply with the requirements of all applicable utility protection laws or regulations.

C. Contact and cooperate with utility companies to locate all utilities (including pipelines, cables, power poles, guy wires, and other structures) on the Site prior to beginning the Work.

D. Conduct a utility search and identification prior to commencement of intrusive field activities and resolve all potential conflicts.

E. All existing underground electrical will be marked out by the Long Island Power Authority.

F. Conduct a utility survey of the excavation area using a private utility locating service and markout all suspected utility locations. Confirm all suspected utility locations with LIPA prior to beginning intrusive activities.

G. Markout the safe off-set distance, as determined by LIPA, for electrical facilities, overhead utilities, substation equipment, and utility poles prior to beginning intrusive activities.

H. Hand clear locations of underground 13 kV electrical cables prior to performing any intrusive activities within 5 feet of the markout location. Cables and conduits must be visually located to confirm the markout. Locations must be permanently marked at the surface following hand clearing. No mechanical intrusive activities will be performed within 3 feet of the 13 kV underground cables.

I. Hand clear all monitoring well or soil boring locations to a depth of 5 feet below ground surface. All Hand clearing will be performed using fiberglass non-conductive tools or vacuum extraction methods and/or air knife.

J. All utilities encountered should be considered live until confirmed by the utility owner.

K. Protect all utilities from damage during construction, unless otherwise indicated to be removed or abandoned. If damaged, repair the utilities as required by the utility's owner at the Contractor's expense.

L. If a utility is encountered that is not shown on the Contract Drawings, or otherwise not made known to the Contractor prior to beginning the Work, promptly take the necessary steps to assure that the utility is not damaged, and notify the Engineer in writing of the presence of the utility. The Engineer will review the conditions and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence of the utility.

M. Immediately notify the Engineer of any incident involving a utility.

1.4. VEHICLE AND EQUIPMENT GROUNDING REQUIREMENTS

A. Ground all equipment involved in invasive activities using a LIPA approved grounding wire. Grounding wire must be a minimum of 20 feet long and have an ampacity equal to or greater than 4 AWG copper wire and be constructed in accordance with LIPA specifications (CS-3575 included as Attachment C).

B. Whenever possible, the grounding wire will be connected to a known ground point at the substation. If the activities are located too far from a known ground point, a (temporary) ground rod should be installed in the area of the work and the equipment or vehicle should be attached to the rod with the same 4 AWG ground.

C. All equipment requiring grounding shall be equipped with a LIPA-approved ground connection welded to the frame of the vehicle.

1.5. WORKING RESTRICTIONS – OVERHEAD ELECTRICAL UTILITIES

A. There are overhead distribution and transmission lines that run over the work area. Use extreme care during the implementation of the remedial construction activities so as not to damage or interfere with these utilities.

B. Maintain the minimum setbacks for all booms, masts, and trucks operating in the vicinity of energized lines as follows:

1. 10 feet for the 13 kV overhead electrical lines; and,
2. 10 feet for the 69 kV transmission cables.

C. Maintain the minimum physical clearance of 5 feet for personnel working within close proximity of energized conductors without any mechanical means.

D. Coordinate all excavation activity with National Grid and LIPA to ensure that overhead electrical lines are de-energized prior to working beneath the electrical lines within the minimum setbacks.

E. Sequence activites so that no remedial work that can potentially interrupt, damage or interfere with the overhead electrical utilities shall be performed during peak summer months (i.e., June 15th to September 1st) unless otherwise approved in writing by National Grid.

F. Do not load or empty/dump trucks under the overhead electrical utilities, unless approved by National Grid and LIPA. Do not open truck covers under the overhead electrical utilities. Provide warning signs of overhead lines and clearances for truck drivers at the site entrance and at the base of the access road.

1.6. SUBMITTALS

A. Submit a utility survey as detailed in Specification Section 01 31 00 – Administrative Requirements.

B. Immediately notify National Grid and the Engineer of an incident involving a utility.

C. Submit utility incident report to the Engineer within 4 hours of any incident causing direct or indirect damage to a utility. National Grid will provide the Contractor with a template for this report. At a minimum, document the following items in a utility incident report:

1. Description of the incident.
2. Damage assessment.
3. Corrective actions taken.
4. Initial estimate on the need for permanent repairs.

PART 2 PRODUCTS

(Not Applicable)

PART 3 EXECUTION

(Not Applicable)

END OF SECTION 01 18 00

SECTION 01 20 00
PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.1. SUMMARY

A. The items listed in the Price Schedule constitute all of the pay items for completion of the Work.

B. The estimated quantities for the unit bid prices shall be verified by the Contractor in the field.

C. National Grid reserves the right to increase or decrease any quantity or to eliminate any line item as a result of actual conditions encountered during the performance of the Work.

1.2. PAYMENT TERMS

A. See National Grid Terms and Conditions, and Supplemental Conditions.

B. Payment will not be made unless the proper support documentation has been submitted and approved by National Grid or National Grid's representative.

C. Payment includes: Full compensation for all required labor, products, tools, equipment, transportation, services, and incidentals; erection, application, or installation of an item of the Work, including overhead and profit.

D. Payment will not be made for any of the following:

1. Products wasted or disposed of in a manner that is not acceptable.
2. Products determined as unacceptable before or after placement.
3. Products not completely unloaded from the transporting vehicle.
4. Products placed beyond the lines and levels of the required Work.
5. Removal, loading, hauling, and disposing of rejected materials.
6. Products remaining on hand after completion of Work.
7. Additional Work undertaken to expedite Contractor's operations.
8. Repair or replacement of monitoring wells, utilities, or any other facilities located within or adjacent to the Work Area.

E. Payment will be made by National Grid for all Work actually performed during a particular payment period. Payments for lump sum items will be made based on the percent completion of the pay item. Judgments of percent completion of lump sum items will be made in reference to the Schedule of Quantities and Prices.

1.3. SUBMITTALS

A. Invoices: Submit invoices monthly in accordance with the provisions of the National Grid Terms and Conditions, and Supplemental Conditions. Include an update of Price Schedule with each invoice. Submit a copy of the invoice to the Engineer.

B. Bid Form: The Contractor shall submit a Price Schedule and Bid Form signed and sealed with a Company Seal by a Company Officer.

1.4. QUANTITY ESTIMATES

A. Verify estimated quantities for unit prices in the field.

B. For all unit price Work, the Contract Price will include an amount equal to the sum of the unit price for each pay item times the estimated quantity of each item as indicated in the Bid Form. The estimated quantities shown on Bid Form Schedule A – Project Price Schedule are not guaranteed and are solely for the purpose of comparison of bids and determining an initial Contract Price. Quantities and measurements supplied or placed in the Work in accordance with the Specifications and Contract Drawings and verified by the Engineer will determine payment.

C. The Engineer will determine the actual quantities and classifications of unit price Work performed by the Contractor. The Engineer will review with the Contractor all preliminary determinations on unit price Work before rendering a written decision on an Application for Payment. The determination of actual quantities and classifications of Work made by the Engineer for the purpose of payment, are final.

D. If the actual Work requires greater or fewer units than the estimated unit quantities indicated on Bid Form Schedule A – Project Price Schedule, the Contractor shall provide the required units at the contracted unit price. Under no circumstances may the Contractor exceed estimated quantities without prior written approval from the Engineer.

E. National Grid or National Grid's representative reserves the right to increase or decrease any pay item quantity or to eliminate any pay item as a result of the actual conditions encountered during the performance of the work, and in no way shall this invalidate the terms of the Agreement.

1.5. MEASUREMENT OF QUANTITIES

A. Measurement by Weight:

1. Weigh Scales: Scales shall be certified in accordance with applicable laws and regulations for the state in which the scales are located. Certification shall have been made within a period of not more than one year prior to date of use for weighing commodity.

2. The term "ton" will mean the short ton consisting of 2,000 pounds.

3. For shipments to off-Site disposal facilities, trucks will be weighed at the receiving facility for the purpose of measuring the quantity of Work for payment.

B. Measurement by Volume:

1. Volumes measured as in-place volumes will be determined by survey approved by the Engineer. The Contractor shall retain the services of an independent land surveyor, licensed or registered in the State of New York, whose determination of in-place volumes shall be authoritative and final for the purpose of measurement for payment. To compute in-place volumes of excavation, the average end area method or other methods acceptable to the Engineer will be used

2. Volume of liquids will be measured by an appropriately calibrated and inspected flow meter. The total computed volume of liquid for payment will be measured as a fraction of the unit of measurement for payment listed on Bid Form Schedule A – Project Price Schedule.

C. Measurement by Area: Measured by square dimension using length and width or radius, and verified by the Engineer.

D. Linear Measurement: Measured by linear dimension, at the item centerline or mean chord, and verified by the Engineer.

E. Measurement by Time: Measure by the actual time rounded to the nearest time unit and verified by the Engineer.

1.6. ASSESSMENT OF NON-CONFORMING WORK

A. Contractor shall replace Work, or portions of the Work, that do not conform to the requirements of the Specifications and Contract Drawings, as assessed by the Engineer.

B. If, in the opinion of the Engineer, it is not practical to remove and replace the non-conforming Work, the Engineer will direct one of the following remedies:

1. The non-conforming Work may remain, but the unit price will be adjusted to a new price at the discretion of the Engineer.

2. The non-conforming Work shall be partially repaired to the instructions of the Engineer, and the unit price will be adjusted to a new price at the discretion of the Engineer.

C. The individual Specification sections may modify these options or may identify a specific formula or percentage price reduction.

D. The authority of the Engineer to assess non-conforming Work and identify payment adjustment is final.

1.7. ELIMINATED ITEMS:

A. If any items contained in the Contract Drawings or Specifications are found unnecessary for the proper completion of the Work, the Engineer may, upon written order to the Contractor, eliminate such items from the Work, and such action shall in no way invalidate the Agreement.

B. The Contractor will be paid for actual Work done and all documented costs incurred, including mobilization of materials prior to elimination of such items.

1.8. MEASUREMENT AND PAYMENT OF BID ITEMS:

A. Bid Form Schedule A – Project Price Schedule, Project Price Schedule, lists the bid items and unit price items for the Work. Measurement and payment of the Work covered by the Contract Documents is specified below.

B. At the direction of the Engineer, Contractor may be asked to perform change order work on a Time and Materials (T&M) basis. The unit rate schedule included in the Contractor's proposal shall be the basis for measurement and payment of equipment and labor for T&M. Hourly prices for equipment and labor listed on the Contractor's unit rate schedule shall include Contractor's overhead and profit for such T&M Work. If any change order work will affect the overall project schedule, then the duration of the change order work must be submitted to National Grid and the Engineer prior to the start of the change order work.

C. The following paragraphs specify measurement and payment of the Lump Sum Bid items listed on Bid Form Schedule A – Project Price Schedule (attached to this Specification):

Item 1 Mobilization and Demobilization

1. Work required to complete Mobilization and Demobilization includes, but is not limited to:

   a. Movement of personnel, equipment, and materials to and from the Site, if such movement is not included in any other Bid Item.

   b. Preconstruction coordination meetings. This includes one meeting at National Grid's Hicksville, NY facility and one meeting at the site.

   c. Preparation, submittal, and revisions of all required pre-mobilization submittals as described in Specification 01 33 00 - Submittal Procedures.

2. Mobilization and Demobilization will be measured for payment as one unit, complete as specified.

3. Payment for Mobilization and Demobilization will be made on a 60% mobilization and 40% demobilization basis of the lump sum price for the Bid item "Mobilization and Demobilization" listed on the Bid Form Schedule A –

Project Price Schedule. Payment of the lump sum price for "Mobilization and Demobilization" will constitute full compensation for all labor, supervision, materials, equipment, start up submittals, incidentals and all other costs necessary to complete Mobilization and Demobilization Work, including the transport of all equipment, labor and temporary facilities and materials to and from the Site.

Item 2 Site Preparation

1. Work required to complete Site Preparation includes, but is not limited to:

   a. Implement requirements for environmental protection specified in Specifications Section 01 50 00 – Temporary Facilities and Controls unless specifically identified as being provided by others.

   b. Implement the health and safety requirements specified in the Contractor Health and Safety Plan detailed in Specification Section 01 31 00 – Administrative Requirements.

   c. Provide and maintain temporary fencing as shown on the Contract Drawings.

   d. Implement the health and safety requirements specified in the approved Contractor Site Operations Manual as detailed in Specification Section 01 50 00 - Temporary Facilities and Controls.

   e. Install and maintain temporary facilities and controls specified in Specifications Section 01 50 00 - Temporary Facilities and Controls, unless specifically identified as being provided by others.

   f. Project management and oversight as specified in Section 01 30 00 - Administrative Requirements.

   g. Install decontamination facilities as specified in Specifications Section 01 50 00 - Temporary Facilities and Controls.

   h. Maintain and repair all temporary facilities and controls including those provided by others during the period when Work is taking place at the Site.

   i. Conduct any surveying needed to control and document the Work.

   j. Clearing, grubbing, and leveling of Work Zones, including CAMP locations.

   k. Removal and off-Site disposal of existing debris.

   l. Maintain and repair all temporary facilities and controls, including those provided by Others, when Work is taking place at the Site.

m. All other one-time and recurring activities required by the Contractor to complete the Work unless included in another pay item or specifically identified as being the responsibility of others.

2. Site Preparation will be measured for payment as one unit, complete as specified.

3. Payment for Site Preparation will be made in accordance with the lump sum price for the Bid item "Site Preparation" listed on Bid Form Schedule A – Project Price Schedule. Payment of the lump sum price for "Site Preparation" shall constitute full compensation for all labor, supervision, materials, equipment, incidentals and all other costs necessary to complete the Site Preparation Work, as specified in Specifications Section 31 10 00 and Specification Section 01 50 00.

Item 3 Soil Excavation

1. Work required to complete Soil Excavation includes, but is not limited to:

   a. Excavation of the utility trench.

   b. Loading of excavated material for off-site disposal.

2. Soil Excavation will be measured for payment as one unit, complete as specified.

3. Payment for Soil Excavation will be made in accordance with the lump sum price for the Bid item "Soil Excavation" listed on Bid Form Schedule A – Project Price Schedule. Payment of the lump sum price for "Soil Excavation" shall constitute full compensation for all labor, supervision, materials, equipment, incidentals and all other costs necessary to as complete Soil Excavation as specified in Specifications Section 31 23 00.

Item 4 Plumbing

1. Work required to complete Plumbing includes but is not limited to:

   a. Installing all the plumbing lines and connections as shown on the Contract Drawings.

   b. Construction of the "Stub Up" as shown on the Contract Drawings.

   c. Performing and satisfactorily completing a pressure test of the system as per the Specifications.

2. Plumbing Work will be measured for payment as one unit, complete as specified.

3. Payment for Plumbing will be made in accordance with the lump sum price for the Bid item "Plumbing" listed on Bid Form Schedule A – Project Price Schedule. Payment of the lump sum price for "Plumbing" shall constitute full

compensation for all labor, supervision, materials, equipment, incidentals and all other costs necessary to complete the Plumbing work, as specified in Specification Section 22 15 00.

Item 5 Backfill to Grade

1. Work required to complete Backfill to Grade includes, but is not limited to:
   a. Sampling the backfill to confirm it meets the Unrestricted Use Soil Cleanup Objective and is approved by NYSDEC.
   b. Placement and compaction of approved fill as specified in Specification Section 31 23 00 - Excavation and Fill.
   c. Restoring the Site to pre-RA conditions as per the Contact Drawings
2. Backfill to Grade will be measured for payment as one unit, complete as specified.
3. Payment for Backfill to Grade will be made in accordance with the lump sum price for the Bid item "Backfill to Grade" listed on Bid Form Schedule A – Project Price Schedule. Payment of the lump sum price for "Backfill to Grade" shall constitute full compensation for all labor, supervision, materials, equipment, incidentals and all other costs necessary to place fill to the final grades shown on the Contract Drawings, and as specified in Specification Section 31 23 00.

Item 6 Injection Point Construction

1. Work required to complete Injection Point Construction includes, but is not limited to:
   a. Performing the drilling required to install the injection wells at the locations and depths shown on the Contract Drawings.
2. Injection Point Construction Work will be measured for payment on a per vertical foot basis, as measured by the installed well materials and verified by the representative of the Engineer observing the construction.
3. Payment for Injection Point Construction will be made in accordance with the unit price for the Bid item "Injection Point Construction" listed on Bid Form Schedule A – Project Price Schedule. Payment of the unit price for "Injection Point Construction" shall constitute full compensation for all labor, supervision, materials, equipment, incidentals and all other costs necessary to complete Injection Point Construction as specified in Specifications Section 32 20 00.

Item 7 Transportation and Disposal: Soil

1. Work required to complete the Transportation and Disposal: Soil pay item includes, but is not limited to:

a. Sampling the soil to meet the frequency and analysis requirements of the Owner-approved disposal facility, and obtaining acceptance from the facility for disposal of the material.

b. Handling, transportation, and disposal of excavated soil and incidental concrete and debris from the Project Site at disposal facilities approved by the National Grid in accordance with Specification 02 61 00 – Removal and Disposal of Contaminated Materials.

c. Identify the proposed disposal facilities and trucking companies in the list of Subcontractors provided in the Contractor's bid. The Contractor shall select a disposal facility from the three listed below, and ensure that the selected disposal facility has capacity to accept excavated materials and spoils at a rate sufficient to meet the Construction Milestones listed in the Contractor's schedule. If multiple disposal facilities are required to achieve the construction milestones, the bidder shall provide unit costs and percent of the total excavated material and spoils shipped to each facility in their Site Operations Plan and in Schedule A.

Bay Shore Soil Management (formerly ESMI of New Jersey) located at 75 Crows Mill Road Keasbey, New Jersey, 08832

Clean Earth of Philadelphia, Inc., Thermal Desorption Services located at 3201 South 61st Street, Philadelphia, Pennsylvania, 19153

Clean Earth of Southeast Pennsylvania, Thermal Desorption Services located at 7 Steel Road East, Morrisville, Pennsylvania, 19067

2. Transportation and Disposal: Soil will be measured for payment on a per ton basis, as documented by approved disposal facility scale weight tickets.

3. Payment for Transportation and Disposal: Soil will be made in accordance with the unit price for the Bid item "Transportation and Disposal: Soil" listed on Bid Form Schedule A – Project Price Schedule. Payment of the unit price for "Transportation and Disposal: Soil" shall constitute full compensation for all labor, supervision, materials, lab fees, disposal facility fees, equipment, incidentals and all other costs necessary to complete Transportation and Disposal: Soil as specified in Specifications Section 02 61 00.

Item 8 Transportation and Disposal: Construction Debris

1. Work required to complete Transportation and Disposal: Construction Debris includes but is not limited to:

a. Handling, transportation and disposal of any and all debris generated from the Project Site that is designated for off-Site disposal by the Engineer at a disposal facility that has been approved by National Grid.

b. Identify the proposed disposal facilities and trucking companies in the list of Subcontractors provided with the Contractor's bid.

2. Transportation and Disposal: Construction Debris will be measured for payment on a per ton basis, as documented by approved disposal facility scale weight tickets.

3. Payment for Transportation and Disposal: Construction Debris will be made in accordance with the unit price for the Bid item "Transportation and Disposal: Construction Debris" listed on Bid Form Schedule A – Project Price Schedule. Payment of the unit price for "Transportation and Disposal: Construction Debris" shall constitute full compensation for all labor, supervision, materials, equipment, incidentals, approved disposal facility fees, and all other costs necessary to complete Transportation and Disposal: Construction Debris Work, as specified in Specifications Section 02 41 00.

Item 9 Transportation and Disposal: Wastewater

1. Work required to complete the Transportation and Disposal: Wastewater pay item includes, but is not limited to:

a. Sampling the wastewater and decontamination liquids to meet the frequency and analysis requirements of the Owner-approved disposal facility, and obtaining acceptance from the facility for disposal of the liquids.

b. Handling, transportation, and disposal of wastewater and decontamination fluids from the Project Site at disposal facilities approved by the Owner in accordance with Specification 02 61 00 – Removal and Disposal of Contaminated Materials.

c. Identify the proposed disposal facilities and trucking companies in the list of Subcontractors provided with the Contractor's bid. The Contractor shall select a disposal facility from the two listed below, and ensure that the selected disposal facility has capacity to accept wastewater and decontamination fluids at a rate sufficient to meet the Construction Milestones listed in the Contractor's schedule.

Clean Water New York, Inc. located at 3249 Richmond Terrace, PO Box 030312, Staten Island, New York, 10303.

United Industrial Services, Inc. located at 136 Gracey Avenue, Meriden, Connecticut, 06451.

2. Disposal will be measured for payment on a per gallon basis, as documented by an appropriately calibrated and inspected flow meter at the receiving facility.

3. Payment for Transportation and Disposal: Wastewater will be made in accordance with the unit price for the Bid item "Transportation and Disposal: Wastewater" listed on Bid Form Schedule A – Project Price Schedule. Payment of the unit price for "Transportation and Disposal: Wastewater" shall constitute full compensation for all labor, supervision, materials, lab fees, disposal facility fees, equipment, incidentals and all other costs necessary to complete Transportation and Disposal: Wastewater as specified in Specifications Section 02 61 00.

Item 10 Approved Off-Site Backfill Material: Bedding Sand

1. Work required to complete Approved off-Site Backfill Material: Bedding Sand includes, but is not limited to:
   a. Procurement, transportation, placement, analytical testing, and compaction of approved Bedding Sand, as specified in Specification Section 31 23 00 - Excavation and Fill.
   b. Sampling the backfill to confirm it meets the Unrestricted Use Soil Cleanup Objective.
2. Approved off-Site Backfill Material: Bedding Sand will be measured for payment on a per cubic yard basis as verified by delivery weight tickets.
3. Payment for Approved off-Site Backfill Material: Bedding Sand will be made in accordance with the unit price for the Bid item "Approved off-Site Backfill Material: Bedding Sand" listed on Bid Form Schedule A – Project Price Schedule. Payment of the unit price for "Approved off-Site Backfill Material: Bedding Sand" shall constitute full compensation for all labor, supervision, materials, equipment, incidentals and all other costs necessary to furnish approved fill for the Site to the lines and grades shown on the Contract Drawings and as specified in Specification Section 31 23 00 – Excavation and Fill.

Item 11 Standby Time: Day

1. Payment for the Work shall be made on a prorated daily basis in no less than 0.25 day increments.
2. Payment for Standby Time - Day will be made in accordance with the unit price for the Bid item "Standby Time - Day" listed on Bid Form Schedule A – Project Price Schedule. Payment of the unit price for "Standby Time – Day" shall constitute full compensation for cease Work at the direction of National Grid or the Engineer for reasons not chargeable to the Contractor. Payment of the unit price for "Standby Time – Day" will not apply to work stoppages

initiated by the Contractor. The Standby Time – Day pay item assumes that labor will be reassigned and thus labor costs will not be included in this pay item.

PART 2 PRODUCTS

(Not Applicable)

PART 3 EXECUTION

(Not Applicable)

END OF SECTION 01 20 00

SECTION 01 30 00
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.1. SUMMARY

A. This section describes the Project administrative requirements, a minimum level of coordination and meetings required to execute the Work in accordance with Sections 4.0 (Personnel) and 15.0 (Meetings and Reports) of the Terms and Conditions (latest revision). Additional meetings and/or other coordination may be required.

1.2. ON-SITE CONSTRUCTION PERSONNEL

A. National Grid will not maintain a full time representative on-Site for the duration of the Work.

B. The Engineer will maintain a full-time on-Site representative for the duration of the Work. The Engineer will be responsible for contractual oversight of the Work on behalf of National Grid. The Engineer will also be responsible for observing the Work relative to conformance with the technical requirements of the Contract Drawings and Specifications. The Engineer will be responsible for construction quality assurance, ensuring that the work is completed in accordance with the Contract Documents, and final certification of the Work. The Engineer will not direct the contractor on the specific means and methods of construction, however, the Engineer will advise the contractor of non-compliance with the contract documents, and identify required corrective action.

C. Maintain a full-time Contractor on-Site Superintendent, who will be responsible for QA/QC, Contractor health and safety, and Competent Person(s) for the duration of the Work. The Superintendent will be responsible for the supervision and/or coordination of all Contractor employees, Subcontractors, manufacturers, fabricators, suppliers, distributors, installers, and testing agencies whose services, materials or equipment are required to ensure the completion of the Work. The Superintendent shall have sufficient qualifications, experience, and authority to act as a single point of contact for the on-Site staff, and to make adjustments to the means and methods as needed and as requested by National Grid, its representative, and the Engineer. Contractor will provide National Grid with a resume for the Superintendent in their proposal. Indicate any prior experience of the Superintendent's experience working in proximity to active transmission and distribution equipment/lines.

D. Maintain a dedicated full-time on-Site Health and Safety officer in accordance with the Supplemental Conditions. The Health and Safety officer may have other responsibilities or duties outside of health and safety.

E. New York State Department of Environmental Conservation (NYSDEC) may maintain a part/full-time field representative for the duration of the Work. NYSDEC will be responsible for administration of the Remedial Design.

1.3. MEETINGS

A. Attend bi-weekly project meetings as often as deemed necessary by National Grid during the term of the Agreement.

B. A post-award meeting will be held at National Grid's Hicksville New York office, or the Site to discuss Project submittals, schedule, etc. Contractor's Project Manager and Superintendent for the Project shall attend the meeting.

C. A pre-construction meeting will be held, in accordance with Section SC-16.0 (Pre-Construction Meeting) of the National Grid Supplemental Conditions (latest revision), at the Site prior to start of Work. At a minimum, the Contractor's Project Manager and/or Superintendent for the Project shall attend the meeting. It is recommended that the Contractor assemble input from their primary Subcontractors.

1. This meeting is intended to make certain that the Work is properly scheduled, responsibilities are coordinated among subcontractors and suppliers, and that those responsibilities are reflected on the Contractor's submittals. Questions concerning the administrative requirements outlined during the Pre-construction conference or any other aspect of the Project may also be addressed.

D. Beginning with the mobilization to the Site, the Engineer will facilitate weekly construction meetings with the on-Site Contractor personnel for the duration of the Work. Prior to mobilization, if necessary, bi-weekly meetings may be held via teleconference. After mobilization, weekly meetings will be held at the Site. The Contractor will present a progress update at weekly construction meetings to include tasks completed from the prior week, currently active tasks, and tasks/activities planned for the next two weeks along with an updated project schedule.

E. The standard meeting day and time for the weekly construction meeting will be established based on mutual agreement with National Grid and the other participants. Prior to each weekly meeting the Engineer will prepare a meeting agenda.

F. Special construction meetings will be held at the Site or other designated locations to discuss urgent construction issues. The Contractor, National Grid, National Grid's representative, the Engineer or NYSDEC may call special construction meetings. Coordination (agenda, meeting minutes, location, time, and attendance) of special construction meetings is the responsibility of the organization calling the meeting. Special construction meetings shall be called judiciously.

G. Ensure weekly construction meeting and special construction meeting attendance by all Contractor staff required to discuss and make decisions on behalf of the Contractor, relative to the meeting agenda.

H. Prepare a Critical Path Method (CPM) project schedule in accordance with Section SC-15.0 (Work Schedule) of the National Grid Supplemental Conditions (latest revision).

I. All expenses associated with attending the meetings, except those that are incurred by National Grid, their representatives or consultants, shall be borne by the Contractor.

1.4. REQUESTS FOR INFORMATION, CLARIFICATIONS, AND CHANGES

A. All Contractor communications regarding discrepancies, claims, and change conditions shall be in accordance with Sections 17.0 (Discrepancies and Claims) and 18.0 (Changed Conditions) of the Terms and Conditions (latest revision).

B. All Contractor requests for project information and clarifications or changes in the requirements of the Contract Documents must be made in writing to National Grid, and the Engineer.

C. Written requests must be provided regardless of any preceding conversations and preliminary decisions regarding the matter(s) subject to the requests.

D. At National Grid's discretion, email communications may qualify as "requests made in writing" for the purposes of this provision.

E. National Grid or the Engineer will provide written responses to the request.

F. At their discretion, National Grid or the Engineer may provide verbal approvals of requests to expedite the Work. In such cases, the Contractor is still required to provide written documentation of the request and approval from National Grid or the Engineer.

G. National Grid or the Engineer may also issue clarifications and/or amendments based on their own assessment of Project needs.

H. Any potential increases or decreases in Contractor compensation and/or schedule due to amendments will be in accordance with the provisions of the Terms and Conditions.

I. National Grid and/or their representative will issue the Contractor supplemental instructions authorizing minor changes in the Work that may or may not involve adjustments to the Contract Price or the schedule.

J. If latent or unforeseen conditions require modifications to the Contract, the Contractor may propose changes in the Work by submitting a detailed request to include labor rates, equipment rates, material costs, schedule impacts, etc. for a change to National Grid and/or their representative.

K. Change Order requests shall be documented in accordance with the requirements of the Terms and Condition, Supplemental Conditions, and with the procedures set forth by National Grid during procurement.

L. The Engineer may issue an Authorization for Contract Change (ACC) on behalf of National Grid, which instructs the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order. Any ACC must be authorized by National Grid in advance and signed by the Engineer and National Grid.

1.2. COMMUNITY RELATIONS

A. National Grid will provide all external communication with the media/press, project stakeholders, elected officials, public, etc. The Contractor shall not communicate with the media/press, project stakeholders, elected officials, public, etc. regarding the Work. Refer all external questions and comments to National Grid.

1.3. RECORDS

A. Maintain on-Site copies of all project correspondence and project documents generated during the Work.

1.4. PREMOBILIZATION SUBMITTALS

A. All submittals are subject to review and approval by the Engineer. Submittals will not be approved until the Engineer has determined that they meet the minimum requirements of these specifications. Claims for lost time or requests for extensions based on rejected pre-mobilization submittals will be denied.

B. Contractor Health and Safety Plan:

1. Prepare and submit a site specific Contractor Health and Safety Plan.

2. Include relevant safety information for all proposed and likely Site activities.

3. The Contractor Health and Safety plan is to be prepared and reviewed by a certified industrial hygienist.

4. The Contractor Health and Safety plan must be at least as conservative as the GEI site specific Health and Safety Plan, which is included in the work plan for this project.

C. Critical Path Method Project Schedule:

1. Prepare a Critical Path Method (CPM) project schedule. Update and disseminate the schedule on a weekly basis prior to the weekly construction meetings.

D. Schedule of Permits:

1. Submit a schedule of Contractor required permits with approximate lead time. Indicate any action items or information required from the Engineer.

2. Submit copies of all supplemental and/or recurring data required by the permits to the Engineer, as needed. Include documentation that the supplemental data was provided to the entity that issued the permit, according to the schedule required by the permit.

3. Submit copies of completed permit applications to the Engineer.

4. Submit copies of fully executed permit applications and final permits to the Engineer.

E. Remedial Action Contingency Plan:

1. Prepare a Remedial Action Contingency Plan (RACP). This plan will describe the provisions required for responding to Site-related emergencies that could potentially occur during the Work. The RACP will, at a minimum, contain the following components:

   a. A spill response plan (SRP) for addressing spills that occur on Site during remedial construction activities. The SRP will describe the means, methods, and facilities required to prevent soil, water, structure, equipment, and material impacts caused by spills; provide information regarding spill containment and cleanup, and provide information related to decontamination measures.

   b. Procedures that Contractor's personnel will take in response to an emergency.

   c. Designation of an emergency coordinator.

   d. Include a current list of all emergency equipment and evacuation plans.

   e. Procedures for monitoring weather emergencies and discussion of how weather conditions and notifications will impact Site operations.

      i. A section of the procedures for weather related emergencies must discuss response plans for a hurricane warning being issued for the Project area.

   f. Procedures and routes for emergency vehicular access/egress.

   g. Procedures for the evacuation of personnel from the Site.

   h. A listing of contact personnel with phone numbers that, at a minimum, includes fire officials, ambulance service, local, county, and state police, local hospitals, and a spill response team.

   i. Routes to local hospitals, including written directions and a map that depicts the location of the Site relative to the hospital(s).

F. Site Operations Plan:

1. Prepare a narrative discussion and drawings describing the means and methods that will be used to execute the Work. The final design will be based on the requirements, intent, and concepts contained in the Contract Documents. Scale drawings included in the Site Operations Plan at no less than 40 feet per inch. At a minimum, the Site Operations Plan will include final submittals with means and methods for the following project elements:

   a. Excavation plan(s) and technique(s).

   b. Site specific Contractor Quality Control Plan for ensuring the Work objectives are met. This will include a summary of equipment maintenance procedures and personnel training requirements.

   c. Manufacturer cut sheets for all products requiring approval by the Engineer prior to being incorporated into the Work.

   d. Shop drawings.

   e. Security procedures, fencing, and equipment specifications.

   f. Sanitary facility locations.

   g. Off-Site parking locations, if used, including routes to and from the Site.

   h. List of Subcontractors, including but not limited to, proposed list of disposal facilities for all anticipated waste streams, and surveyor.

   i. Procedures for gross level decontamination of vehicles.

   j. Staff roles and responsibility summary, including explicit identification of Contractor or Subcontractor staff and qualifications (including resumes), and who will personally perform and be responsible for the following tasks:

      i. Site health and safety.

      ii. Quality control.

      iii. Construction documentation.

      iv. For each company performing one of the above roles, include company contact information (address, telephone number, facsimile number, website, etc.). For each person identified in the Site Operations Plan include a resume with license numbers, if the individual is performing work requiring licensure.

   k. Crew size and equipment list and price for major tasks. Identify owned vs. rented equipment.

2. The Site Operations Plan may be submitted in parts, so long as all parts are submitted by the submittal deadline. Organize the Site Operations Plan for use in the field and for review. The Site Operations Plan will be reviewed for

both technical content and organization. Include a table of contents, sections and subsections, appendices, tables, drawings, data, etc.

3. All components of the Site Operations Plan are subject to review and approval by the Engineer. This includes, but is not limited to, manufacturer cut sheets, shop drawings, Subcontractor lists, etc. A change to any constituent component of the Site Operations Plan (e.g., a change in a Subcontractor) must be approved by the Engineer.

G. Borrow Source Evaluation:

1. Submit a borrow source evaluation for each material type that will be incorporated into the Work.

2. Refer to Specification Section 31 23 00 – Excavation and Fill for details on the required components of the borrow source evaluation submittal. Additionally, all borrow sources must meet Unrestricted Use Criteria and be approved by NYSDEC in advance of transporting material to the site.

H. Utility Survey:

1. Contact Dig Safely New York to perform a utility markout.

2. Provide copies of Dig Safely numbers/tickets/utilities plates/private utility location information to Engineer prior to beginning intrusive activities. The Engineer will maintain copies on-Site in a clearance package.

I. Pre-construction Survey:

1. Perform a pre-construction survey/inspection of the Site to 50 feet beyond the limits of the Work under the supervision of the Engineer and/or National Grid.

a. Conduct the survey under the oversight of the Engineer and have the findings reviewed and approved by the Engineer and National Grid prior to mobilization.

b. Include video/photographic documentation of the existing conditions of the Site and surrounding properties.

c. Claims determined to be resulting from pre-existing structural and/or cosmetic damage, not identified during the pre-construction survey, shall be the responsibility of the Contractor.

d. Establish additional survey control points as necessary.

e. Provide survey to National Grid and the Engineer upon completion in accordance with the submittal schedule in Section 01 33 00.

1.5. DAILY PROGRESS REPORT

A. Prepare a daily report summarizing the staff and equipment used and the Work performed each Day and anticipated Work for the next Day. The daily report should also list all daily quantities applicable to pay items listed on the price

schedule. The Contractor's internal documentation used for this purpose may be used to fulfill this requirement, subject to approval by National Grid and the Engineer. At a minimum, the daily report will include the following items:

1. Summary of any safety related issues including a summary of the daily safety meeting.
2. Description of the work performed, including a sketch of the site(s) showing work performed that day, if necessary. Description should include, but not be limited to:
   a. Site preparation.
   b. Excavation, backfill, and/or compaction.
   c. Restoration.
3. Summary of footage rates for drilling and injection point installation.
4. Description of any QC testing performed and the results.
5. Excavation and backfill rate for each working Day. Submit certified weight tickets for material exported for off-Site disposal and for each load of imported backfill material.
6. Estimate of the excavation rate, number of trucks needed for transportation to the disposal facility, and the disposal facility production rate for the next Day.
7. Quantity of wastewater generated.
8. Identification of any delays in the project schedule.
9. Note the status of any change notices submitted. If none, state none.

B. Submit the daily report to the Engineer by 10 AM of the next Day worked.

1.6. SUBMITTALS

A. Prepare a Critical Path Method (CPM) project schedule. Update and disseminate the schedule on a weekly basis before the weekly construction meetings.

B. Submit daily progress reports for each working Day of the previous week by 10 AM of the first Day of Work of the subsequent week.

PART 2 PRODUCTS

(Not Applicable)

PART 3 EXECUTION

(Not Applicable)

END OF SECTION 01 30 00

SECTION 01 33 00
SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1. SUMMARY

A. This section summarizes the protocol and procedures for the preparation and delivery of required submittals to the Engineer.

1.2. GENERAL REQUIREMENTS

A. Provide all submittals in electronic format directly to the Engineer in accordance with the schedule and procedures contained in this Section and in Section SC-27.0 (Submittals) of the National Grid Supplemental Conditions (latest revision).

B. Include calculations, Contract Drawings, shop drawings, plans, reports, records, photographs, diagrams, and details with submittals where applicable to facilitate the review and/or approval.

C. For all submittals requested via paper copy, provide two (2) copies to the Engineer unless otherwise directed.

D. If directed by National Grid or the Engineer, provide submittals electronically in the format requested (i.e. document file, drawing file, image file, etc.). For electronic drawings, submit AutoCAD 2004 (or more recent version) file using e-transmit feature (i.e. include external references, image files, color table file, font file, line file, etc.). Convert all AutoCAD add on data to AutoCAD format. Use descriptive layer titles (i.e. not numbers or internal use acronyms). Use extensive layer control and use line color by layer and line type by layer management. AutoCAD files of Contract Drawings will be available to the Contractor upon request.

E. Certifications must be signed by an officer or other individual authorized to sign on behalf of the entity. Submittals requiring preparation by an engineer or surveyor must be signed and sealed by a Professional Engineer/Surveyor licensed to practice engineering in the State of New York.

F. Schedule submittals to expedite Work. Provide the Engineer a minimum of 5 working Days, excluding transmittal time, for review.

1.3. SUBMITTAL SCHEDULE

A. See Table 01 33 00-1 - Project Submittal Summary, attached at the end of this Section. Submittals are required on the items as described individually in each Section of the Specifications. The description of the submittal data is defined in the Specifications.

1.4. SUBMITTAL PROCEDURES

A. Use the submittal numbers assigned in Table 01 33 00-1. For submittals not included in Table 01 33 00-1, use the next sequential number as the submittal number. For revised submittals, use original number and a sequential alphabetic suffix. For multiple submittals with the same submittal number, use the original number with a sequential numerical suffix.

B. Use a cover form for each submittal. The cover form shall include Project identification, Project number, date, submittal number, submittal description/title, submittal exclusions, special issues, Contractor, Subcontractor, etc.

C. Include drawings and details as appropriate.

D. Use the same units of weights and measures used on all submittals as are used in the Contract Documents.

E. Submit all supplier and Subcontractor submittals.

F. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of the completed Work.

G. Prepare submittals that are complete and in sufficient detail for ready determination of compliance with the contract requirements.

H. Resubmit based on Engineer review: revise, update, and resubmit, identifying all changes made since previous submission. For each re-submittal allow the same number of workdays required for review as the original submittal.

I. Submittals not requested will not be recognized or processed.

1.5. SUBMITTAL REGISTER

A. Maintain a technical submittal register at the Site including the submittal number, description, date submitted, status, date of approval/rejection in accordance with Section SC-27 (Submittals) of the National Grid Supplemental Conditions (latest revision).

1.6. SUBMITTAL REVIEW

A. The Engineer will review all submittals solely for the purpose of determining whether the information contained in the submittal conforms to the design concept of the Contract Documents. The Engineer will return the submittals with the following classifications:

1. No Exceptions Taken: Work may proceed, no exceptions taken.
2. Furnish as Corrected: Work may proceed subject to comments, resubmittal not required.
3. Revise and Resubmit: Work may not proceed, resubmittal required for indicated items. Proceed with Work on other items subject to comments.
4. Rejected: Work may not proceed, resubmittal required, submittal unresponsive

and/or not in conformance with Contract Documents.

5. For Information Only: Items not reviewed or items for which no submittal is required.

B. Engineer's review of submittals for conformance with Contract Documents does not relieve the Contractor from responsibility with regard to fulfillment of the terms of the Contract and proper and complete performance of the Work in accordance with the requirements of the applicable permits, and the general requirements of the Contract Documents.

C. Engineer's review of submittals does not relieve the Contractor from responsibility for errors or omissions in its designs, details, calculations, analyses, test methods, materials, and its sole responsibility for means and methods of construction, and safe and successful construction of the Work.

1.7. CERTIFICATES OF COMPLIANCE

A. Submit any certificates required for demonstrating proof of compliance with the Contract Documents to the Engineer as part of the submittal package.

B. Certificates must be signed by an official authorized to sign on behalf of the manufacturing or testing company.

C. For each certification, include the name and address of the Subcontractor, name of the requestor, the Project name and location, relevant test data (if required), and the dates of shipment and delivery.

D. Certifications do not relieve the Contractor from furnishing satisfactory materials.

1.8. INVOICES

A. Submit monthly invoices in accordance with the provisions of the Terms and Conditions and Supplemental Conditions.

1. Include an update of the price schedule with each invoice.

2. Payment shall not be made unless all the proper supporting documentation has been submitted and approved by National Grid or National Grid's representative.

PART 2 PRODUCTS

(Not Applicable)

PART 3 EXECUTION

(Not Applicable)

SUBMITTAL SUMMARY TABLE 01 33 00-1

Submittal Number	Description of Submittal	Submission Deadline	Referenced Specification Section
PRE-CONSTRUCTION			
1	Critical Path Method Project Schedule	Submitted with Bid, Updated weekly during construction	01 30 00
2	Site Operations Plan	1 week after award	01 50 00
3	Disposal Facility Contracts	Prior to Excavation	02 61 00, 01 50 00,
4	Contractor Health and Safety Plan	1 week after award	01 11 00, 01 50 00
5	Remedial Action Contingency Plan	1 week after award	National Grid Terms and Conditions
6	Burrow Source Evaluation	Prior to importing fill to the site	31 23 00
7	Schedule of Permits	1 week after award	01 41 00, 01 50 00
8	Permits and Data Submittals	Prior to submittal to agency	01 41 00
9	Final Executed Permits	Upon Receipt	01 41 00
10	Pre-Construction Survey	Upon Completion, Prior to Excavation	01 30 00
CONSTRUCTION			
10	Backfill Geotechnical Analytical Reports	1 Week Prior to Placement	31 23 00
11	Analytical Sampling Reports	Upon Receipt	National Grid Terms and Conditions
12	Waste Manifests, Bills of Lading, Weight Slips for off-Site disposal	As received with daily report	01-20-00, 02 61 00
13	Daily Progress Reports	By 10 AM of the first Day of the Work of the subsequent week.	01 30 00, 31 23 00
PROJECT CLOSEOUT			
14	Written Notice of Completion	Work is Substantially Complete	01 77 00
15	Project Closeout	Final Completion of Work	01 77 00
16	Permit Closeout Documentation	Upon Receipt	01 77 00
17	Insurance Certification for Continuing Coverage	Prior to Closeout	01 77 00
18	Utility Repair Confirmation	Prior to Closeout	01 77 00
19	Record Documents	Prior to closeout	01 77 00
20	Invoices	Monthly	01 12 00, 01 33 00

END OF SECTION 01 33 00

SECTION 01 35 00
SPECIAL PROCEDURES – HEALTH AND SAFETY REQUIREMENTS

PART 1 GENERAL

1.1. SUMMARY

A. The Work required under this section includes furnishing all labor, materials and equipment, and performing all operations required to conform with all healthy and safety requirements during the performance of the system installations and improvements.

1.2. SUBMITTALS

A. Prior to mobilization, submit the Contractor's Health and Safety Plan, and documentation of OSHA training and enrollment in medical monitoring for Site personnel.

B. Contractor's Monthly Safety Report, which, at a minimum, will consist of the following components:

1. The names of all Contractor and Subcontractor personnel employed at the Site at any time during the month and the names and duties of key personnel including Contractor's project manager, Superintendent, safety officer, and competent person(s).

2. A summary of all Health and Safety incidents that describes any medical treatment that was provided during the month, the current status of any individuals affected, the names of individuals who may have observed the incident, and actions taken by Contractor to address the unsafe act or unsafe condition.

3. A summary of all Health and Safety near-misses or observations providing an opportunity for shared learning and future hazard avoidance. For any Health or Safety incident or near-miss, list the date, the nature of the incident or near-miss, and the names of individuals involved.

4. The total number of labor hours worked at the Site during that month.

5. Internal Health and Safety audits performed by the Contractor as part of the Contractor's HASP.

C. Submit a hot work permit for any welding, torch cutting, or activities that generate sparks. If the Contractor does not have a permit readily available, they may request a permit from the Engineer. In some instances, the Engineer's client may require the use of their specific permit and permitting process.

D. Contractor shall conduct a job safety analysis (JSA) for significant activities and submit the documentation to the Engineer for review prior to the start of the activities. Submit the JSA on a form acceptable to the Engineer.

E. Submit copies of all periodic equipment inspections completed.

1.3. REFERENCES

A. Applicable regulations and publications include, but are not limited to, the following:

1. ACGIH, Threshold Limit Values and Biological Exposure Indices (most recent version).
2. ANSI, Emergency Eyewash and Shower Equipment, Z358.1, 1981.
3. ANSI, Practice for Occupational and Educational Eye and Face Protection, Z87.1, 1979.
4. ANSI, Practices for Respiratory Protection, Z88.2, most recent version.
5. ANSI, Protective Footwear, Z41.1, 1983.
6. ANSI, Respirator Use Physical Qualification for Personnel, Z88.6, 1984.
7. DHHS, "Manual of Analytical Methods," 3rd edition Volumes I and II, DHHS (NIOSH) Publication 84-100.
8. DOT Standards and Regulations, 49 CFR 171, 49 CFR 172 and 49 CFR 214.
9. NESHAP (40 CFR 61 Subpart M), National Emission Standards for Hazardous Air Pollutants: Asbestos.
10. NFPA, Flammable and Combustible Liquids Code, NFPA 30, most recent revision.
11. NIOSH Pocket Guide to Chemical Hazards, DHHS/PHS/CDC/NIOSH, August, 2006 or most recent.
12. NIOSH/OSHA/USCG/USEPA, Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, DHHS/PHS/CDC/NIOSH, October 1985.
13. OSHA, Title 29 CFR Part 1910, Occupational Safety and Health Standards, in particular 1910.134, Respiratory Protection; Title 29 CFR Part 1926, Safety and Health Regulations for Construction Sites, in particular 1926.1101, Asbestos, and 1926.62, Lead.
14. OSHA, Title 49 CFR Part 214, Roadway Workplace Safety.

15. USEPA, Health and Safety Requirements for Personnel Engaged in Field Activities, USEPA Order No. 14402.

16. USEPA, Standard Operating Safety Guidelines, November 1984.

B. Except to the extent that more stringent requirements are written directly into the contract documents, all applicable codes, regulations, and standards have the same force and effect and are made a part of the contract documents by reference as if copied directly into the contract documents, or as if published copies are bound herewith.

C. Where two or more regulations/documents conflict, the one(s) offering the greatest degree of protection shall apply.

1.4. CONTRACTOR'S RESPONSIBILITY FOR HEALTH AND SAFETY

A. Comply with any and all state, federal, and local ordinances, laws and regulations.

B. The Contractor is responsible for the Health and Safety their employees, its Subcontractors, suppliers, agents, inspectors, visitors, the general public, and any Others associated with, or interacting with Contractor who provides labor, goods, or other services on the Site.

C. The Contractor is responsible for emergency response planning and notification and for actual response to any and all emergencies that may occur during the course of the Work, including emergencies that may occur when Contractor is not present at the Site.

D. The Contractor is responsible for communicating daily with the Engineer regarding Health and Safety issues for the safe conduct of the Engineer's duties, but such communication shall not imply any duty or responsibility on the part of the Engineer with regard to Health and Safety of Contractor's employees, its Subcontractors, suppliers, the general public, or Others. The Engineer's responsibility and duty with regard to Health and Safety shall be limited to their employees. Communicate Health and Safety issues accurately and in a timely manner to allow the Engineer and take appropriate actions to protect the Engineer's employees and the Owner's employees.

E. Designate a Site Safety and Health Officer (SSHO) who, at a minimum, has at least 1 year of experience as an SSHO on an uncontrolled hazardous waste site, is 40-hour OSHA Hazardous Waste Operations trained, and 8-hour OSHA Supervisor trained.

F. The SSHO shall enforce the health and safety requirements for all Contractor personnel on-Site at all times. The SSHO shall ensure that all Contractor personnel, Subcontractor personnel, and Contractor visitors follow the Contractor's site Health and Safety Plan (HASP), including wearing the

designated level of Personal Protective Equipment (PPE). If the SSHO elects to require a higher level of protection than that specified in the Engineer's HASP, the extra costs associated with such higher level shall be borne by Contractor, unless such extra costs are approved in advance in writing by the Engineer.

G. Prior to mobilization and continually through the duration of the Work, the SSHO shall inspect the Site and document area-specific and worker-specific protection requirements.

H. After mobilization, the SSHO shall monitor Work activities and document the need for additional worker protection, as required, based on the Work being performed and action levels specified in the Contractor HASP.

I. The SSHO shall verify that all activities are performed in accordance with the HASP and all federal, state, local, and Health and Safety standards, Laws and Regulations, and guidelines.

J. In the event of a health or safety risk, as determined by the SSHO, other Contractor personnel, or by the Engineer, stop Work until a method for handling the risk has been determined and implemented in consultation with the Engineer. Report any health or safety risk resulting in a Work stoppage to the Engineer.

K. The Contractor is responsible for implementing a behavior-based safety process and providing site training, observation, and feedback for Contractor personnel employed at the Site.

L. The Contractor is responsible for the stability of excavations and embankments created as part of the Contractor's Work. Designate one competent person as defined in 29 CFR Part 1926, Subpart P, Excavations, to inspect and document excavation safety conditions daily and to ensure excavation safety prior to any personnel entering an excavation.

M. The Engineer will provide the Contractor with a copy of the Engineer's HASP as a reference. The Contractor is responsible for preparing their own HASP under which their employees will perform the Work.

1.5. CONTRACTOR'S HEALTH AND SAFETY PLAN

A. Prepare and submit a Site-specific Health and Safety Plan (HASP) to the Engineer prior to the start of the Work. Follow all applicable local, state, and federal Health and Safety standards, Laws and Regulations, and guidelines implemented through, but not limited to, the OSHA, NIOSH, ACGIH, and USEPA. Where these references are in conflict, follow the more stringent requirement. At a minimum, address the following topics in the Contractor HASP:

1. Names of key personnel and alternates responsible for Health and Safety, including a Contractor Health and Safety Representative and SSHO.

2. A Health and Safety risk or JSA associated with each portion of the Work (i.e., list potential chemical and physical hazards), including JSAs for material handling, separation, sizing, stockpiling, loading, transportation, and disposal.
3. Documentation of employee and Subcontractor training and medical certifications required by 29 CFR 1910.120, as described in Part 3 of this Section.
4. A requirement that Contractor locate Underground Facilities by using "Safe Dig" procedures prior to the start of the Work.
5. PPE to be used for each of the tasks and operations being conducted, as required by the PPE program in 29 CFR 1910.120, 29 CFR Subpart I, and 29 CFR 1926.
6. Medical surveillance requirements in accordance with the program in 29 CFR 1910.120.
7. Frequency and types of air monitoring, personnel monitoring, and environmental sampling techniques and instrumentation to be used by the Contractor, including methods of maintenance and calibration of monitoring and sampling equipment.
8. Corrective actions and upgrading of PPE based on monitoring of air, personnel, and environmental sampling, with specific Action Levels identified.
9. Site control measures in accordance with the control program required in 29 CFR 1910.120 and 29 CFR 1926.
10. Decontamination procedures in accordance with 29 CFR 1910.120 and Specifications Section 02 51 00.
11. If confined space entry is required, include confined space entry procedures in accordance with 29 CFR 1910.146, and a list of all anticipated confined space entries required by Contractor in the course of the Work.
12. A list of Health and Safety and emergency equipment available on the Site.
13. A description of engineering controls used to reduce the hazards of equipment operation and exposure to site hazardous chemicals.
14. An air monitoring plan describing the method, type, frequency, locations of air monitoring, laboratories, and type of analysis to be performed at the Work area for the purpose of employee safety.

15. Open trench excavation procedures in accordance with applicable OSHA Regulations, if required.
16. Documentation of training and experience for the designated excavation-competent person.
17. Procedures for earthwork near buried utilities, where hand digging should be performed within 24 inches of known utility lines unless more stringent requirements are specified by laws or regulations, or the affected utility.
18. Training for emergency response procedures as outlined in the Engineer's HASP.
19. Heat stress program consistent with the references provided in the Engineer's HASP.
20. Cold stress program consistent with the references provided in the Engineer's HASP.
21. Lockout/Tagout procedures where the sudden start up or release of stored energy could cause injury to personnel.

1.6. NOTIFICATIONS

A. Immediately (within 30 minutes) verbally report to the Engineer the occurrence of any and all Health and Safety incidents. A Supervisor's accident/incident report (SAIR), which may be requested from the Engineer, must be submitted within 4 hours of occurrence of the incident or issue.

B. Immediately and fully investigate any such incident or near-miss and conduct a root cause analysis. Submit to the Engineer the Contractor's written corrective action plan within 1 day of the incident occurring.

C. Notify the Engineer in writing at least 5 days prior to bringing any hazardous material, equipment, or process to the Site. Provide the Engineer with an MSDS for all chemicals brought on to the Site.

D. Immediately notify the Engineer in writing of any hazard the Contractor discovers or observes on the Site, and the corrective measures planned or taken to eliminate or minimize the hazard. Hazard reporting will be completed as a near miss report.

PART 2 PRODUCTS

2.1. EQUIPMENT AND FACILITIES

A. Provide all equipment, temporary facilities, and personnel required to perform activities on Site safely in accordance with all applicable laws and regulations and the Contractor's HASP.

2.2. PERSONAL PROTECTIVE EQUIPMENT

A. The appropriate level of PPE is to be determined by the Contractor for the specific tasks as described in the Contractor's HASP. If hazards are identified that require a level of protection greater than Level C (defined in paragraph D below), Work shall be suspended and the Engineer notified. The Contractor's SSHO, in consultation with the Engineer, will determine what corrective actions are required prior to restarting Work. Determine and document the appropriateness of the suggested minimum PPE requirements for Contractor's personnel and Others at the Site.

B. Furnish and maintain materials and equipment for the Health and Safety of Contractor employees, its Subcontractors, Suppliers, and visitor personnel. Provide all required Health and Safety equipment, first aid equipment, tools, monitoring equipment, PPE, and ancillary equipment and methods required to ensure workers' Health and Safety and to comply with the Contractor's HASP.

C. Level D protection will be required at all times for all personnel and visitors on the Site, except in Support Zone areas. Level D PPE consists of:

1. Hard hat.
2. Steel-toed boots.
3. Safety glasses with permanent side shields.
4. Work clothes (long pants, shirts with sleeves).
5. Work gloves.
6. High visibility reflective safety vests.
7. Hearing protection (as needed to prevent exposure exceeding 85 dB level).

D. If additional protection consisting of Level C PPE is required during the Work, Level C PPE shall include protection from dust particulates and entrained heavy metals and consist of Level D protection with the following additions:

1. Air purifying respirator, half-face or full-face (depending on required protection factor) with high efficiency particulate air cartridges meeting NIOSH Specifications. The presence of chemical vapors during certain activities (e.g. painting) could trigger the need for additional respiratory protection.
2. Disposable poly-coated chemically protective coveralls.
3. Disposable chemically resistant outer gloves (nitrile).
4. Disposable chemically resistant inner gloves (nitrile).
5. Chemically resistant, steel-toed, and steel-shanked boots (polyvinyl chloride, neoprene, or nitrile), or outer booties.

E. In most cases, Level C will be the maximum allowable level of PPE. Level B may be allowed provided that personnel are properly trained and certified, and exposure levels are below immediately dangerous to life and health (IDLH) conditions.

F. In cases where the Engineer's client requires additional PPE, the Engineer will notify the Contractor of these additional requirements in advance of mobilization so that Contractor may obtain the necessary equipment.

2.3. OTHER HEALTH AND SAFETY EQUIPMENT

A. Maintain the following equipment available on the Site for the health and safety of Contractor, Subcontractors, suppliers, and visitors:

1. First aid kits.
2. Fire suppression equipment (appropriate to location and type of flammable materials present). Equipment will be certified ready for use within the previous 12 months and will also have been inspected each month; maintain documentation supporting certification and inspections available for review.
3. Emergency eyewash facilities meeting OSHA specifications.
4. Personnel decontamination facilities and equipment.
5. Other equipment or supplies as determined to be necessary or prudent by Contractor or the Engineer.
6. Flammable liquids storage cabinet(s), if necessary.
7. Personnel air monitoring equipment.
8. Confined space entry equipment, if necessary.
9. Fall protection equipment appropriate for the hazards on the project.

PART 3 EXECUTION

3.1. WORKER QUALIFICATION

A. Provide the following training to workers, except those who will be restricted to the Support Zone.

1. Initial 40-hour OSHA hazardous waste Health and Safety training and current annual 8-hour refresher training.
2. Eight-hour OSHA hazardous waste supervisory training (required for the Contractor's Superintendent and SSHO).

3. Enrollment in a medical monitoring program, with clearance within the previous 12 months from a licensed physician allowing the worker to participate in field activities and use respiratory protective equipment.

4. Current respiratory fit testing certification for workers who may be required to work in Level C PPE.

5. Current cardiopulmonary resuscitation (CPR) and first aid certification for at least two workers assigned to Work on the site.

6. Confined Space Entry Training for workers entering confined spaces.

7. For any worker who is assigned the role of a "competent person," provide documentation of sufficient and relevant training and experience to perform the assigned duties and responsibilities of that role. As defined in 29 CFR 1926.31, the competent person shall be "one who is capable of identifying existing and predictable hazards, and who has authority to take prompt corrective measures to eliminate them." Relevant training and experience shall be in the same type of Project activities included in the Work under this Contract. Indicate any prior experience of the competent person(s) experience working in proximity to active transmission and distribution equipment/lines.

B. Designate one "competent person" as defined in 29 CFR Part 1926, Subpart P, Excavations, to inspect and document excavation safety conditions daily and to ensure excavation safety prior to any personnel entering an excavation, if required.

3.2. WORK PLANNING AND MEETINGS

A. Conduct a daily health and safety meeting, prior to beginning Work for that day, to address health and safety issues, changing site conditions, activities, and personnel. All Contractor and Subcontractor employees working on the Site on that day must attend the meeting. Document all meetings and have attendees sign a form acknowledging their presence at the meeting. Include as part of the daily meeting, an evaluation of the Work to be conducted, the hazards associated with the work, and the control measures being used to reduce exposure.

B. Contractor personnel who are not in attendance for the daily Health and Safety must be briefed on the meeting notes prior to commencing any Work related activities. All visitors to the site will be signed in and briefed on the meeting notes prior to accessing the site.

C. Hold and document additional safety meetings at the start of each major task, and whenever site conditions change such that it could potentially affect worker

safety. Any major task undertaken requires the completion of a JSA as described in this Section.

3.3. ENGINEERING CONTROLS

A. Provide the following engineering controls, as required, to complete the Work, to reduce the hazards of equipment operation and exposure to impacted materials.

1. Roll-over cages for bulldozers, back hoes, loaders, and tractors.
2. Back-up alarms for all trucks and moving equipment.
3. Fire extinguisher in all equipment.
4. Water source with sufficient volume and pressure to reach all areas of the Work. Use the water source for wetting debris, soil and other media to control dust during the Work. A water source is available on-site for the use.
5. Decontamination of personnel and equipment in accordance with Specifications Section 01 50 00.
6. Barricades for open trenches and excavations.
7. Bars or cages for cabs of equipment as deemed necessary to resist damage and eliminate risk of injury during material and debris handling.
8. Sloping, benching, shoring, drainage systems, or other controls as necessary to ensure stability of excavations and embankments.
9. Others controls as determined to be necessary or prudent by Contractor or as directed by the Engineer.

B. Post ground-level warning signs every 50 feet below all overhead utilities on Site, as needed.

3.4. MONITORING

A. Perform heat exposure and cold exposure monitoring activities as required by weather conditions.

B. Perform all air monitoring activities described in the Contractor's HASP required to provide health and safety protection to the Contractor and Subcontractor personnel.

C. The perimeter air monitoring plan will be implemented by the Engineer.

D. Pay all costs associated with sampling and analysis to comply with OSHA regulations, outside of those associated with the perimeter air monitoring plan being performed by the Engineer.

3.5. EVALUATION OF PERFORMANCE

A. Conduct internal safety audits on Subcontract and sub-subcontract Work sites in accordance with the Contractor's HASP. The focus of these routine audits will focus on compliance with OSHA, and local, safety regulations.

B. Conduct routine behavioral observations and provide immediate feedback during Work activities to promote safe behavior of Contractor and Subcontractor employees.

END OF SECTION 01 35 00

SECTION 01 41 00
REGULATORY REQUIREMENTS - PERMITS

PART 1 GENERAL

1.1. SUMMARY

A. This section establishes responsibility for obtaining major Project permits between National Grid, the Engineer, and the Contractor.

B. This section does not describe all permits required for performance of the Work. Any permits not identified in this section, or elsewhere in the Contract Documents, are the responsibility of Contractor. The Contractor will also be responsible for providing any technical and equipment related data required for National Grid or the Engineer to obtain the necessary permits.

C. Regardless of who is responsible for obtaining a permit, the Contractor is responsible for performing in accordance with the terms and conditions of all permits.

1.2. NATIONAL GRID/ENGINEER PERMITS

A. National Grid and/or the Engineer will obtain the following Project permits:

1. Approvals from NYSDEC and/or NYSDOH, excluding approvals of Contractor submittals required by NYSDEC and/or NYSDOH.

1.3. CONTRACTOR PERMITS

A. Obtain the following Project permits in accordance Section 33.0 (Permits, Licenses, Laws, and Regulations) of the Terms and Conditions (latest revision):

1. Local construction and demolition permits.

2. Permits required for temporary road closures, if necessary.

3. Permits required for any off-Site parking that is negotiated between the Contractor and the City of Glen Cove, and/or private parking facilities.

4. Permits required for any off-Site staging of trucks that is negotiated between the Contractor and the City of Glen Cove, and/or private parking facilities.

5. Any other permits required for the Work.

1.4. COORDINATION/ASSISTANCE

A. National Grid and/or the Engineer will coordinate delivery of Contractor submittals to NYSDEC and/or NYSDOH.

B. Provide all data requested by National Grid or the Engineer required to support permit applications. When necessary, National Grid and/or the Engineer may provide data summaries or other Project information to the Contractor in support of Contractor data submittals.

C. Any coordination and/or assistance between the Contractor and National Grid or the Engineer is provided in the interest of expediting the Project. Provision of coordination and/or assistance does not relieve the Contractor of any obligations regarding the timeliness and completeness relative to the permit submittals.

1.5. WORK RESTRICTIONS

A. Comply with local noise limitations for the City of Glen Cove at all times while performing the Work, which include:

1. § 196-14. Sound created by certain equipment and vehicles impacting residential occupancy - Do not create sound exceeding 75dBA as measured at the property line of the residential receiving property.
2. § 196-13. Maximum permissible impulse sound levels
3. § 196-12. Maximum permissible continuous sound levels
4. Do not conduct Work outside of the permitted working hours (Monday through Friday, 8:00 am to 5:00 pm, no work on Federal holidays) without advanced approval.

1.6. SUBMITTALS

A. Submit a schedule of applicable permits including approximate lead time. Indicate any action items or information required from National Grid or the Engineer.

B. Submit copies of all supplemental data required by permits with documentation that the supplemental data was provided to the entity that issued the permit according to the schedule required by the permit.

C. Submit copies of complete permit applications to National Grid and the Engineer prior to submittal to the regulatory entity.

D. Submit copies of fully executed permit applications and final permits to National Grid and the Engineer.

PART 2 PRODUCTS

(Not Applicable)

PART 3 EXECUTION

(Not Applicable)

END OF SECTION 01 41 00

SECTION 01 50 00
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.1. SUMMARY

A. The Work required under this section includes furnishing all labor, equipment, supplies, laboratory testing, materials, and performing all operations required for providing temporary facilities and controls during the performance of the Work.

B. For the purposes of this Specification, environmental protection is defined as the retention of the environment in its natural state to the greatest extent possible during the Work and to enhance the natural appearance in its final condition. Environmental protection requires consideration of air, water, and land resources and involves noise, solid waste management, and management of other pollutants. Comply with all applicable or relevant and appropriate Federal, State, and local laws to provide for abatement and control of any environmental pollution arising from the construction activities in performance of the Work.

C. National Grid, National Grid's representative, or the Engineer may notify the Contractor in writing of any non compliance with Federal, State, and/or local laws. Such notice, when delivered to the Contractor or Contractor's representative at the Site, shall be deemed sufficient for the purpose. After receipt of the notice, immediately inform National Grid, National Grid's representative, or the Engineer of the proposed corrective action and take such actions if they are approved. If the Contractor fails or refuses to comply promptly, National Grid and/or National Grid's representative, or the Engineer may issue an order suspending or halting all or parts of the Work until satisfactory corrective action has been taken. Claims for extensions of time or for excess costs or damages by the Contractor due to the stop orders described above, will be denied.

D. Ensure that all Subcontractors comply with the provisions of the specifications.

E. Operate and maintain all equipment and systems to ensure that that the temporary facilities, controls, utilities, other services, etc. are provided without disruption.

1.2. ENVIRONMENTAL PROTECTION

A. Do not pollute any stream, river, waterway, roadway, or soil with fuel, oil, grease, lubricant, hydraulic fluid, bitumen, calcium chloride, acid, base, or other harmful materials. Comply with appropriate Federal, State, and local regulations and guidelines for the handling and disposal of all materials.

B. Properly dispose any debris resulting from the performance of the Work. Disposing any debris, soil, water, effluent, by product, waste, trash, chemical, fuel, oil, grease, lubricant, bitumen, calcium chloride, acid, base, or other harmful

material etc., in or adjacent to the work area is not acceptable. Remove any unauthorized dumped materials and restore the area as directed by the Engineer. If necessary, contaminated areas as a result of unauthorized activity or dumping by the Contractor shall be remediated or excavated at no additional cost to National Grid.

C. All contaminated materials (debris, soil, water, effluent, by-product, waste, trash, chemical, fuel, oil, grease, lubricant, bitumen, calcium chloride, acid, base or other harmful material etc.) resulting from the Work shall be disposed in accordance with all applicable or relevant and appropriate Federal and State laws prior to completion of construction.

1.3. WORK ZONES

A. Establish a Secured Zone, Support Zone, Exclusion Zone, and Decontamination Zone, as defined herein.

1. Lay out the Work Zones and establish boundaries, barriers, facilities, and controls to ensure that all personnel and equipment exiting the Exclusion Zone pass through the Contamination Reduction Zone before entering the Support Zone and before exiting the Site.

2. Furnish, install, and maintain in good condition, orange plastic mesh fencing secured to metal posts to delineate the boundaries between Work Zones, including the Exclusion Zone, Contamination Reduction Zone, and Support Zone. Install orange plastic mesh fencing at the entrance of the Exclusion Zone for a clear demarcation for Site workers.

B. Establish a general Secured Zone that excludes unauthorized personnel from entering the Site.

1. Control access to the secure zone by use of the existing steel chain-link fence shown on the Drawings.

2. The Engineer, National Grid, LIPA, and National Grid's representative shall be allowed free access to the Secured Zone 24 hours per day, subject to appropriate safety precautions. Providing the Engineer and Owner with access to the Secured Zone does not in any way relieve that Contractor of the responsibility for maintaining Site security during the performance of the Work.

3. Maintain a log sheet on which all Contractor personnel and visitors must sign in and out upon entering or leaving the Secured Zone.

4. The Contractor is solely responsible for the security and safety of equipment, facilities, personnel, and materials within the Secured Zone.

C. Establish a Support Zone for storage, sanitary facilities, hand washing facilities, and non-construction vehicle parking.

1. The Support Zone shall be an area that is free of physical and chemical hazards.

2. Maintain the Support Zone in a safe, clean, orderly, and sanitary manner at all times.

D. Establish the limits of the Exclusion Zone using the following criteria in addition to any other criteria that may be deemed necessary by the Engineer.

1. Open excavation areas.

2. All stockpile areas.

3. All areas where impacted materials are present at the ground surface.

4. OSHA Regulations and all other applicable Laws and Regulations.

E. Establish a Contamination Reduction Zone between the Support Zone and the Exclusion Zone.

1. Provide suitable facilities for personnel decontamination in the Contamination Reduction Zone, including portable toilets, emergency eyewash and a water hand washing station. Equip the personnel decontamination to provide seating and shelter from the elements.

2. Construct a vehicle and equipment decontamination pad that allows for the capture of solid residuals and evaporation/infiltration of liquid residuals generated during decontamination of construction vehicles and trucks bound for off-site disposal facilities.

3. The vehicle and equipment decontamination facility will be sufficiently sized to ensure the largest piece of equipment can be adequately decontaminated.

4. If requested by Engineer, provide splash protection around the vehicle decontamination facility. Design splash protection to minimize potential contamination from splatter and mist during the vehicle and equipment decontamination process. If directed, furnish splash protection that is stable and capable of being dismantled in the event of high winds.

5. Provide a method for the transport of wastewater generated during decontamination procedures to the on-Site wastewater treatment system.

1.4. WETLAND BUFFER ZONE

A. Establish 100-foot buffer zone from Glen Cove Creek in accordance with the conditions of Freshwater Wetlands Permit ID 1-2805-00199/00001 and Modification 1 included as Attachment B.

1. Install flagging to demarcate the 100-foot buffer zone from Glen Cove Creek.
2. Ensure no equipment and waste staged overnight after work hours is within the 100-foot buffer zone.

PART 2 PRODUCTS

2.1. MATERIALS AND FACILITIES

A. All materials shall be suitable for their intended use and shall conform to applicable codes and standards.

B. Provide appropriate first aid supplies in accordance with all applicable and relevant Federal, State, and local regulations.

C. Provide hand carried, portable, UL rated, Class ABC, dry chemical extinguishers or a combination of extinguishers of NFPA recommended classes for the exposures. Provided fire extinguishers at all temporary facilities, workstations, trailers, office, and vessels. Keep detailed records of maintenance and expiration dates.

D. Provide fully equipped hand wash stations outside of toilets and in the personnel decontamination area.

E. Provide and maintain a sufficient supply of materials/equipment required to implement decontamination procedures, including, but not limited to, the following items:

1. Plastic trash barrels.
2. Plastic trash bags
3. Liners for trash barrels.
4. Wash basins.
5. Alconox™ or approved equivalent detergent concentrate.
6. Hand pump sprayers.
7. Long handled soft bristle brushes.
8. Large sponges.
9. Cleaning wipes for respirators.
10. Bench or stool(s), if necessary.
11. Stepladder(s), if necessary.
12. Steam generator.
13. Liquid detergent and paper towels.

14. Supplies and equipment to construct the decontamination pad.

F. Install temporary security fence around the perimeter of the Sites currently under construction, as needed to create a secure perimeter.

1. Existing fencing, where present around the Site, is shown on the Contract Drawings. Protect this security fencing from damage and repair and replace fencing damaged by Contractor's activities.

2. Furnish, install, and maintain all other proposed temporary fencing, gates, and barriers around impacted areas as required by the Contract Documents, and as may be needed to complete the Work.

3. Temporary fencing should be 6 feet high and adequately anchored to prevent overturning from wind or other forces.

G. Furnish and post a professionally lettered sign, of a minimum size of 4 feet by 4 feet, at each entrance, or gate to the Site with the following text, or other similar text approved by the Engineer. "All Personnel and Visitors Beyond This Point Must Wear Hard Hat, Safety Glasses, High-Visibility Vest, and Steel Toe Boots."

PART 3 EXECUTION

3.1. GENERAL

A. Operate and maintain all equipment and systems to ensure that that the temporary facilities, controls, utilities, and other services are provided without disruption.

B. Design, furnish, install, and maintain all temporary Site facilities and controls required for the performance of the Work.

C. Provide and maintain all temporary environmental controls, as necessary for protection of the environment, throughout the performance of the Work.

D. Provide and maintain proper barricades and warning signs at all closures, holes, hazards, and equipment areas.

3.2. SANITARY FACILITIES

A. Sanitary facilities shall be located on each Site where work is being performed, when space available.

B. Empty the sanitary facilities before the capacity is exceeded, or on a weekly basis, whichever occurs first. Clean sanitation facilities concurrently with emptying.

C. Clean and restock hand wash stations as needed.

3.3. TEMPORARY UTILITIES

A. Provide suitable decontamination water for the duration of the Project. A water source is available on-site for the use

B. Supply potable drinking water for on-Site personnel.

C. Provide all temporary utility services in accordance with this Specification for the duration of the Project. This includes, but is not limited to, installation, operation, maintenance, and removal of all equipment and/or systems required to ensure uninterrupted service and paying all fees associated with installation, connection, service, and shut-off.

D. There are no other on-Site utility connections currently available for use.

3.4. PERSONNEL DECONTAMINATION

A. Comply with all requirements of Site Specific Contractor Health and Safety Plan.

B. Provide the means for National Grid and the Engineer, to comply with Site Specific Contractor Health and Safety Plan.

C. Provide personnel decontamination station within the work zone where personnel can drop equipment and remove personal protective equipment (PPE).

1. The Contractor will equip decontamination station with basins for water and detergent and trash bags or cans for containing disposable PPE and other discarded materials.

2. The Contractor will supply a sink as a secondary means of personal hygiene for personnel.

3.5. EQUIPMENT DECONTAMINATION

A. Install decontamination facilities in accordance with the concepts shown on the Contract Drawings.

1. Decontamination pad will be located and operated at any point that equipment leaves the Exclusion Zone.

2. Decontamination pad will be sufficiently sized to ensure the largest piece of equipment can be adequately decontaminated.

B. Remove heavy contamination using a broom and/or brushes within the excavation area prior to movement to the decontamination pad.

C. Perform heavy equipment decontamination within the limits of the decontamination pad.

D. Pressure wash heavy equipment before leaving the Site, if necessary.

E. Decontaminate any equipment utilized to excavate impacted materials prior to backfilling.

F. Collect and pump wastewater from equipment decontamination into United States Department of Transportation (USDOT)-approved 55 gallon drums.

G. Collect and remove soils from decontamination pad and bulk with excavated materials.

3.6. EQUIPMENT LEFT ON-SITE

A. Secure all vehicles and/or equipment left on the Site outside of the standard work hours.

B. Ensure that all equipment, where feasible, is de energized when left on-Site and not in use to prevent electrical/fire/explosive hazards. Contractor will be responsible for security and operation and maintenance of any systems that require such services outside standard Site work hours. If systems are operational outside the standard Site work hours and outside of the 100-foot wetland buffer zone, provide oversight at all times when equipment is in operation, or provide an electronic monitoring system with remote communication of system failure. Repair system failures in a timely manner such that the Project schedule is not affected.

3.7. SITE SECURITY

A. Establish written Site security procedures as part of the Site Operations Plan. At a minimum the procedures will include:

1. Roles and responsibilities of personnel involved with Site Security;
2. Description of proposed daily security operations;
3. Method and frequency for conducting security checks;
4. Sign in/sign out procedures;
5. Description of how a breach of security will be handled. A breach of security shall include, but not be limited to, unauthorized personnel located on-Site, unauthorized personnel attempting to gain access to the Site, broken fences and unlocked gates, and unauthorized personnel in the exclusion zone;
6. Communications; and
7. List of personnel to be contacted in case of emergency.

END OF SECTION 01 50 00

SECTION 01 77 00
CLOSEOUT PROCEDURES

PART 1 GENERAL

1.1. SUMMARY

A. Closeout procedures covers the administrative and technical requirements for final cleaning, inspection, Project as-built documents, system demonstrations and adjustments, warranties, bonds, final payment, and other procedures for Project closeout in accordance with the Contract Documents.

1.2. CLOSEOUT PROCEDURES

A. Restore Site: Refer to the Contract Drawings

B. Substantial Completion:

1. When the Contractor considers the Work, or designated portion thereof, to be at Substantial Completion, provide written notice, with a list of items to be completed or corrected (punch list), the value of items on the list, and reasons why the Work is not complete.

2. The Engineer will inspect the Work to determine the status of completion.

3. If the Engineer determines that the Work is not at Substantial Completion, the Contractor will be notified of the deficiencies in writing.

4. The Contractor will, within two (2) days of the written notice, provide a schedule for when all defects will be corrected and/or the Work completed for the Engineer to review.

5. Upon approval from the Engineer, correct any deficient and/or incomplete Work and notify the Engineer upon completion. The Engineer will then re-inspect the Work for the purpose of Final Acceptance.

A. Provide copies of all Project records including, but not limited to, the following:

1. Manifests and bills of lading.

2. Weight tickets.

3. Testing results.

4. Health and Safety reports.

5. Copies of permits.

B. Utility Relocation:

1. Submit written confirmation from the utility providers that all temporary relocated utilities have been restored to pre-remediation condition, and that all temporary utility connection points have been restored to a suitable condition.

C. Permit Closeout:

1. Submit written confirmation that all permits have been closed with their governing authority and that any and all remaining fees have been paid in full.

D. Final Acceptance:

1. Submit written certification that confirms the following: Contract Documents have been reviewed, Work has been inspected, Work is complete in accordance with the Contract Documents (including satisfactory compliance with performance guarantees), any previously noted deficiencies have been corrected or remediated, equipment has been tested in the presence of the Engineer, and that the Work is complete and ready for final inspection.

2. The Engineer will inspect the Work to verify status of completion.

3. Should the Engineer find the Work to be satisfactory, the Contractor will be allowed to make application for final payment in accordance with the Agreement. Should the Engineer find deficiencies and incomplete Work, the Contractor will be notified in writing of deficient and/or incomplete Work and requests for final payment will not be approved until such time that the Contractor has satisfactorily completed the required Work.

4. Take immediate action to remedy incomplete/deficient Work and send written notice to the Engineer upon completion. The Engineer will then re-inspect Work to verify the status of completion.

E. Final Payment:

1. Submit an application for final payment after the final acceptance of the Work.

2. Submit evidence of final continuing insurance coverage, complying with insurance requirements, with the application for final payment.

3. Identify total Contract amount, previous payments and the amount due.

PART 2 MATERIALS

(Not Applicable)

PART 3 EXECUTION

(Not Applicable)

END OF SECTION 01 77 00

SECTION 02 61 00
REMOVAL AND DISPOSAL OF CONTAMINATED MATERIALS

PART 1 GENERAL

1.1. SUMMARY

A. The Work required under this section includes furnishing all labor, materials and equipment, and performing all operations required for the proper management, off-Site transportation, and disposal of waste materials and waste liquids generated during performance of the Work.

B. It is anticipated that all materials encountered during the trenching will be free of MGP-related impacts, and have the potential to be reused as stated in Specification Section 31 23 00 – Excavation and Fill.

C. The soil spoils generated from injection well installation during performance of the Work will be segregated, placed in a lined roll-off container, sampled, and disposed of at a National Grid-approved thermal desorption facility.

1.2. SUBMITTALS

A. Designate and submit primary and alternate liquid waste treatment facilities, and thermal desorption receiving facilities for materials. Upon final approval from National Grid, the Contractor shall contract with all facilities prior to the start of the Work. Copies of contracts or letters from each facility indicating acceptance of the total estimated volume of material from this Project shall be given to the Engineer.

B. Submit copies of all waste manifests, bills of lading, and certified weight slips from a scale approved for use by the Engineer and/or National Grid for all materials removed from the Site for disposal.

C. Submit copies of Part 364 Permits for all waste transporters.

PART 2 PRODUCTS

2.1. VEHICLE REQUIREMENTS

A. Trucks must arrive on-Site clean. The Engineer may instruct a truck to depart the Site if it arrives in a dirty condition.

B. The license plates on the truck must be properly affixed and visible at all times.

C. Proper placards must be displayed and extraneous or incorrect placards must be covered and/or removed prior to the truck departing the Site.

D. All required permits must be properly displayed or readily available for verification by the Engineer.

E. Drivers must remain in the truck at all times unless they are wearing the correct personal protective equipment required for the Site.

F. Standing on the back of the truck is prohibited. Ladders or scaffolding must be used when securing tarps and/or covers.

G. Provide polyethylene impermeable liners for the interior of the excavated impacted material storage containers and vehicles to prevent the leakage of entrained liquid. The liner material must be strong enough to withstand the placement of excavated material into the container without tearing, chemically resistant to the contaminants within the material, and be of sufficient length and width to cover the interior bed of the haul truck with no seams while completely covering over the load with overlap.

H. Contractor and any transportation subcontractor(s) provide vehicles and containers used for the storage and/or transport of materials with SOLID sealable covers to minimize the release of odors from the containers during transport. The use of mesh covers is not permitted.

I. The Engineer reserves the right to reject vehicles that are not properly equipped and/or require the use of plastic sheeting if the gasket seal and flaps are not considered by the Engineer or National Grid to be in serviceable condition.

PART 3 EXECUTION

3.1. LOADING AND TRANSPORTATION OF MATERIAL

A. All trucks entering the Site will be free of contamination and/or visual dirt. The Engineer and/or National Grid reserve the right to reject or send away trucks that arrive to the Site dirty.

B. All trucks transporting material should be outfitted with an impermeable liner.

C. Provide traffic control at the Site entry to ensure a smooth flow of traffic and to minimize congestion at the Site entrance.

D. Appropriately cover trucks (see Paragraph 2.1[H]) filled with excavated material prior to exiting the Site to prevent vapor and fugitive dust emissions during transport. Supplement with odor suppressant foam or solvent as needed. Gross vehicle truck weights shall conform with the most current DOT regulations for the Federal, State, and local level.

E. All Work in and around trucks shall be performed in appropriate personal protective equipment. These activities must be specifically addressed in the Site Specific Contractor HASP.

F. Prior to leaving the Site, all material transport vehicles and containers shall be visually inspected for evidence of contamination (including inside of wheels and undercarriage). All trucks leaving the Site shall proceed to a decontamination station for cleaning prior to exiting onto public roads.

1. Brush off equipment using a broom and/or brushes within the excavation area prior to movement to the decontamination pads to decrease the amount of respirable particulates leaving the remediation area.
2. If necessary, at the decontamination pad, all heavy equipment will be pressure washed before leaving the Site.
3. All equipment leaving the Site will be decontaminated per these guidelines. In addition, any equipment previously utilized to excavate impacted material will be decontaminated prior to use in backfilling (e.g. excavator bucket).
4. Size decontamination pads to ensure that the largest piece of Contractor equipment can be adequately decontaminated. Provisions will be made to control overspray at the decontamination pads.
5. Collect and pump wastewater from equipment decontamination into frac tank(s).
6. Wastewater will be transported from the Site by a properly licensed liquid waste hauler.
7. Soils collected from the decontamination pads will be bulked with the MGP-related impacted material and sent to the properly licensed National Grid-approved disposal facility, as necessary.

G. Trucks shall proceed directly to the designated thermal desorption facility.

H. The Contractor is responsible for any and all actions necessary to remedy situations involving material spilled or leaked in transit, or mud or dirt tracked off-Site. This includes trucks carrying imported fill or other materials to the Site (i.e. dust generated from trucks entering the Site on adjacent roads). Clean up shall be performed in accordance with all applicable Federal, State, and local regulations at no additional costs to National Grid.

I. All transporters used shall be properly licensed, permitted, and certified for the service provided.

J. Material from the Site will not be combined with any other material, without the Engineer's approval.

K. National Grid or a National Grid designated representative will sign transport bills of lading or manifests. National Grid will provide a hazardous waste generator number, if required. Maintain copies of all documents involving transportation of materials from the Site. Copies of these records shall be submitted to the Engineer at a frequency agreed to by the Contractor and National Grid. All records shall be turned over to National Grid at the completion of the Work.

L. Ensure that transport vehicles are properly secured, labeled, and placarded prior to exiting the Site.

3.2. DISPOSAL OF MATERIALS

A. Soil Disposal:

1. Dispose of all excavated soil at an off-Site licensed thermal desorption facility approved by National Grid, unless otherwise specified.
2. In the event that analytical sampling indicates that MGP-impacted material cannot be thermally desorbed, notify National Grid in writing that the material must be disposed as hazardous waste at a Subtitle C landfill.
3. After notification that soils cannot be thermally desorbed, National Grid will provide a list of approved hazardous waste facilities.

B. Construction Debris:

1. Segregate non-contaminated construction debris and bulky wastes for transport to a landfill facility.
2. Dispose of debris to an off-Site licensed landfill receiving Construction & Debris facility approved by National Grid, unless otherwise specified.

C. Liquid Waste:

1. Groundwater and decontamination wastewater shall be disposed of at an off-Site liquid waste treatment facility approved by National Grid.

D. The Contractor is responsible for the acceptance of materials at the facilities. In the event that the identified and approved facilities cease to accept the materials, the Contractor shall be responsible for identifying alternate facilities, and making arrangements with such facilities to accept material from the Site with no change in the unit price submitted in the Contractor's Bid for this project. Alternate facilities are subject to review and approval by National Grid.

E. In the event that an alternate facility is needed to accept the material, the Contractor will supply a written submission to National Grid on the material type, amount, location, and reason the approved facility ceased to accept the material. Alternate facilities not previously audited by National Grid will require an audit prior to allowing transport of materials to the facility. Any charges or fees incurred by the Contractor associated with delays to the Project schedule during this audit process are the sole responsibility of the Contractor.

F. If any materials are encountered during excavation that appear to exhibit hazardous characteristics, these materials should be segregated, stored on Site, sampled, and disposed of appropriately.

3.3. SAMPLING AND CHEMICAL ANALYSIS

A. Sampling and laboratory analyses as required by disposal facilities will be performed by the Contractor.

B. All laboratory analyses will be conducted by a laboratory certified by the New York State Environmental Laboratory Approval Program for the analyses conducted.

C. Results of the laboratory analysis will be forwarded to the Engineer upon receipt.

END OF SECTION 02 61 00

SECTION 22 15 00
GENERAL SERVICE COMPRESSED AIR SYSTEMS

PART 1 GENERAL

1.1. SUMMARY

A. The Work required under this section includes furnishing all labor, materials and equipment, and performing all operations required for the installation of compressed air system lines during performance of the Work.

1.2. SUBMITTALS

A. Submit the manufacturers catalog data to the Engineer with the Contractor bid narrative for the following items:

1. High Density Polyethylene (HDPE) tubing, and
2. Tee junctions.

PART 2 MATERIALS

2.1. HDPE TUBING

A. Tubing shall be black virgin polyethylene, conforming to ASTM D 2239. The tubing shall have an inner diameter of 0.75 inches, be rated to at least 100 pounds per square inch (PSI), and conform to the stress-crack tests performed in accordance with ASTM D 1693.

B. Tee junctions shall be constructed of Schedule 40 Polyvinyl Chloride (PVC) as shown on the Contract Drawings.

C. Provide all necessary piping system components and miscellaneous required supporting elements shown in the Contract Drawings. Supporting elements shall be suitable for stresses imposed by system pressures and temperatures, and natural and other external forces.

PART 3 EXECUTION

3.1. INSTALLATION

A. Refer to Specification Section 31 23 00 – Excavation and Fill for details on the required earthwork.

B. Install the HDPE lines and connections as shown on the Contract Drawings.

C. Affix a permanent marking to the HDPE tubing at the beginning and the termination point identifying the injection well to which the HDPE tubing is connected.

3.2. PERFORMANCE TEST

A. Prior to backfilling the utility trench the Contractor will conduct a performance test of the system in the presence of the Engineer.

1. Each injection line will be brought up to an internal pressure specified by the Engineer, not to exceed 27 pounds per square inch (PSI), and then monitored for a period of 15 minutes. The injection well and associated injection line will be deemed satisfactory if the internal pressure of the system remains unchanged over a 15 minute period.

B. The Engineer may amend the requirements of the performance test if break through at the injection well occurs, that is, if air begins entering the subsurface. The authority of the Engineer to amend the requirements of the performance test is final.

END OF SECTION 22 15 00

SECTION 31 10 00
SITE PREPARATION

PART 1 GENERAL

1.1. SUMMARY

A. The Work required under this section includes furnishing all labor, materials and equipment and performing all operations required for the Site preparation prior to performance of the Work.

B. Locate all underground utilities prior to the initiation of intrusive Work. The Contract Drawings indicate the location of known utilities on-Site. The Contractor is responsible for locating and protecting all underground utilities in and adjacent to the excavation/drilling area in accordance with Section 01 50 00.

C. Install temporary fencing in accordance with Contract Drawings.

D. Clear all debris, rubble, and vegetation from the work areas and in any other areas which will be used by the Contractor for construction support as approved by the Engineer, and National Grid.

E. Clear all debris, rubble, and vegetation from the CAMP station locations as directed by the Engineer, and National Grid.

F. Provide protection for existing monuments, structures, and appurtenances during the duration of the Work.

G. Provide temporary relocation of appurtenances from off-Site properties, which may become damaged during the Work.

1.2. SUBMITTALS

A. Provide the One Call of New York City & Long Island ticket number and the findings of the utility markout to National Grid and the Engineer prior to beginning intrusive activities.

PART 2 PRODUCTS

(Not Applicable)

PART 3 EXECUTIONS

3.1. UNDERGROUND UTILITIES

A. Contact One Call of New York City & Long Island to request that all utilities on the Site are located and marked. Ensure that the utility markout is refreshed as necessary, as directed by DigNet, or at the direction of National Grid and/or the Engineer.

B. Retain the services of a private underground utility location company to markout the locations of underground utilities in the areas of planned excavation on private property.

C. Any underground utility protection will be the responsibility of the Contractor prior to and during any intrusive activities.

D. Repair any utilities damaged as a result of the Work.

3.2. SITE CLEARING AND DEBRIS REMOVAL

A. Remove debris within the limits of the work area; handle, screen, characterize, and dispose of the debris as necessary.

B. Contaminated materials must be segregated from non-contaminated materials and prepared, as necessary, for disposal at an off-Site facility approved by National Grid.

END OF SECTION 31 10 00

SECTION 31 23 00
EXCAVATION AND FILL

PART 1 GENERAL

1.1. SUMMARY

A. The Work required under this section includes furnishing all labor, materials, equipment, and performing all operations required for the excavation, handling, backfilling, and dewatering of material during performance of the Work.

B. Limits of the trenching are as indicated on the Contract Drawings.

C. The anticipated area of the trenching was established based on the existing Site data. The Contractor should be prepared to accommodate potential field adjustments as necessary.

D. Strip, excavate, and load the material into trucks for disposal at an appropriately licensed National Grid-approved disposal facility. Excavated material handling includes:

1. Stripping and stockpiling existing stone surface.
2. Excavation of subsurface soil and any debris encountered.
3. Load subsurface soil for off-Site transport and disposal at a regulated, licensed, National Grid-approved disposal facility.
4. Segregate bulk solid waste and construction debris encountered during excavation.

E. Implement airborne dust and vapor suppression measures required to comply with the CAMP and as directed by National Grid or the Engineer. These actions may include, but are not limited to, any of the following:

1. Applying water on exposed soil surfaces and/or roadways to suppress dust.
2. Covering working areas of exposed soils with tarpaulins, vapor suppressing foam, or other vapor controls.
3. Modifying the means and methods of the Work (i.e. using different or additional equipment, etc.).
4. Modifying the production rate (i.e. excavation rate, etc.).
5. Changing the sequence of activities.

F. Handle materials in a manner that will protect Site personnel, the public, and the environment in accordance with all applicable Federal, State, and local laws and regulations and to prevent cross contamination.

G. For weight submittals, provide documentation in the form of weight tickets from the disposal facility and borrow source locations.

1.2. SUBMITTALS

A. Borrow Source Evaluation: Submit the results of the borrow source evaluation for each source to be used as imported clean backfill indicating the material is in compliance with the geotechnical and environmental criteria. Perform borrow source evaluation prior to the import of fill from the borrow source. Include the following:

1. Name, address, telephone number, facsimile number, and web site address of borrow source.

2. Certificate of clean fill from the borrow location stating that the soil is native in origin and free of contamination.

3. Analytical results from the borrow source, specific to the actual fill being imported to the Site, as confirmation that the material is free of contamination and in compliance with the clean fill environmental criteria.

4. Geotechnical test results from the borrow source, specific to the actual fill being imported to the Site, as confirmation that the material is in compliance with the clean fill geotechnical criteria.

B. Geotechnical Laboratory Test Results: Submit geotechnical laboratory test results for backfill as the test results become available. Incorporate into a Daily Report one week prior to placing the tested materials.

C. Daily Report - Excavation Rate and Weight Tickets: Submit excavation rate for each working day. Submit certified weight tickets for material exported for off-Site disposal and for each load of imported backfill material each working Day.

D. Provide National Grid and the Engineer the manufacturers' MSDS and product information for all stabilization agents prior to their use on-Site.

PART 2 PRODUCTS

2.1. TRENCHING TOOLS

A. Equipment, storage containers, and tanks brought on-Site for the purpose of handling and/or storage of materials shall be clean and certified decontaminated prior to entry to the Site. Construction equipment and materials to be incorporated into the Work shall be placed in a location so as not to damage any part of the Work or existing facilities, and will be stored at a sufficiently safe distance from any contaminated location or material, covered against the weather, and elevated.

B. All equipment brought on site for the purpose of the Work shall be appropriately sized. The Engineer reserves the right to reject any equipment brought to the Site if deemed unsuitable for the Work due to its size, or for any other reason.

2.2. BACKFILL

A. Bedding Sand

1. Bedding sand shall conform to ASTM C33-Specification for Concrete Aggregates. Bedding sand shall be free of organic matter and meet the following gradation requirements:

U.S. Standard Sieve	Percent Finer by Dry Weight
3/8 inch	100
No. 4	95 to 100
No. 8	80 to 100
No. 16	50 to 85
No. 30	25 to 60
No. 50	10 to 30
No. 100	2 to 10

B. Environmental criteria sampling is not required for material from a New York State Department of Transportation (DOT) approved source provided that the most recent analytical results are provided to the Engineer in advance of importing the material.

C. Collect a sample of the backfill and submit for testing to determine conformance to the geotechnical criteria prior to the material being brought to the Site.

D. If the material is from a non-DOT approved source, at a minimum collect one sample of the backfill and submit for environmental analysis.

1. Analyze backfill samples for RCRA 8 Metals, PCBs by EPA Method 8082, VOCs by EPA Method 8260 or NYSASP Method 95.1, and SVOCs by EPA Method 8270C or NYSASP Method 95-2.

2. At least one sample must be collected for environmental analysis from each non-DOT approved borrow source.

E. Material must be approved by NYSDEC prior to transportation to the site.

2.3. BALL MARKERS

A. Ball Markers should be equal or equivalent to 3M™ EMS Ball Marker 1405-XR.

PART 3 EXECUTION

3.1. CAMP REQUIREMENTS

A. Implement airborne dust and vapor suppression measures required to comply with the CAMP and as directed by National Grid, the Construction Manager, or the Engineer. These actions may include any of the following or other measures to minimize air emissions:

1. Applying water on exposed soil surfaces and/or roadways to suppress dust.
2. Covering working areas of exposed soils or stockpiles with tarpaulins, vapor suppressing foam, or other vapor controls.
3. Modifying the means and methods of the Work (i.e. using different or additional equipment, etc.).
4. Modifying the production rate (i.e. excavation rate, etc.).
5. Changing the sequence of activities.

3.2. TRENCHING

A. Perform trenching in accordance with OSHA regulations.

1. Excavated material will be set aside for reuse in the backfill of the utility trench.
2. If material is observed to contain MGP-related impacts, as determined by the Engineer, manage the excavated materials in accordance with Specification Section 02 61 00 – Removal and Disposal of Contaminated Materials.

3.3. BORROW SOURCE EVALUATION

A. Perform borrow source evaluation for geotechnical and environmental criteria to ensure that the imported material meets the Project requirements.

3.4. BACKFILL

A. Backfill shall consist of imported clean backfill material.

1. Backfill the bottom of the utility trench with 6 inches of bedding sand.
2. After injection lines have been installed, backfill with an additional 6 inches of bedding sand.
3. Place a warning tape over the bedding sand that states “DANGER OXYGEN GAS LINES BELOW.”
4. Place a sounding wire as shown on the Contract Drawings.
5. Place gas utility locating “Ball Markers” every 50 feet along the length of the sounding wire.
6. Place excavated material that has been set aside for reuse on top of the bedding sand to bring the utility trench up to the original Site grade.

B. Do not place backfill without the approval of the Engineer. Placement of backfill prior to Engineer approval is at the Contractor’s risk and may require removal at the Contractor’s cost. Commence backfill placement and compaction upon confirmation of the horizontal and vertical limits of the trenching; whichever is applicable, and as directed by the Engineer.

C. General

1. Perform required laboratory testing.
2. Backfill excavations in accordance with the Contract Drawings.
3. Place backfill using a method that does not disturb or damage adjacent structures or property.
4. Maintain moisture content to the satisfaction of the Engineer while placing and compacting backfill.
5. Place backfill in 6 inch lifts and compact with a minimum four passes of a vibratory plate compacter. The Engineer reserves the right to instruct Contractor to bring a plate compactor capable of delivering a greater amount of energy if the on-Site compactor is deemed to be insufficient for performance of the Work.

D. Field Control Quality

1. The Engineer reserves the right to reject backfill that differs visually from the identified source material and to randomly test backfill materials for conformance with the Specifications. Backfill that is found to not meet the project requirements shall be removed at no additional expense to National Grid.

3.5. CONSTRUCTION METHODS

A. Establish, in consultation with the Engineer, manageable and appropriate excavation stages to permit continuous work and to ensure effective coordination between trenching; and material load out, while accommodating the receiving capacity of the selected disposal facilities.

B. Divert or otherwise prevent surface water from entering open trenches to the greatest extent practicable without causing damage or flooding to adjacent properties.

END OF SECTION 31 23 00

SECTION 33 24 00
WELLS

PART 1 GENERAL

1.1. SUMMARY

A. The Work required under this section includes furnishing all labor, materials and equipment, and performing all operations required for the installation of the injection wells during performance of the Work.

1.2. DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in an undamaged condition. Unload and store with minimal handling. Store materials in on-Site enclosures or under protective coverings. Store plastic piping, jointing materials, and rubber gaskets under cover, out of direct sunlight. Store materials off the ground. Keep insides of pipes and fittings free of dirt and debris. Replace defective or damaged materials, as determined by the Engineer, with new materials at no additional cost to National Grid.

PART 2 MATERIALS

2.1. WELL CASING

A. Injection well casing shall consist of 1 inch inner diameter, Schedule 40 PVC pipe that meets the requirements set forth in ASTM F 480. Threaded joints shall be wrapped with flouropolymer tape, and provided with nitrile o-ring gaskets.

2.2. WELL SCREEN

A. Injection well screen shall consist of 1 inch inner diameter, Schedule 40 PVC screen that meets the requirements set forth in ASTM D 1785. The screen shall contain machine slotted construction and flush threaded joint ends. Slots shall be 0.010 inches wide and even in width, length, and separation.

2.3. WELL SUMP

A. Injection wells will have a sump. Provide a one-foot long, one-inch diameter flush threaded solid sump at the bottom of the injection well. The sump shall be the same material as the injection well screen to which it is attached. Joints shall be wrapped with fluoropolymer tape and provided with nitrile o-ring gaskets.

2.4. FILTER PACK

A. Provide clean, durable, well-rounded, and washed silica 00 sand. The filter pack shall not contain organic matter or friable materials. The filter pack shall allow free flow of water in the well, and shall prevent the infiltration of aquifer materials.

2.5. ANNULAR SEALANTS

A. Provide powdered, granular, or pelletized, bentonite in sealed containers from a commercial source, free of impurities. Diameter of pellets shall be less than one fifth the diameter of the borehole annular space to prevent bridging. Bentonite base grout shall meet the requirements set forth in ASTM D 5092.

2.6. GROUT

A. Grout shall be mixed as follows:

1. One 94-pound bag of type I Portland cement;
2. 3.9 pounds powdered bentonite;
3. 1 pound calcium chloride; and
4. 6.0-7.8 gallons potable water.

2.7. WELL PLUG

A. Provide a well plug equipped with a 3/8 inch ¼ turn air bleed valve. The well plug must be capable of withstanding the pressure required by the system performance test described in Specification Section 22 15 00.

2.8. WELL HEAD COMPLETIONS

A. Clearly mark and secure the well to avoid unauthorized access and tampering. Cast the words “NO FILL” on the well head covers.

2.9. AT-GRADE COMPLETIONS FOR WELLS

A. Provide cast iron vault box, 12 inch in diameter, with watertight frame and cover. Vault shall be designed to support a traffic loading. The frame shall extend to cover the tee junction allowing access for future maintenance, and shall be set in a concrete collar a minimum 8 inches thick and extending 4 inches beyond the edge of the frame in all directions. Frame and concrete collar shall be set to meet the existing grade for wells located in grass areas, and set above the existing grade as required to meet the final grade in locations to be paved.

PART 3 EXECUTION

3.1. GENERAL

A. The location and construction of the injection wells shall be as indicated in the Specifications and Contract Drawings. The drilling and installation of the injection wells will be monitored at all times by the Engineer.

3.2. DRILLING

A. The borehole shall be advanced using a direct push drilling method, or Engineer approved alternative.

3.3. WELL CONSTRUCTION

A. The borehole shall be stable and verified straight, as determined by the Engineer, before beginning well construction. The Engineer reserves the right to reject boreholes that are determined to be unsatisfactory for well construction.

B. When the assembly has been installed at the appropriate elevation, it shall be adequately secured to preclude movement during placement of the filter packs and annular seals. The top of the well point casing shall be capped during filter pack placement.

C. Filter packs shall be placed as indicated on Contract Drawings to fill the entire annular space between the screen and casing assembly and the outside wall of the borehole. Control speed of filter placement to prevent bridging and to allow for settlement.

D. Bentonite shall be placed through time released capsules. Control speed of bentonite placement to prevent bridging or segregation of slurry. Additional water shall be added to the annular space as directed by the Engineer to ensure complete hydration of the bentonite.

E. Grout shall be placed in the annular space above the bentonite seal as indicated on the Contract Drawings. Grout shall be placed as a slurry through a tremie pipe, and injected under pressure to reduce chance of voids.

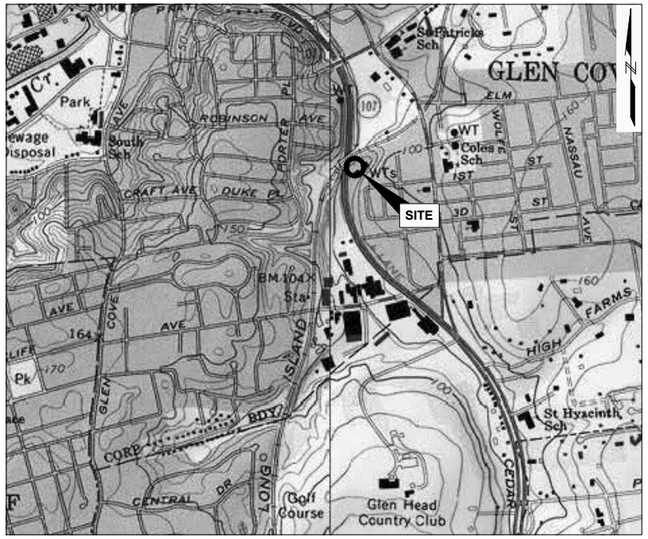
F. Install well head completions as indicated on the Contract Drawings and as specified herein.

END OF SECTION 32 24 00

Attachment A

Glen Cove Phase II Remedial Action Contract Drawings

PHASE II REMEDIAL ACTION
GLEN COVE FORMER MANUFACTURED GAS PLANT SITE
CITY OF GLEN COVE, NASSAU COUNTY, NEW YORK



SOURCE:
MAP CREATED WITH TOPO! ® ©2001 NATIONAL GEOGRAPHIC (www.nationalgeographic.com/topo)

SITE LOCATION

0 1000 2000

APPROXIMATE GRAPHIC SCALE IN FEET

SCHEDULE OF DRAWINGS

PREPARED FOR:

nationalgrid

175 EAST OLD COUNTRY ROAD
HICKSVILLE, NEW YORK 11801

GEI Consultants
455 WINDING BROOK DRIVE
SUITE 201
GLASTONBURY, CT 06033
(860)368-5300
WWW.GEICONSULTANTS.COM

PROJECT NUMBER: 093270-4-1404

AUGUST 2014

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For Review

PROFESSIONAL ENGINEER LIC. NO. 091317
Matthew J. O'Neil, P.E. EXP. DATE: 08/31/2015

NO.	DATE	DESCRIPTION	DES	DR	CH	APP
0	8/29/2014	ISSUED FOR REVIEW	ES/HK	PHH	JP	MJO

DRAFT

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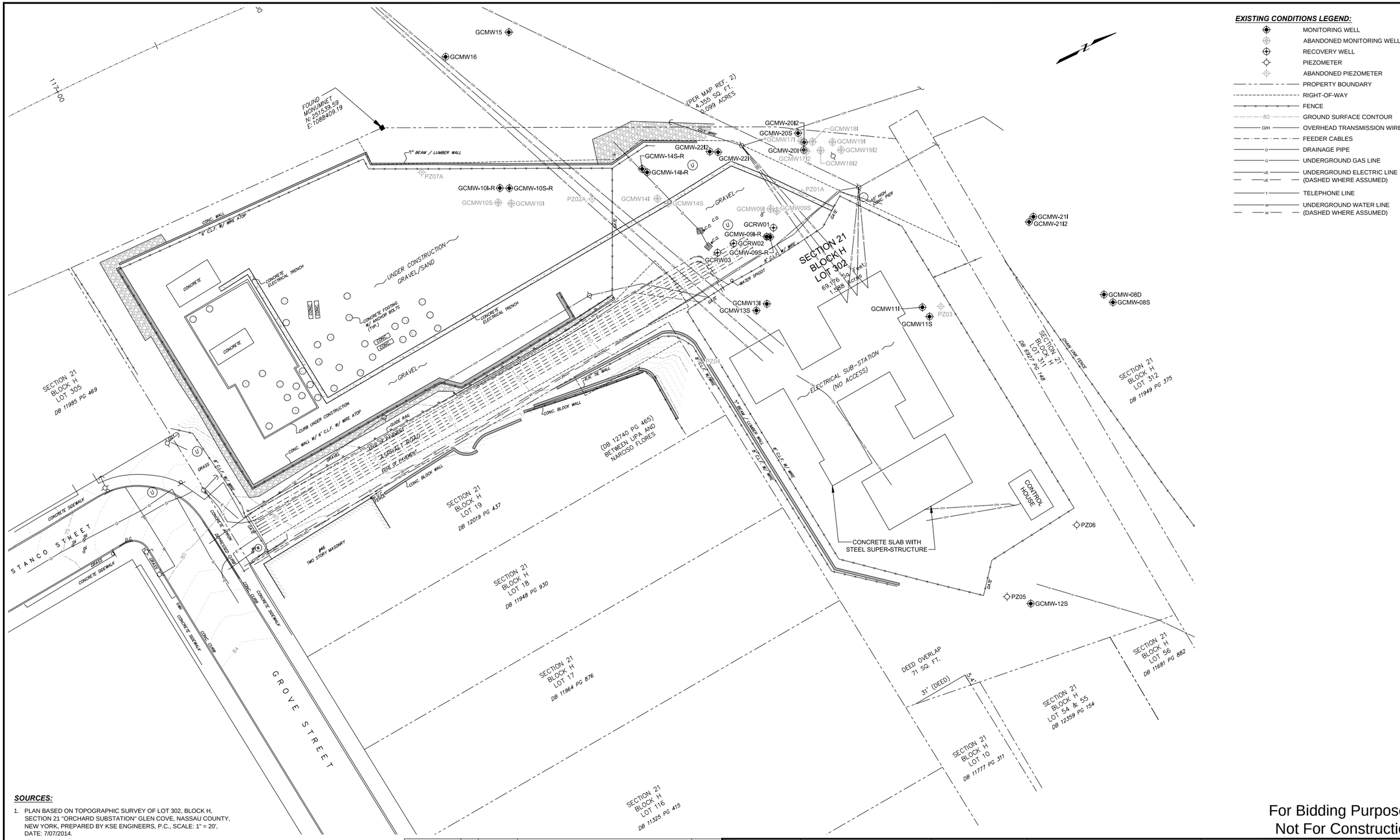

EXISTING CONDITIONS LEGEND:

- MONITORING WELL
- ABANDONED MONITORING WELL
- RECOVERY WELL
- PIEZOMETER
- ABANDONED PIEZOMETER
- PROPERTY BOUNDARY
- RIGHT-OF-WAY
- FENCE
- GROUND SURFACE CONTOUR
- OVERHEAD TRANSMISSION WIRE
- FEEDER CABLES
- DRAINAGE PIPE
- UNDERGROUND GAS LINE
- UNDERGROUND ELECTRIC LINE
- UNDERGROUND ELECTRIC LINE (DASHED WHERE ASSUMED)
- TELEPHONE LINE
- UNDERGROUND WATER LINE
- UNDERGROUND WATER LINE (DASHED WHERE ASSUMED)

SOURCES:

1. PLAN BASED ON TOPOGRAPHIC SURVEY OF LOT 302, BLOCK H, SECTION 21 "ORCHARD SUBSTATION" GLEN COVE, NASSAU COUNTY, NEW YORK, PREPARED BY KSE ENGINEERS, P.C., SCALE: 1" = 20', DATE: 7/07/2014.
2. SUBSTATION STRUCTURES ARE NOT TO BE CONSIDERED ACCURATE AND WERE DIGITIZED FROM: *DRAWING NO. 2A: SAMPLE LOCATION MAP*, PREPARED BY PAULUS, SOKOLOWSKI AND SARTOR ENGINEERING, PC, SCALE: 1" = 25', DATE: 6/12/2006.
3. OVERHEAD TRANSMISSION LINES ENTERING SUBSTATION BASED ON *DRAWING F-24646: TRANSMISSION LINE TERMINATION, ORCHARD SUBSTATION*, PREPARED BY NATIONAL GRID ENGINEERING AND SURVEY, INC., SCALE: 1" = 20', REVISION DATE: 10-17-06.

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Not For Construction

Attention:

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DRAFT

Designed:	ES/HK
Checked:	JP
Drawn:	PHH
Submitted By:	MJO
NY P.E. No.:	091317
Submittal Date:	08/29/2014

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Hicksville, NY
nationalgrid

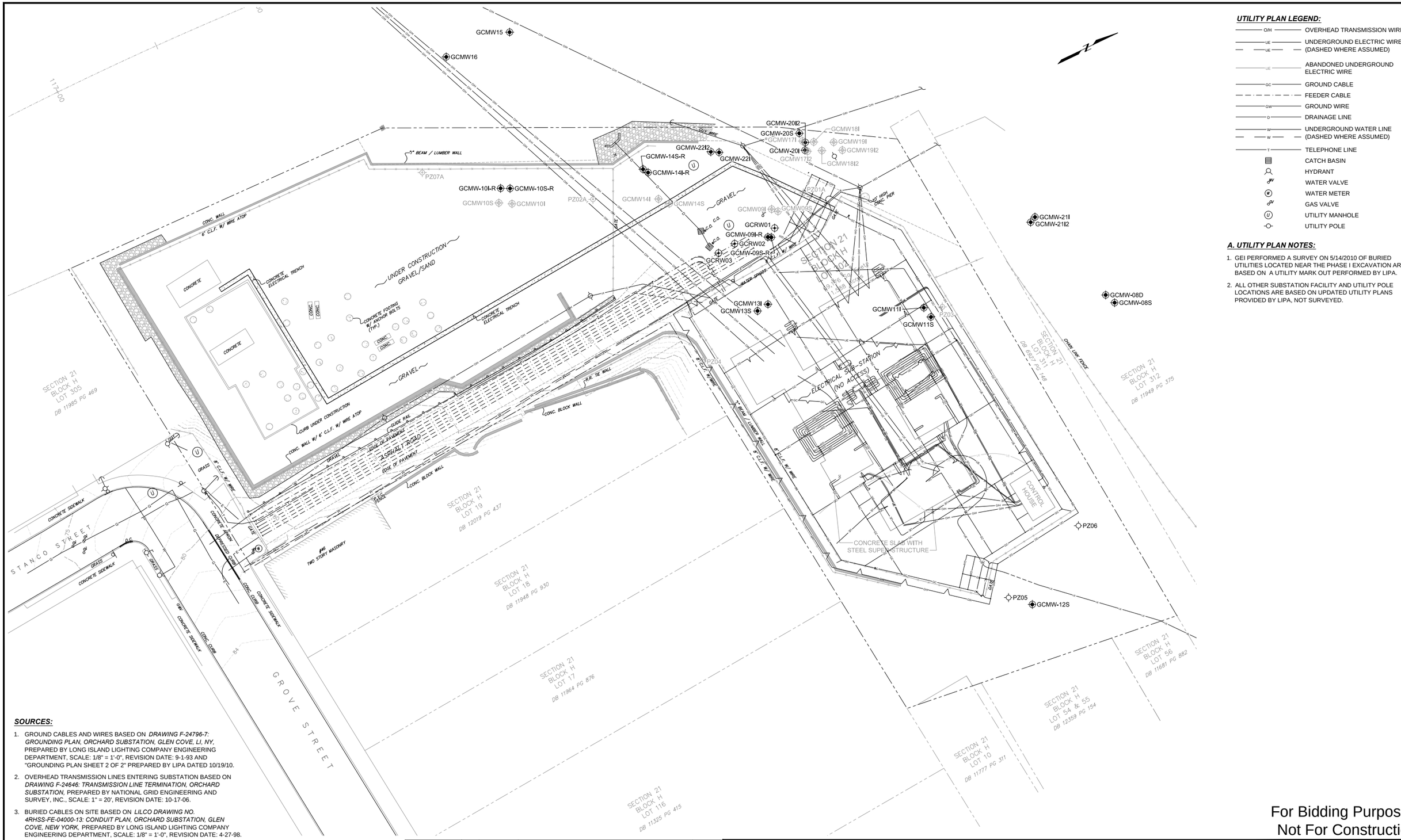
GEI Project 093270

Phase II Remedial Action Work Plan
Glen Cove Former MGP Site
Glen Cove, New York

DWG. NO. 1

EXISTING CONDITIONS

REV 0



UTILITY PLAN LEGEND:

- O/H — OVERHEAD TRANSMISSION WIRE
- UE — UNDERGROUND ELECTRIC WIRE
- UE — (DASHED WHERE ASSUMED)
- UE — ABANDONED UNDERGROUND ELECTRIC WIRE
- GC — GROUND CABLE
- FEEDER CABLE
- GW — GROUND WIRE
- D — DRAINAGE LINE
- W — UNDERGROUND WATER LINE
- W — (DASHED WHERE ASSUMED)
- T — TELEPHONE LINE
- CATCH BASIN
- HYDRANT
- WV — WATER VALVE
- W — WATER METER
- GV — GAS VALVE
- U — UTILITY MANHOLE
- UTILITY POLE

A. UTILITY PLAN NOTES:

1. GEI PERFORMED A SURVEY ON 5/14/2010 OF BURIED UTILITIES LOCATED NEAR THE PHASE I EXCAVATION AREA BASED ON A UTILITY MARK OUT PERFORMED BY LIPA.
2. ALL OTHER SUBSTATION FACILITY AND UTILITY POLE LOCATIONS ARE BASED ON UPDATED UTILITY PLANS PROVIDED BY LIPA, NOT SURVEYED.

SOURCES:

1. GROUND CABLES AND WIRES BASED ON *DRAWING F-24796-7: GROUNDING PLAN, ORCHARD SUBSTATION, GLEN COVE, LI, NY,* PREPARED BY LONG ISLAND LIGHTING COMPANY ENGINEERING DEPARTMENT, SCALE: 1/8" = 1'-0", REVISION DATE: 9-1-93 AND "GROUNDING PLAN SHEET 2 OF 2" PREPARED BY LIPA DATED 10/19/10.
2. OVERHEAD TRANSMISSION LINES ENTERING SUBSTATION BASED ON *DRAWING F-24646: TRANSMISSION LINE TERMINATION, ORCHARD SUBSTATION,* PREPARED BY NATIONAL GRID ENGINEERING AND SURVEY, INC., SCALE: 1" = 20', REVISION DATE: 10-17-06.
3. BURIED CABLES ON SITE BASED ON *LILCO DRAWING NO. 4RHSS-FE-04000-13: CONDUIT PLAN, ORCHARD SUBSTATION, GLEN COVE, NEW YORK,* PREPARED BY LONG ISLAND LIGHTING COMPANY ENGINEERING DEPARTMENT, SCALE: 1/8" = 1'-0", REVISION DATE: 4-27-98.
4. PLAN BASED ON TOPOGRAPHIC SURVEY OF LOT 302, BLOCK H, SECTION 21 "ORCHARD SUBSTATION" GLEN COVE, NASSAU COUNTY, NEW YORK, PREPARED BY KSE ENGINEERS, P.C., SCALE: 1" = 20', DATE: 7/07/2014.
5. SUBSTATION STRUCTURES ARE NOT TO BE CONSIDERED ACCURATE AND WERE DIGITIZED FROM: *DRAWING NO. 2A: SAMPLE LOCATION MAP,* PREPARED BY PAULUS, SOKOLOWSKI AND SARTOR ENGINEERING, PC, SCALE: 1" = 25', DATE: 6/12/2006.

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GEI Project 093270

Phase II Remedial Action Work Plan
Glen Cove Former MGP Site
Glen Cove, New York

DWG. NO. 2

UTILITY PLAN

REV 0

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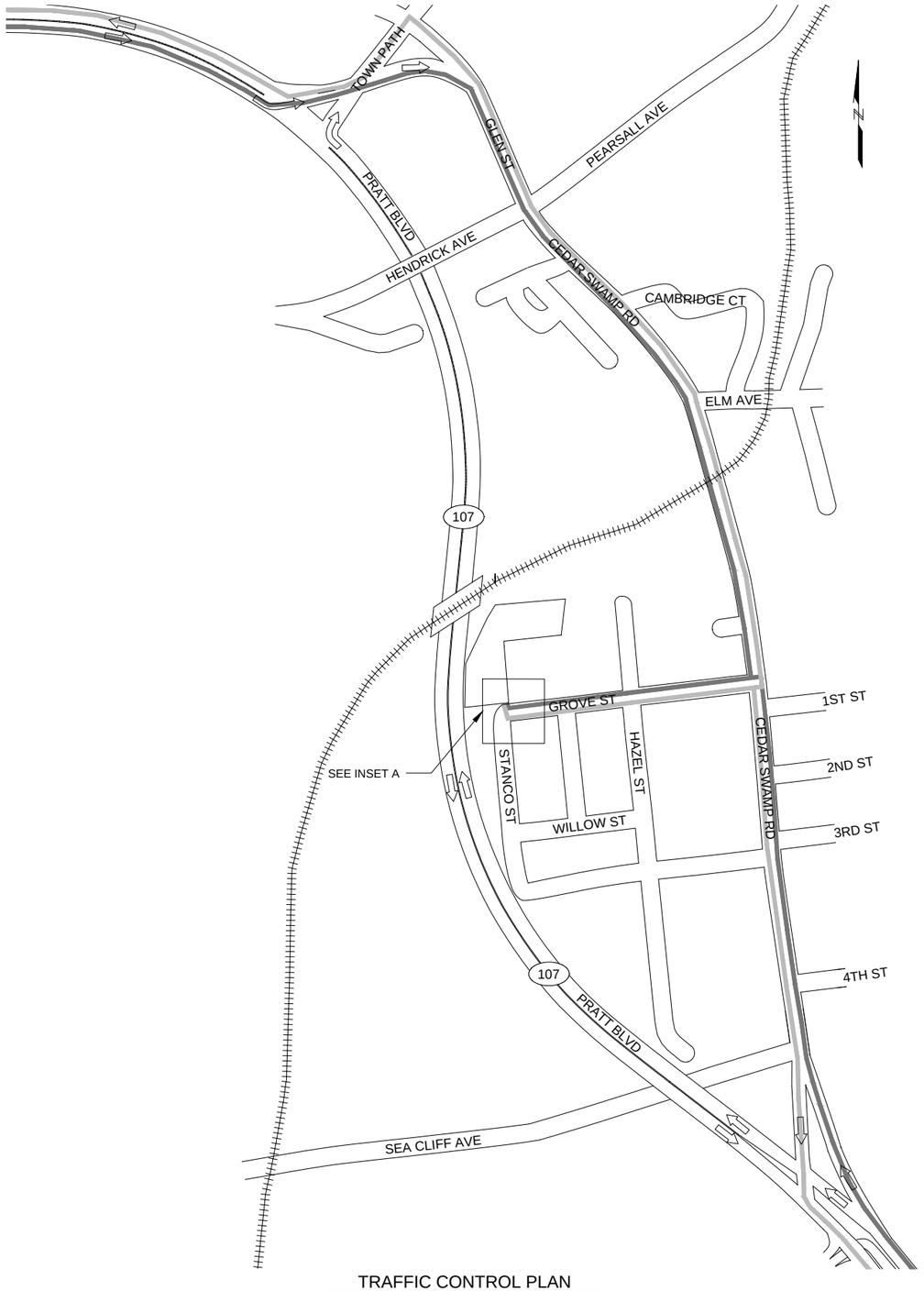
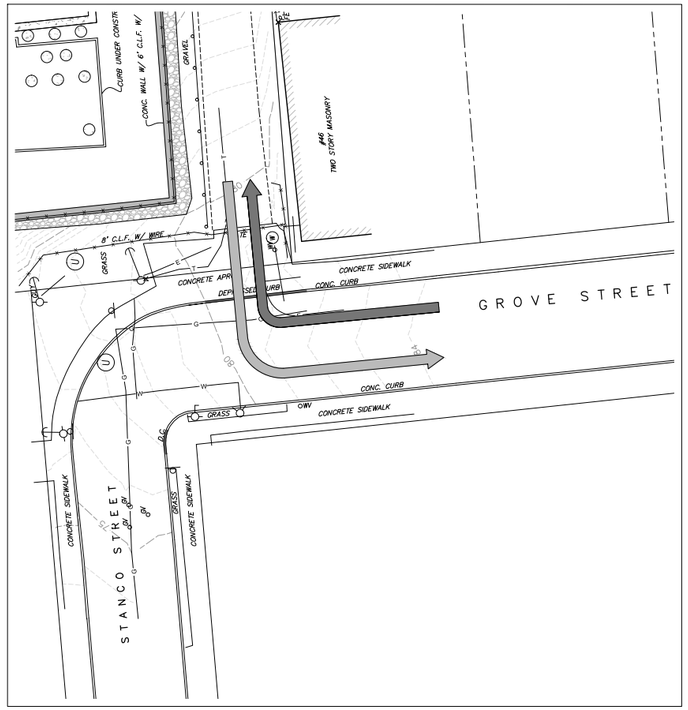


TRAFFIC CONTROL PLAN

SCALE: 1" = 200'

0 200' 400'

SCALE: 1" = 200'



INSET A: SITE ENTRANCE

SCALE: 1" = 20'

0 20' 40'

SCALE: 1" = 20'

TRUCK ROUTE LEGEND:

- PROJECT LIMITS
- DIRECTION OF TRAFFIC
- EXITING SITE TRUCK ROUTE
- ENTERING SITE TRUCK ROUTE
- RAILROAD TRACKS

A. TRUCK ROUTE NOTES:

1. ROADWAY BASE MAP SOURCE: NEW YORK STATE OFFICE OF CYBER SECURITY & CRITICAL INFRASTRUCTURE COORDINATION
2. ALL STREETS CONTAIN TWO WAY TRAFFIC UNLESS NOTED OTHERWISE.
3. TRUCKS TRANSPORTING CONSTRUCTION EQUIPMENT OR MATERIALS (SOIL, WATER, PIPE, CEMENT, ETC.) TO OR FROM THE SITE MUST USE SPECIFIED ROUTES.
4. DO NOT QUEUE TRUCKS AND EQUIPMENT IN LOCAL STREETS.
5. TRUCK ROUTE MUST BE INSPECTED DAILY FOR SPILLAGE, DUST, OR OTHER SITE RELATED IMPACTS. ANY IMPACTS MUST BE APPROPRIATELY REMEDIATED AS DIRECTED BY THE ENGINEER.
6. MAINTAIN CONTINUOUS TRAFFIC FLOW ON GROVE STREET OUTSIDE THE PROJECT AREA.
7. PERMANENT ROAD CLOSURES ARE NOT AUTHORIZED DURING THE DURATION OF THE REMEDIATION.
8. NEGOTIATE TEMPORARY ROAD CLOSURES WITH THE CITY OF GLEN COVE, IF NECESSARY.
9. PERFORM MAINTENANCE AND PROTECTION OF TRAFFIC IN ACCORDANCE WITH THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS, LATEST EDITION, AND TO THE SATISFACTION OF THE ENGINEER.

B. DIRECTIONS ENTERING THE SITE:

FROM THE NORTH OFF ROUTE 107:	
1.LEFT ON TOWN PATH	0.1 MI
2.TURN RIGHT ON GLEN ST	0.3 MI
3.CONTINUE ONTO CEDAR SWAMP RD	0.2 MI
4.TURN RIGHT ON GROVE ST	0.2 MI
5.TURN RIGHT INTO SITE	

FROM THE SOUTH OFF ROUTE 107:	
1.SLIGHT RIGHT ON CEDAR SWAMP RD	0.4 MI
2.LEFT ON GROVE ST	0.2 MI
3.TURN RIGHT INTO SITE	

C. DIRECTIONS LEAVING THE SITE:

TO POINTS NORTH:	
1.LEFT OUT OF SITE	
2.HEAD EAST ON GROVE ST	0.2 MI
3.TURN LEFT ON CEDAR SWAMP RD	0.2 MI
4.CONTINUE ON GLEN ST	0.3 MI
5.TURN LEFT ON TOWN PATH	0.01 MI
6.MERGE ONTO ROUTE 107	

TO POINTS SOUTH:	
1.LEFT OUT OF SITE	
2.HEAD EAST ON GROVE ST	0.2 MI
3.TURN RIGHT AT CEDAR SWAMP RD	0.4 MI
4.MERGE ONTO ROUTE 107	

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DRAFT

Designed:	ES/HK
Checked:	JP
Drawn:	PHH
Submitted By:	MJO
NY P.E. No.:	091317
Submittal Date:	08/29/2014

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Phase II Remedial Action Work Plan
Glen Cove Former MGP Site
Glen Cove, New York

DWG. NO. 3

TRAFFIC CONTROL PLAN

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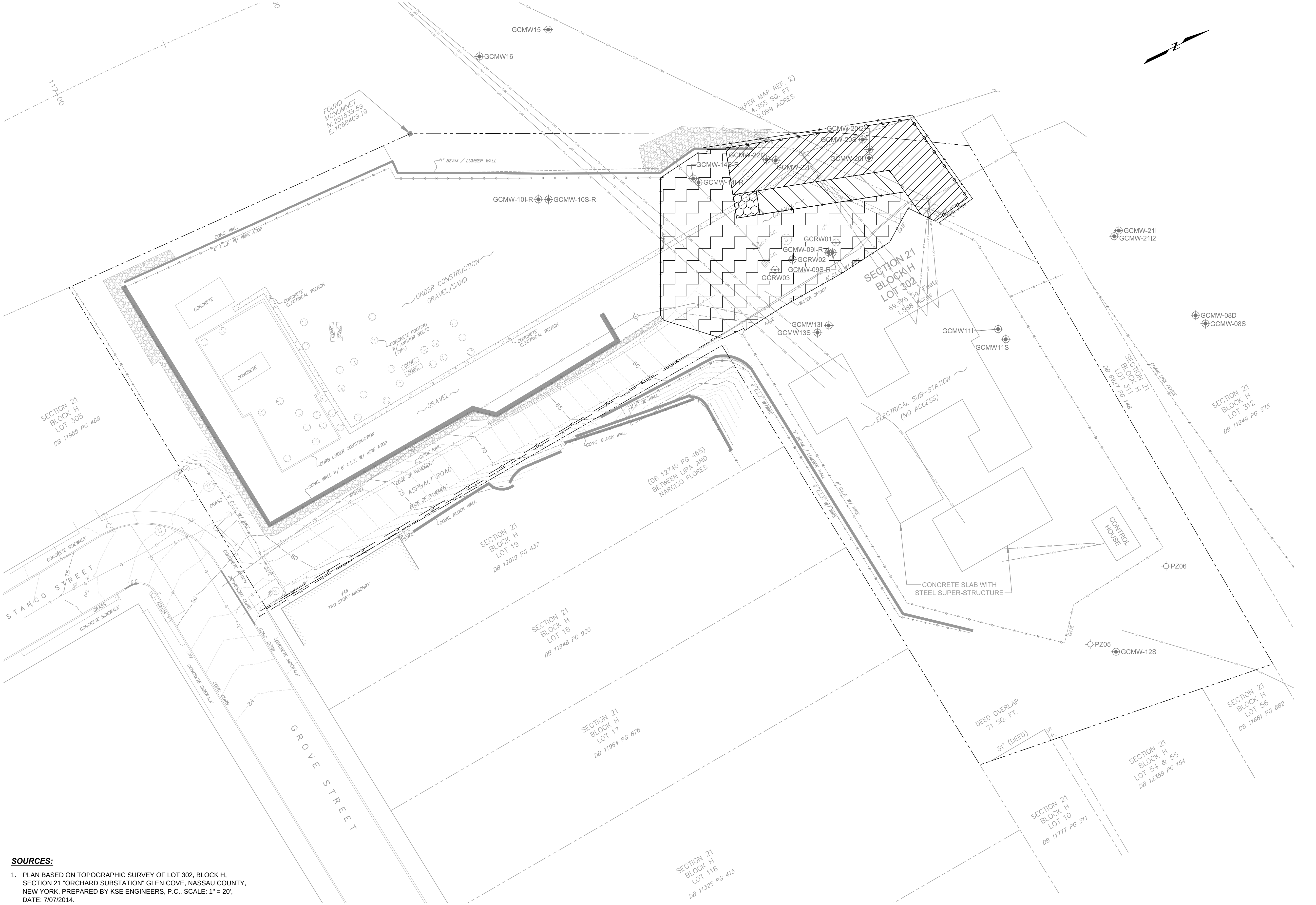

SITE MANAGEMENT LEGEND:

- TEMPORARY FENCE
- SILT FENCE BARRIER SEE DETAIL 1/10
- DECONTAMINATION PAD (ACTUAL SIZE TO BE DETERMINED IN FIELD) SEE DETAIL 2/10
- EXCLUSION ZONE
- CONTAMINATION REDUCTION ZONE
- SUPPORT ZONE

A. SITE MANAGEMENT NOTES:

1. CONTROL GROUNDWATER FLOW AWAY FROM OPEN TRENCHES.
2. CLEAR AND GRUB SITE AS NEEDED TO COMPLETE THE EXCAVATION AND SETUP OF CONTAMINANT REDUCTION AND SUPPORT ZONES.

SOURCES:

1. PLAN BASED ON TOPOGRAPHIC SURVEY OF LOT 302, BLOCK H, SECTION 21 "ORCHARD SUBSTATION" GLEN COVE, NASSAU COUNTY, NEW YORK, PREPARED BY KSE ENGINEERS, P.C., SCALE: 1" = 20', DATE: 7/07/2014.
2. SUBSTATION STRUCTURES ARE NOT TO BE CONSIDERED ACCURATE AND WERE DIGITIZED FROM: *DRAWING NO. 2A: SAMPLE LOCATION MAP,* PREPARED BY PAULUS, SOKOLOWSKI AND SARTOR ENGINEERING, PC, SCALE: 1" = 25', DATE: 6/12/2006.
3. OVERHEAD TRANSMISSION LINES ENTERING SUBSTATION BASED ON *DRAWING F-24646: TRANSMISSION LINE TERMINATION, ORCHARD SUBSTATION,* PREPARED BY NATIONAL GRID ENGINEERING AND SURVEY, INC., SCALE: 1" = 20', REVISION DATE: 10-17-06.

0 20' 40'
SCALE: 1" = 20'

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NY P.E. No.:	091317
Submittal Date:	08/29/2014

GEI Consultants
455 WINDING BROOK DRIVE SUITE 201 GLASTONBURY, CT 06033 (860)368-5300

National Grid
175 East Old Country Road,
Hicksville, NY
nationalgrid

GEI Project 093270

Phase II Remedial Action Work Plan
Glen Cove Former MGP Site
Glen Cove, New York

SITE MANAGEMENT PLAN

DWG. NO. 4

REV 0

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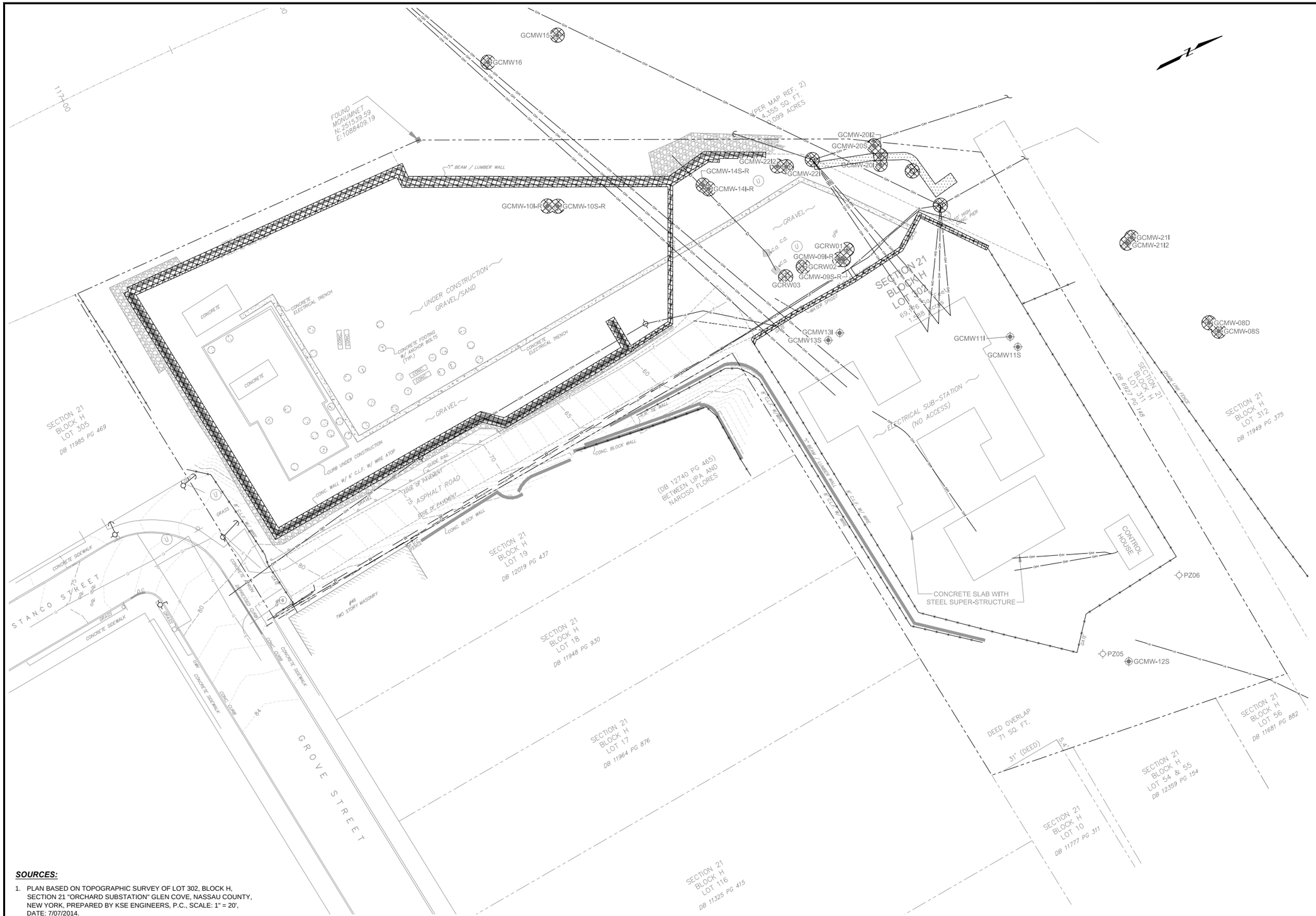

DEMOLITION AND PROTECTION LEGEND:

- EXCAVATION AREA
- PROTECT RETAINING WALLS
- PROTECT SITE FENCE
- PROTECT UTILITY POLES
- PROTECT MONITORING WELLS

A. DEMOLITION AND PROTECTION NOTES:

1. PROTECT SUBSTATION.
2. CLEAR AND GRUB WITHIN SUPPORT ZONE AND CONTAMINATE REDUCTION ZONE AREAS.
3. REMOVE AND DISPOSE OF DEBRIS WITHIN SITE BOUNDARY OFF-SITE.

SOURCES:

1. PLAN BASED ON TOPOGRAPHIC SURVEY OF LOT 302, BLOCK H, SECTION 21 "ORCHARD SUBSTATION" GLEN COVE, NASSAU COUNTY, NEW YORK, PREPARED BY KSE ENGINEERS, P.C., SCALE: 1" = 20', DATE: 7/07/2014.
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3. OVERHEAD TRANSMISSION LINES ENTERING SUBSTATION BASED ON *DRAWING F-24646: TRANSMISSION LINE TERMINATION, ORCHARD SUBSTATION,* PREPARED BY NATIONAL GRID ENGINEERING AND SURVEY, INC., SCALE: 1" = 20', REVISION DATE: 10-17-06.

SCALE: 1" = 20'

Attention:

0 1"

If this scale bar does not measure 1" then drawing is not original scale.

NO.	DATE	ISSUE/REVISION	APP
0	08/29/14	ISSUED FOR REVIEW	MJO

DRAFT

Designed:	ES/HK
Checked:	JP
Drawn:	PHH
Submitted By:	MJO
NY P.E. No.:	091317
Submittal Date:	08/29/2014

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DWG. NO. 5

DEMOLITION AND PROTECTION PLAN

REV 0

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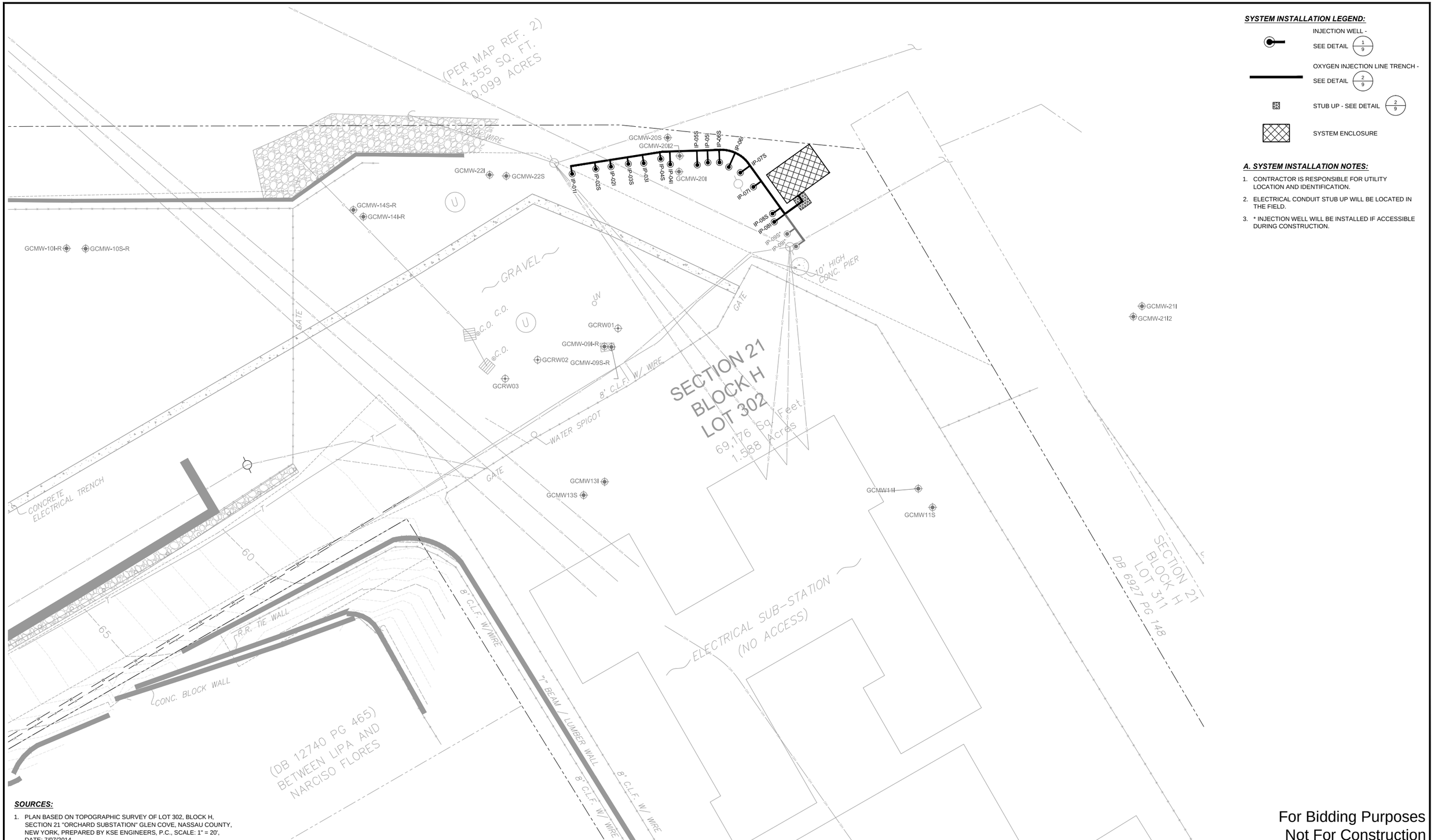

SYSTEM INSTALLATION LEGEND:

- INJECTION WELL - SEE DETAIL 1/9
- OXYGEN INJECTION LINE TRENCH - SEE DETAIL 2/9
- STUB UP - SEE DETAIL 2/9
- SYSTEM ENCLOSURE

A. SYSTEM INSTALLATION NOTES:

1. CONTRACTOR IS RESPONSIBLE FOR UTILITY LOCATION AND IDENTIFICATION.
2. ELECTRICAL CONDUIT STUB UP WILL BE LOCATED IN THE FIELD.
3. * INJECTION WELL WILL BE INSTALLED IF ACCESSIBLE DURING CONSTRUCTION.

SOURCES:

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0 10' 20'
SCALE: 1" = 10'

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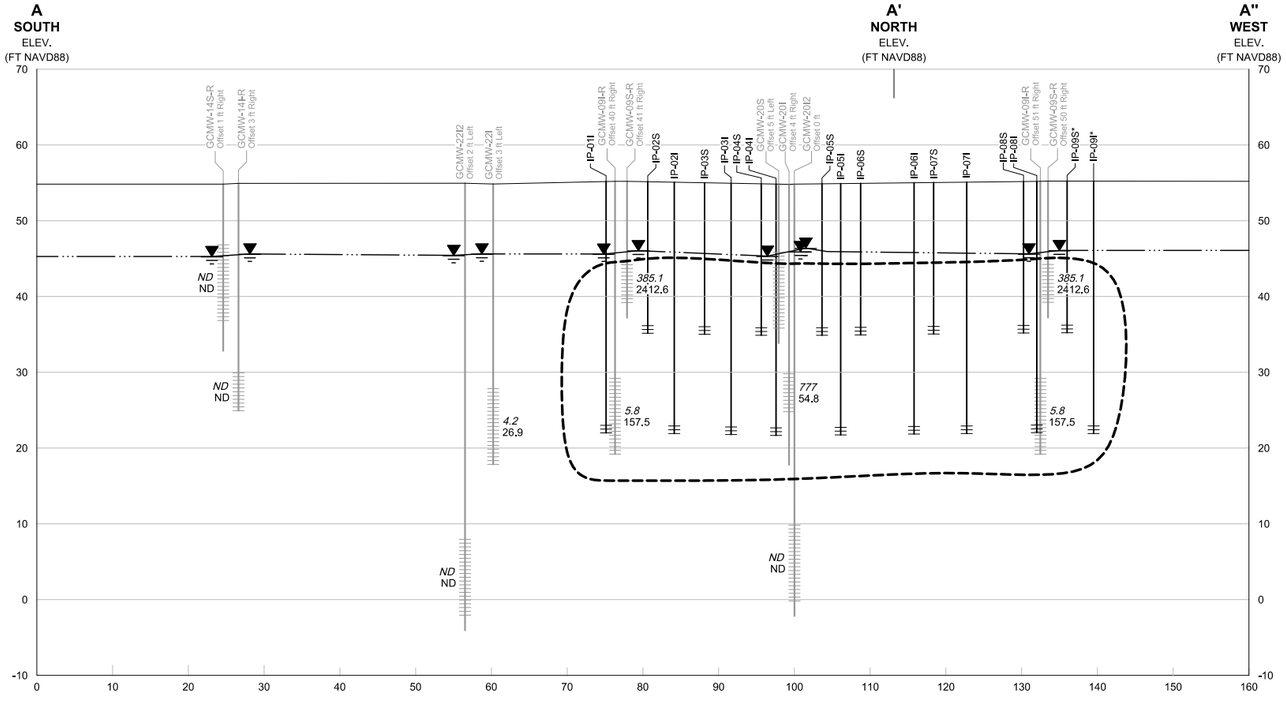
DWG. NO. 6

OXYGEN INJECTION SYSTEM INSTALLATION PLAN

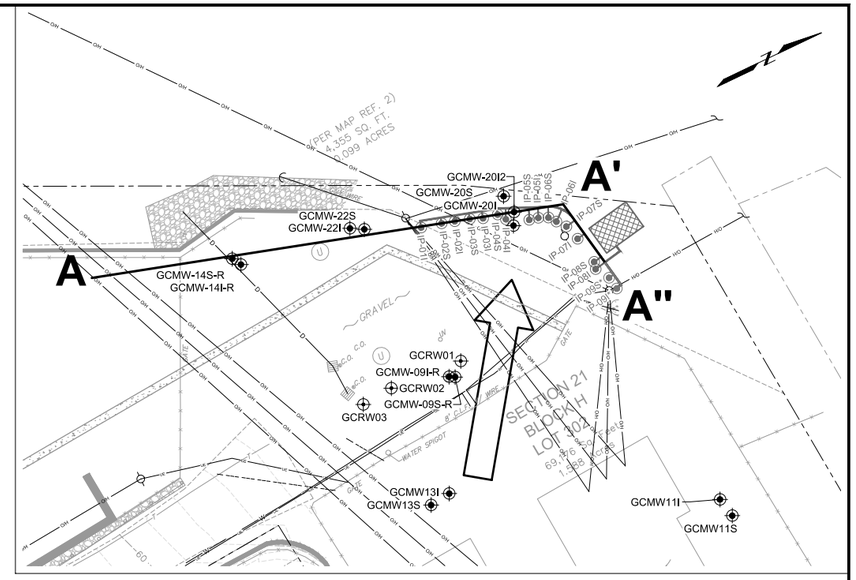
REV 0



HORIZONTAL SCALE: 1" = 10'

VERTICAL SCALE: 1" = 10'

NOTE: NO VERTICAL EXAGGERATION



CROSS SECTION LOCATION

0 40' 80'

SCALE: 1" = 40'

CROSS SECTION LEGEND

- GROUNDWATER FLOW DIRECTION (FEBRUARY 2014)
- GCMW-11I Offset 0 ft — MONITORING WELL ID AND OFFSET DISTANCE/ DIRECTION FROM THE CROSS SECTION LINE
- GROUNDWATER LEVEL
- WELL SCREEN INTERVAL
- 3.9 / 162.4 — TOTAL BTEX µg/L / TOTAL PAHs µg/L
- TOTAL PAHs AND/OR BTEX > 100 µg/L
- IP-01S — PROPOSED INJECTION POINT ID
- INJECTION POINT SCREEN

NOTES:

1. GCMW-09S-R AND GCMW-09I-R ARE USED TO REFLECT GROUNDWATER CONDITIONS AT A-A' AS WELL AS THE A'-A" CROSS SECTIONAL AREAS.
2. * INJECTION WELL WILL BE INSTALLED IF ACCESSIBLE DURING CONSTRUCTION

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DWG. NO. 7

SUBSURFACE CROSS SECTION

REV 0

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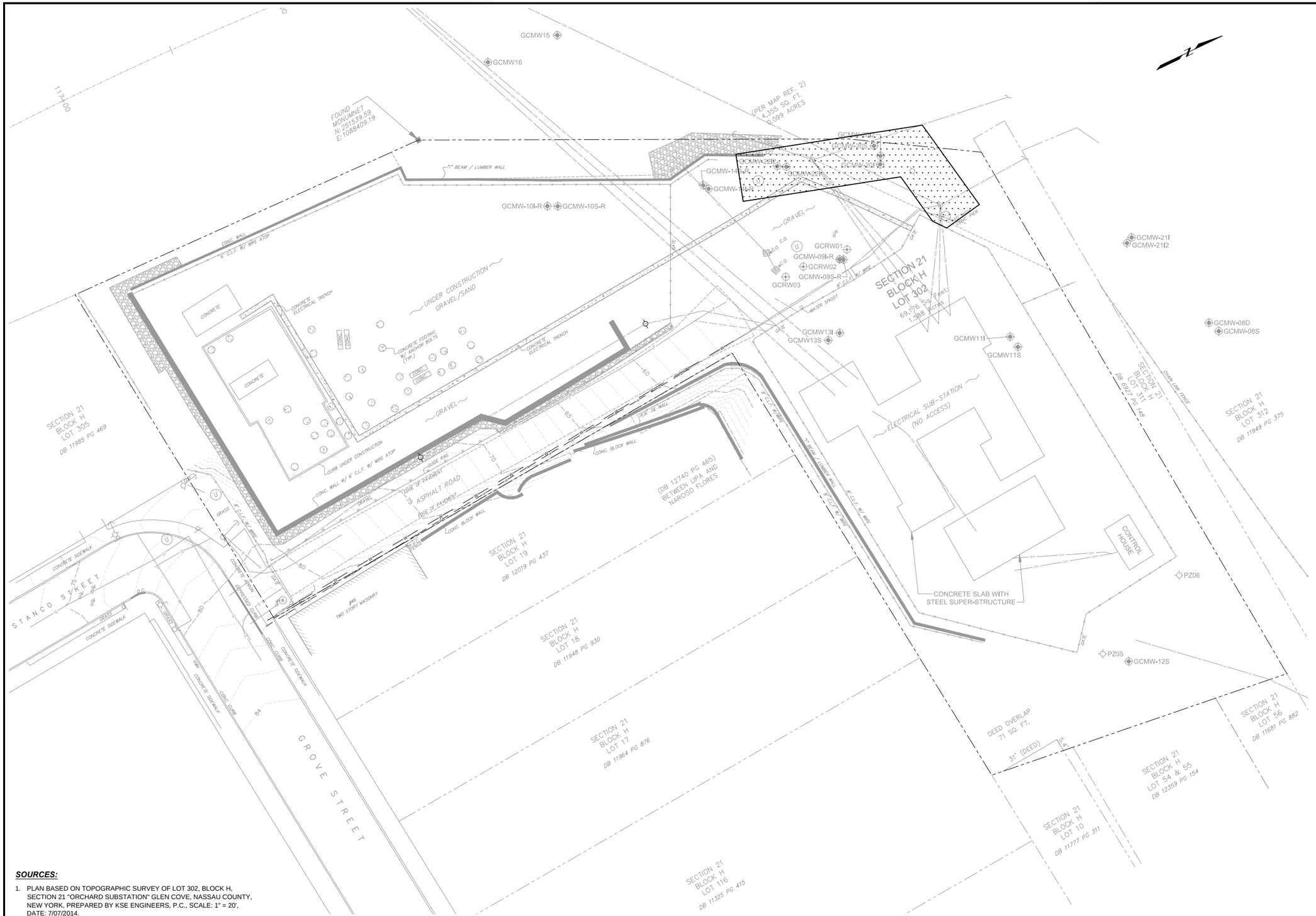

RESTORATION LEGEND:

RESTORE GRAVEL (IF NEEDED)

A. RESTORATION NOTES:

1. MINIMUM RESTORATION LIMITS SHOWN. ACTUAL RESTORATION LIMITS TO BE BASED ON CONTRACTOR'S MEANS AND METHODS. FEATURES NOT REMOVED, DEMOLISHED OR DAMAGED DO NOT NEED TO BE RESTORED.
2. RESTORE THE AREA INSIDE THE PROJECT LIMITS TO THE CONDITIONS SHOWN ON THE PLAN.
3. RESTORE ANY EXISTING FEATURE THAT IS REMOVED, DEMOLISHED, OR DAMAGED TO THE SATISFACTION OF THE ENGINEER.
4. CONSTRUCT NEW FENCE TO MATCH EXISTING PERIMETER FENCE IN HEIGHT, COLOR, AND DESIGN.
5. RESTORE ALL AREAS OUTSIDE PROJECT LIMITS THAT HAVE BEEN DISTURBED BY CONSTRUCTION TO PRE-EXISTING CONDITIONS
6. LEAVE SILT FENCE ON-SITE, REPAIR ANY DAMAGED AREAS PRIOR TO DEMOBILIZATION.
7. REMOVE TEMPORARY CONSTRUCTION FEATURES (SECURITY CONTROLS, AIR MONITORING EQUIPMENT, ODOR CONTROL EQUIPMENT, DECONTAMINATION EQUIPMENT, ETC.) WHEN NO LONGER NEEDED.
8. REMOVE FIELD OFFICE AND DISCONNECT UTILITIES (ELECTRIC POWER, TELEPHONE, INTERNET SERVICE, ETC.).
9. CLEAR SITE OF CONSTRUCTION DEBRIS AND LEAVE SITE IN A NEAT, ORDERLY CONDITION.

B. RESTORATION SURVEY NOTES:

1. SURVEY THE FOLLOWING:
   - A. FINAL GRADE
   - B. NEW FEATURES
   - C. REPLACED FEATURES
   - D. FINAL EXCAVATION ELEVATION

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DWG. NO. 8

RESTORATION PLAN AND DETAILS

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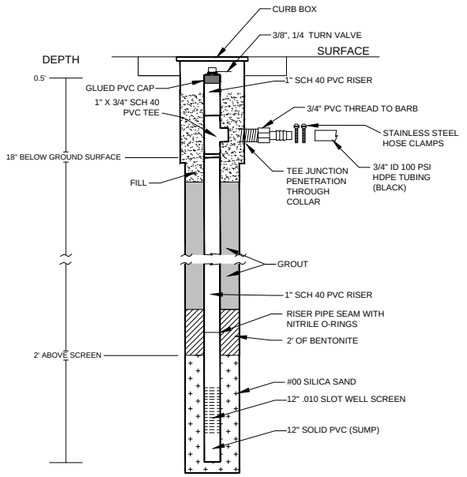
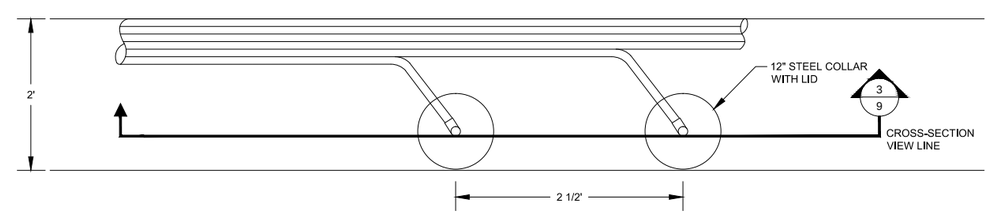


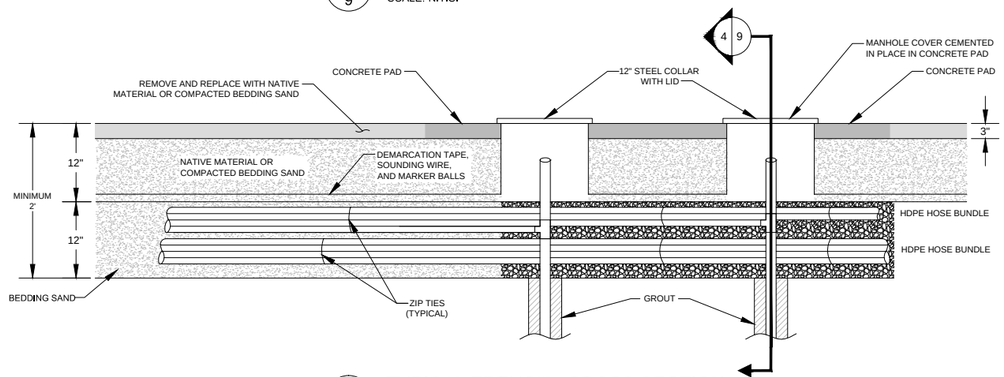
1/9 TYPICAL INJECTION WELL CONSTRUCTION

SCALE: N.T.S.



2/9 TYPICAL TRENCH - PLAN VIEW

SCALE: N.T.S.

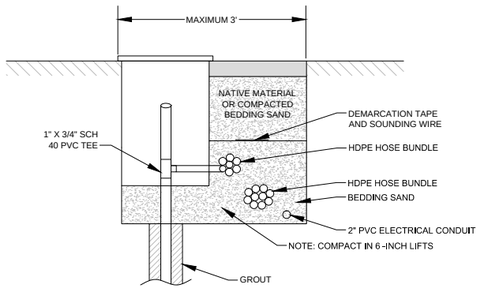


3/9 TYPICAL TRENCH - CROSS SECTION

SCALE: N.T.S.

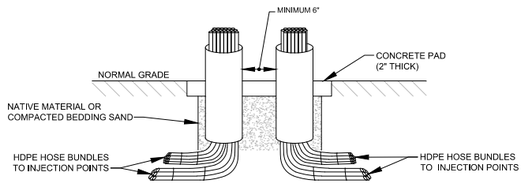
NOTES:

1. UTILITY MARKER BALLS WILL BE INSTALLED EVERY 50 FEET.



4/9 TYPICAL TRENCH DETAIL

SCALE: N.T.S.



5/9 STUB-UP SCHEMATIC

SCALE: N.T.S.

NOTES:

1. SCALE: 1" = 10' EXCEPT PIPE/HOSE SIZE.
2. CONNECTION TO INJECTION POINT SHOULD BE MADE WITH SCH 40 PVC TEE AT A MINIMUM OF 18" BELOW GROUND SURFACE.
3. NATIVE MATERIAL OR BEDDING SAND WILL BE COMPACTED IN 6-INCH LIFTS.
4. EACH HDPE HOSE LINE WILL BE LABELED ACCORDING TO ITS RESPECTIVE INJECTION POINT EVERY TWENTY FEET.

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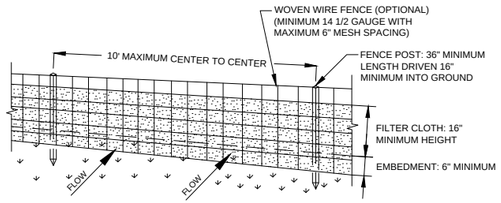
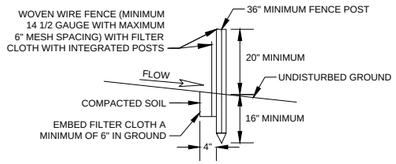
DWG. NO. 9

TRENCH AND INJECTION POINT DETAILS

REV 0



PERSPECTIVE VIEW



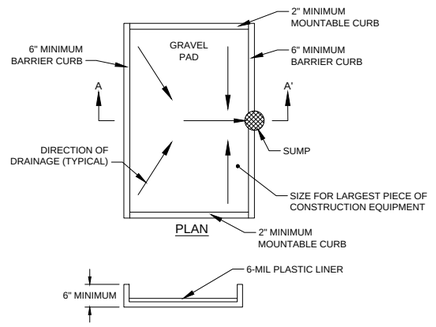
SECTION VIEW

1/10 TYPICAL WOVEN SILT FENCE DETAIL

SCALE: N.T.S.

WOVEN SILT FENCE NOTES:

1. FASTEN WOVEN WIRE FENCE SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES. POSTS SHALL BE STEEL EITHER "T" OR "U" TYPE OR HARDWOOD.
2. FASTEN FILTER CLOTH SECURELY TO WOVEN WIRE FENCE WITH TIES SPACED EVERY 24-INCHES AT TOP AND MID-SECTION. FENCE SHALL BE WOVEN WIRE, 14 1/2 GAUGE, 6-INCH MAXIMUM MESH OPENING.
3. OVERLAP ADJACENT FILTER CLOTH SIX INCHES AND FOLD. FILTER CLOTH SHALL BE EITHER FILTER X, MIRAFI 100X, STABILINKA T140N, OR APPROVED EQUIVALENT.
4. PREFABRICATED UNITS SHALL BE GEOFAB, ENVIROFENCE, OR APPROVED EQUIVALENT.
5. PERFORM MAINTENANCE AS NEEDED AND REMOVE MATERIAL WHEN "BULGES" DEVELOP.
6. FILTER FABRIC WITH INTEGRATED STAKES MAY BE USED INSTEAD OF WIRE FENCE.



PLAN

2/10 TYPICAL EQUIPMENT DECONTAMINATION PAD

SCALE: N.T.S.

DECONTAMINATION NOTES:

1. ALL VEHICLES EXITING EXCLUSION ZONE MUST PASS THROUGH THE CONTAMINANT REDUCTION ZONE. USE EQUIPMENT DECONTAMINATION PAD AS REQUIRED BY ENGINEER AND NYSDEC. CONTROL OVER SPRAY.
2. WATER MUST BE REMOVED FROM PAD ON A DAILY BASIS AT A MINIMUM AND COVERED AT THE END OF WORK FOR THAT DAY.

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SITE MANAGEMENT DETAILS

DWG. NO. 10

REV 0

Attachment B

Freshwater Wetlands Permit ID 1-2805-00199/00001 and Modification 1

PERMIT
Under the Environmental Conservation Law (ECL)

Permittee and Facility Information

Permit Issued To:
LONG ISLAND POWER AUTHORITY
333 EARLE OVINGTON BLVD STE 403
UNIONDALE, NY 11553
(516) 222-7700

Facility:
ORCHARD SUBSTATION
GROVE ST|NCTM 21-H-302
GLEN COVE, NY 11542

Facility Application Contact:
GEI CONSULTANTS INC
1239 RTE 25A STE 1
STONY BROOK, NY 11790
(631) 751-4600

Facility Location: in GLEN COVE in NASSAU COUNTY **Village:** GLEN COVE
Facility Principal Reference Point: NYTM-E: 616.05 NYTM-N: 4523.763
Latitude: 40°51'24.2" Longitude: 73°37'23.2"

Authorized Activity: Construct a vegetated swale with associated piping, catch basin, leaching rings and stilling basin, and install retaining walls and other structures and equipment associated with the expansion of the substation. All work must be done in accordance with the attached plans prepared by National Grid Engineering & Surveying Inc. dated 10/21/10, and drawing S1 prepared by GEI Consultants last revised 9/19/12, all stamped NYSDEC Approved on 9/21/12.

Permit Authorizations

Freshwater Wetlands - Under Article 24
Permit ID 1-2805-00199/00001
New Permit Effective Date: 9/21/2012 Expiration Date: 9/20/2017

NYSDEC Approval

By acceptance of this permit, the permittee agrees that the permit is contingent upon strict compliance with the ECL, all applicable regulations, and all conditions included as part of this permit.

Permit Administrator: ROGER EVANS, Regional Permit Administrator
Address: NYSDEC REGION 1 HEADQUARTERS
SUNY @ STONY BROOK|50 CIRCLE RD
STONY BROOK, NY 11790 -3409

Authorized Signature: _____ Date ___/____/____

Distribution List

GEI CONSULTANTS INC
Habitat
KEVIN A KISPERT

Permit Components

NATURAL RESOURCE PERMIT CONDITIONS

GENERAL CONDITIONS, APPLY TO ALL AUTHORIZED PERMITS

NOTIFICATION OF OTHER PERMITTEE OBLIGATIONS

Permit Attachments

Site Plan 9/19/2012

NATURAL RESOURCE PERMIT CONDITIONS - Apply to the Following Permits: FRESHWATER WETLANDS

1. **Conformance With Plans** All activities authorized by this permit must be in strict conformance with the approved plans submitted by the applicant or applicant's agent as part of the permit application. Such approved plans were prepared by National Grid Engineering & Surveying Inc. dated 10/21/10, and drawing S1 prepared by GEI Consultants last revised 9/19/12, all stamped NYSDEC Approved on 9/21/12.

2. **Crossview of Leaching Basins** A cross view of the proposed leaching basins that shows the dimensions of the structural components, the size of the drainage area and the capacity of the stormwater system, and the separation distance between the components and groundwater must be provided for Region 1 Bureau of Habitat staff review and approval. Plans of appropriate scale can be provided via e-mail to the following address: kajennin@gw.dec.state.ny.us

The permit holder must receive written approval of the cross view prior to installation of the leaching basins.

3. **Notice of Commencement** At least 48 hours prior to commencement of the project, the permittee and contractor shall sign and return the top portion of the enclosed notification form certifying that they are fully aware of and understand all terms and conditions of this permit. Within 30 days of completion of project, the bottom portion of the form must also be signed and returned, along with photographs of the completed work.

4. Post Permit Sign The permit sign enclosed with this permit shall be posted in a conspicuous location on the worksite and adequately protected from the weather.

5. Area Limits The limits of clearing, grading and ground disturbance line is equal to the proposed silt fence line located west of the proposed swale, as shown on the approved plans.

6. Work Area Limits Any work, disturbance, and or storage of construction materials shall be confined to the area within the limits of clearing, grading and ground disturbance defined above.

7. Equipment Storage 100' from Wetland, Water Body All equipment and machinery shall be stored and safely contained greater than 100 feet landward of the regulated wetland or water body at the end of each work day. This will serve to avoid the inadvertent leakage of deleterious substances into the regulated area.

8. Materials Disposed at Upland Site Any demolition debris, excess construction materials, and/or excess excavated materials shall be immediately and completely disposed of on an approved upland site more than 100 feet from any regulated freshwater wetland. These materials shall be suitably stabilized so as not to re-enter any water body, wetland, or wetland adjacent area.

9. Silt Screen Prior to commencement of any construction activities, a continuous line of silt screen (maximum opening size of U.S. Sieve #20) shall be staked along the silt fence line a shown on the approved plans.

10. Silt Screen to Be Recessed Silt screen shall be recessed six inches into the ground.

11. Maintain Silt Screen The screen shall be maintained, repaired and replaced as often as necessary to ensure proper function, until all disturbed areas are permanently vegetated. Sediments trapped by the screen shall be removed to an approved upland location before the screen is removed.

12. Swale Excavation A National Grid consultant will be on-site during swale excavation. If contaminated material is encountered the material will be handled according to the NYSDEC-approved remedial action work plan. If contaminated material is found at the bottom of the swale excavation, additional material must be removed to a depth of 6” below proposed grade, disposed of appropriately, and clean sand/soil must be used to backfill the swale to meet the proposed grade.

13. Clean Fill Only All fill shall consist of clean soil, sand and/or gravel that is free of the following substances: asphalt, slag, flyash, broken concrete, demolition debris, garbage, household refuse, tires, woody materials including tree or landscape debris, and metal objects. The introduction of materials toxic to aquatic life is expressly prohibited.

14. Stormwater Management Stormwater on site must be directed to the proposed stormwater management system (Vortechs unit, leaching rings and vegetated swale) as shown on the approved plans.

15. Area Planting Specifications The proposed swale area shall be planted as follows : as noted on approved plan Drawing "S-1" entitled "Proposed Wet Meadow Concept", and as in Special Condition # 16 "2 Year Plant Survival".

16. 2 Year Plant Survival All plantings shown on the drawings made a part of this permit must survive for a minimum of two growing seasons. If mortality exceeds ten percent, or bare areas occur, dead plants must be replaced.

17. Seed, Mulch Disturbed Areas All areas of soil disturbance resulting from this project shall be seeded with an appropriate perennial grass, and mulched with straw immediately upon completion of the project, within two days of final grading, or by the expiration of the permit, whichever is first.

18. Minimum % Vegetative Cover Suitable vegetative cover is defined as a minimum of 85 % area vegetative cover with contiguous unvegetated areas no larger than 1 square foot in size.

19. State Not Liable for Damage The State of New York shall in no case be liable for any damage or injury to the structure or work herein authorized which may be caused by or result from future operations undertaken by the State for the conservation or improvement of navigation, or for other purposes, and no claim or right to compensation shall accrue from any such damage.

20. State May Order Removal or Alteration of Work If future operations by the State of New York require an alteration in the position of the structure or work herein authorized, or if, in the opinion of the Department of Environmental Conservation it shall cause unreasonable obstruction to the free navigation of said waters or flood flows or endanger the health, safety or welfare of the people of the State, or cause loss or destruction of the natural resources of the State, the owner may be ordered by the Department to remove or alter the structural work, obstructions, or hazards caused thereby without expense to the State, and if, upon the expiration or revocation of this permit, the structure, fill, excavation, or other modification of the watercourse hereby authorized shall not be completed, the owners, shall, without expense to the State, and to such extent and in such time and manner as the Department of Environmental Conservation may require, remove all or any portion of the uncompleted structure or fill and restore to its former condition the navigable and flood capacity of the watercourse. No claim shall be made against the State of New York on account of any such removal or alteration.

21. State May Require Site Restoration If upon the expiration or revocation of this permit, the project hereby authorized has not been completed, the applicant shall, without expense to the State, and to such extent and in such time and manner as the Department of Environmental Conservation may lawfully require, remove all or any portion of the uncompleted structure or fill and restore the site to its former condition. No claim shall be made against the State of New York on account of any such removal or alteration.

22. Precautions Against Contamination of Waters All necessary precautions shall be taken to preclude contamination of any wetland or waterway by suspended solids, sediments, fuels, solvents, lubricants, epoxy coatings, paints, concrete, leachate or any other environmentally deleterious materials associated with the project.

GENERAL CONDITIONS - Apply to ALL Authorized Permits:

1. Facility Inspection by The Department The permitted site or facility, including relevant records, is subject to inspection at reasonable hours and intervals by an authorized representative of the Department of Environmental Conservation (the Department) to determine whether the permittee is complying with this permit and the ECL. Such representative may order the work suspended pursuant to ECL 71- 0301 and SAPA 401(3).

The permittee shall provide a person to accompany the Department's representative during an inspection to the permit area when requested by the Department.

A copy of this permit, including all referenced maps, drawings and special conditions, must be available for inspection by the Department at all times at the project site or facility. Failure to produce a copy of the permit upon request by a Department representative is a violation of this permit.

2. Relationship of this Permit to Other Department Orders and Determinations Unless expressly provided for by the Department, issuance of this permit does not modify, supersede or rescind any order or determination previously issued by the Department or any of the terms, conditions or requirements contained in such order or determination.

3. Applications For Permit Renewals, Modifications or Transfers The permittee must submit a separate written application to the Department for permit renewal, modification or transfer of this permit. Such application must include any forms or supplemental information the Department requires. Any renewal, modification or transfer granted by the Department must be in writing. Submission of applications for permit renewal, modification or transfer are to be submitted to:

Regional Permit Administrator
NYSDEC REGION 1 HEADQUARTERS
SUNY @ STONY BROOK|50 CIRCLE RD
STONY BROOK, NY11790 -3409

4. Submission of Renewal Application The permittee must submit a renewal application at least 30 days before permit expiration for the following permit authorizations: Freshwater Wetlands.

5. Permit Modifications, Suspensions and Revocations by the Department The Department reserves the right to exercise all available authority to modify, suspend or revoke this permit. The grounds for modification, suspension or revocation include:

a. materially false or inaccurate statements in the permit application or supporting papers;

b. failure by the permittee to comply with any terms or conditions of the permit;

c. exceeding the scope of the project as described in the permit application;

d. newly discovered material information or a material change in environmental conditions, relevant technology or applicable law or regulations since the issuance of the existing permit;

e. noncompliance with previously issued permit conditions, orders of the commissioner, any provisions of the Environmental Conservation Law or regulations of the Department related to the permitted activity.

6. Permit Transfer Permits are transferrable unless specifically prohibited by statute, regulation or another permit condition. Applications for permit transfer should be submitted prior to actual transfer of ownership.

NOTIFICATION OF OTHER PERMITTEE OBLIGATIONS

Item A: Permittee Accepts Legal Responsibility and Agrees to Indemnification
The permittee, excepting state or federal agencies, expressly agrees to indemnify and hold harmless the Department of Environmental Conservation of the State of New York, its representatives, employees, and agents ("DEC") for all claims, suits, actions, and damages, to the extent attributable to the permittee's acts or omissions in connection with the permittee's undertaking of activities in connection with, or operation and maintenance of, the facility or facilities authorized by the permit whether in compliance or not in compliance with the terms and conditions of the permit. This indemnification does not extend to any claims, suits, actions, or damages to the extent attributable to DEC's own negligent or intentional acts or omissions, or to any claims, suits, or actions naming the DEC and arising under Article 78 of the New York Civil Practice Laws and Rules or any citizen suit or civil rights provision under federal or state laws.

Item B: Permittee's Contractors to Comply with Permit
The permittee is responsible for informing its independent contractors, employees, agents and assigns of their responsibility to comply with this permit, including all special conditions while acting as the permittee's agent with respect to the permitted activities, and such persons shall be subject to the same sanctions for violations of the Environmental Conservation Law as those prescribed for the permittee.

Item C: Permittee Responsible for Obtaining Other Required Permits
The permittee is responsible for obtaining any other permits, approvals, lands, easements and rights-of-way that may be required to carry out the activities that are authorized by this permit.

Item D: No Right to Trespass or Interfere with Riparian Rights
This permit does not convey to the permittee any right to trespass upon the lands or interfere with the riparian rights of others in order to perform the permitted work nor does it authorize the impairment of any rights, title, or interest in real or personal property held or vested in a person not a party to the permit.

New York State Department of Environmental Conservation
Division of Environmental Permits, Region 1
SUNY @ Stony Brook
50 Circle Road, Stony Brook, NY 11790-3409
Phone: (631) 444-0365 • **Fax:** (631) 444-0360
Website: www.dec.ny.gov

Joe Martens
Commissioner

PERMIT MODIFICATION

October 10, 2012

Long Island Power Authority
c/o National Grid
Environmental Management South
175 E. Old Country Road
Hicksville, NY 11801
Attn: Adam Yablonsky

Re: NYSDEC Permit # 1-2805-00199/00001
Orchard Substation, Glen Cove
Substation Expansion – Roll-off Container

Dear Permittee:

The Department of Environmental Conservation (DEC) has reviewed your request to modify the above referenced permit in accordance with the Uniform Procedures Regulations (6NYCRR Part 621). It has been determined that the proposed modifications will not substantially change the scope of the permitted actions or the existing permit conditions. Therefore, the permit is hereby modified to authorize temporary placement of a lined Roll-off container to contain excavated material as shown on the attached plan drawing No. S1 prepared by GEI Consultants, last revised 10/4/12, stamped "NYSDEC Approved" on 10/10/12.

The following additional special condition applies.

1. **Container Storage:** The Roll-off container may be stored within 100' of the regulated wetland, within the limit of clearing and ground disturbance (LCGD), provided that the container is lined, and is covered at all times when not in use. Suitable sediment control barriers must remain in place between the container and the creek at all times.

This letter is a modification to the original permit and must be available at the job site whenever authorized work is in progress.

All other terms and conditions remain as written in the original permit.

Sincerely,

Roger Evans
Regional Permit Administrator

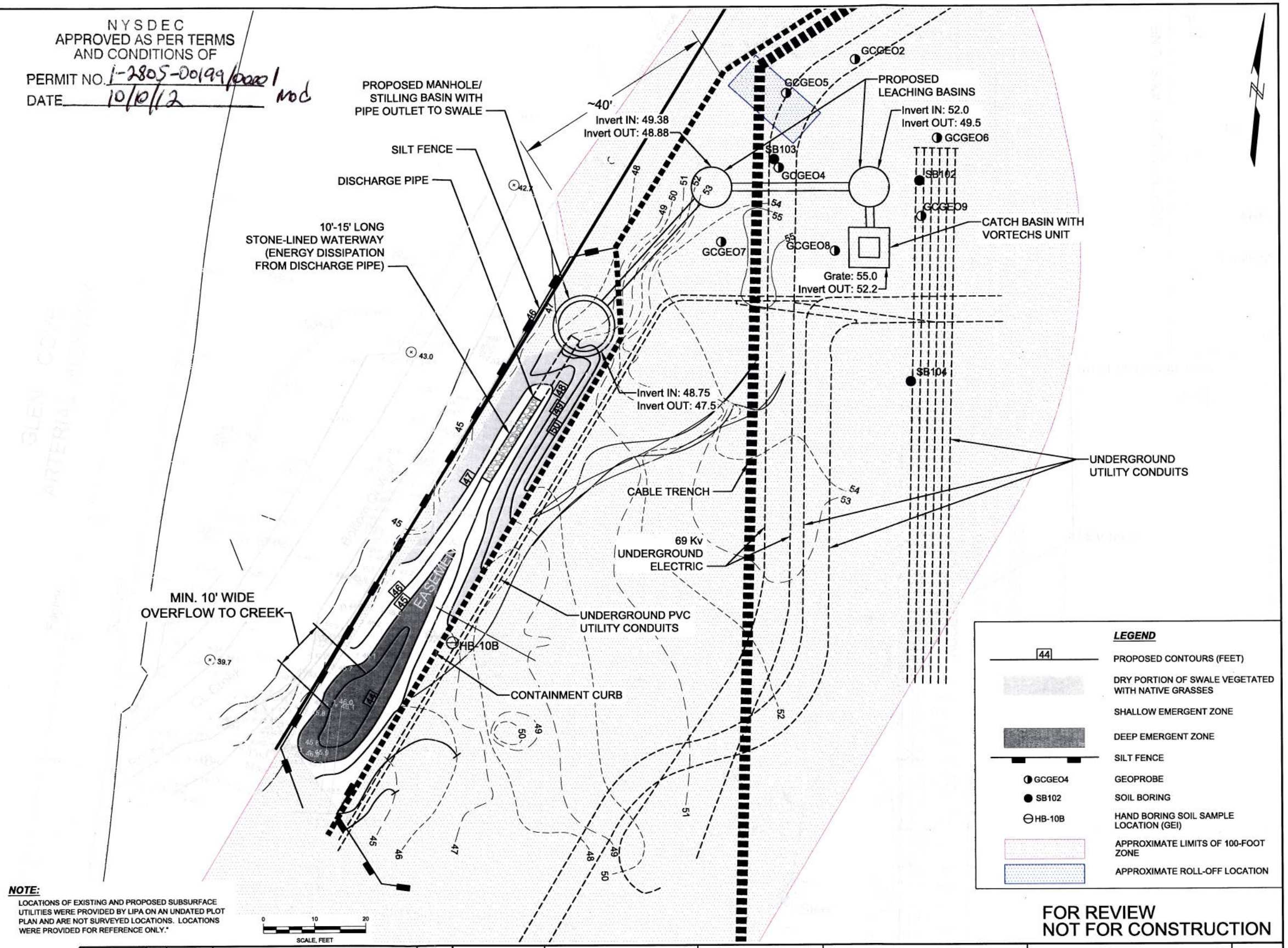
KAK/File
cc: Habitat
M. Billerman, GEI

ORCHARD SUBSTATION DRY/WET SWALE MITIGATION
PLANT SCHEDULE

Abv.	Botanical Name	Common Name	Size	Cont.	Spacing	Planting Zone
Acr	*Acer rubrum*	Red maple	4-5'	#2 Cont.	As Shown	Dry Swale
Anv	*Andropogon virginicus*	Broom Sedge	Min. 5 stems	2" Peat Pot	1' o.c.	Dry Swale
Asi	*Asclepias incarnata*	Swamp milkweed	Min. 5 stems	2" Peat Pot	1' o.c.	Shallow emergent
Ana	*Aster novae-angliae*	New England Aster	Min. 5 stems	2" Peat Pot	1' o.c.	Dry Swale
Cal	*Carex lacustris*	Lake sedge	Min. 5 stems	2" Peat Pot	1' o.c.	Deep emergent
Cla	*Carex languinosa*	Wooly Sedge	Min. 5 stems	2" Peat Pot	1' o.c.	Shallow emergent
Cre	*Carex retrosa*	Retrorse Sedge	Min. 5 stems	2" Peat Pot	1' o.c.	Shallow Emergent
Cst	*Carex stricta*	Tussock Sedge	Min. 5 stems	2" Peat Pot	1' o.c.	Shallow Emergent
Cvu	*Carex vulpinoidea*	Fox Sedge	Min. 5 stems	2" Peat Pot	1' o.c.	Shallow Emergent
Ca	*Clethra alnifolia*	Sweet pepperbush	2-3'	#1 Cont.	4' o.c.	Dry Swale
Cam	*Cornus amomum*	Silky Dogwood	2-3'	#1 Cont.	4' o.c.	Dry Swale
Cse	*Cornus sericea*	Red-osier Dogwood	2-3'	#1 Cont.	4' o.c.	Dry Swale
Gst	*Glyceria striata*	Fowl Managrass	Min. 5 stems	2" Peat Pot	1' o.c.	Shallow Emergent
Ig	*Ilex glabra*	Inkberry	2-3'	#1 Cont.	4' o.c.	Dry Swale
Jef	*Juncus effusus*	Soft Rush	Min. 5 stems	2" Peat Pot	1' o.c.	Deep Emergent
Jte	*Juncus tenuis*	Slender Rush	Min. 5 stems	2" Peat Pot	1' o.c.	Shallow Emergent
Mp	*Myrica pensylvanica*	Bayberry	2-3'	#1 Cont.	4' o.c.	Dry Swale
Ns	*Nyssa sylvatica*	Black gum	4-5'	#2 Cont.	As Shown	Dry Swale
Pav	*Panicum virgatum*	Switchgrass	Min. 5 stems	2" Peat Pot	1' o.c.	Dry Swale
Phy	*Polygonum hydropiperoides*	Mild Water Pepper	Min. 5 stems	2" Peat Pot	1' o.c.	Deep Emergent
Pop	*Polygonum pensylvanicum*	Pennsylvania Smartweed	Min. 5 stems	2" Peat Pot	1' o.c.	Shallow Emergent
Ppe	*Polygonum persicaria*	Lady's Thumb	Min. 5 stems	2" Peat Pot	1' o.c.	Deep Emergent
Rp	*Rosa palustris*	Swamp rose	2-3'	#1 Cont.	4' o.c.	Dry Swale
Sc	*Sambucus canadensis*	Elderberry	2-3'	#1 Cont.	4' o.c.	Dry Swale
Sca	*Scirpus acutus*	Hardstem bulrush	Min. 5 stems	2" Peat Pot	2' o.c.	Deep Emergent
Sam	*Scirpus americanus*	Olney's Bulrush	Min. 5 stems	2" Peat Pot	2' o.c.	Shallow Emergent
Scy	*Scirpus cyperinus*	Woolgrass	Min. 5 stems	2" Peat Pot	2' o.c.	Shallow Emergent
Scf	*Scirpus fluviatus*	River Bulrush	Min. 5 stems	2" Peat Pot	2' o.c.	Deep Emergent
Scp	*Scirpus pungens*	Common three square	Min. 5 stems	2" Peat Pot	2' o.c.	Shallow Emergent
Sva	*Scirpus validus*	Softstem bulrush	Min. 5 stems	2" Peat Pot	2' o.c.	Deep Emergent
Spa	*Sparganium americanum*	Eastern Bur-reed	Min. 5 stems	2" Peat Pot	2' o.c.	Shallow Emergent
Tho	*Thuja occidentalis*	Northern White Cedar	6'-10'	B&B, 30" DIA	8' o.c.	Dry Swale
Tya	*Typha angustifolia*	Narrow-leaved cattail	Min. 5 stems	2" Peat Pot	2' o.c.	Deep Emergent
Vc	*Vaccinium corymbosum*	Highbush blueberry	2-3'	#1 Cont.	4' o.c.	Dry Swale
Vde	*Viburnum dentatum*	Arrowood	2-3'	#1 Cont.	4' o.c.	Dry Swale

	SEED MIXTURES	
%	**Botanical Name**	**Common Name**
Seasonally Flooded Wildlife Food Mix ERNMX-128		
20	*Carex vulpinoidea*	Fox Sedge
17	*Panicum clandestinum*	Deertongue
16	*Elymus virginicus*	Virginia Wildrye
15	*Echinochloa crusgalli*	Japanese Millet
15	*Elymus riparius*	Riverbank Wildrye
8	*Panicum virgatum*	Switchgrass
4	*Desmodium canadense*	Showy Ticktrefoil
2	*Scirpus atrovirens*	Green Bulrush
2	*Heliopsis helianthoides*	Oxeye Sunflower
1	*Agrostis perennans*	Autumn Bentgrass
100%		

NYSDEC
APPROVED AS PER TERMS
AND CONDITIONS OF
PERMIT NO. 1-2805-00199/00001 Mod
DATE 10/10/12



LEGEND

- 44 — PROPOSED CONTOURS (FEET)
- DRY PORTION OF SWALE VEGETATED WITH NATIVE GRASSES
- SHALLOW EMERGENT ZONE
- DEEP EMERGENT ZONE
- SILT FENCE
- GCGEO4 — GEOPROBE
- SB102 — SOIL BORING
- HB-10B — HAND BORING SOIL SAMPLE LOCATION (GEI)
- APPROXIMATE LIMITS OF 100-FOOT ZONE
- APPROXIMATE ROLL-OFF LOCATION

NOTE:

LOCATIONS OF EXISTING AND PROPOSED SUBSURFACE UTILITIES WERE PROVIDED BY LIPA ON AN UNDATED PLOT PLAN AND ARE NOT SURVEYED LOCATIONS. LOCATIONS WERE PROVIDED FOR REFERENCE ONLY.*

0 10 20
SCALE, FEET

FOR REVIEW
NOT FOR CONSTRUCTION

Attention:
0 1"
If this scale bar does not measure 1" then drawing is not original scale.

NO.	DATE	ISSUE/REVISION	APP
B	10/04/12	PERMIT MODIFICATION REQUEST	MO
A	9/19/12	REVISED DRAINAGE ALIGNMENT	LS

DRAFT

Designed: CP
Checked: MO
Drawn: SG
Submitted By: LS
NJ P.E. No.: –
Submittal Date: 9/19/12

GEI Consultants
455 WINDING BROOK DRIVE
SUITE 201
GLASTONBURY, CONNECTICUT 06033

nationalgrid

GEI Project 123020

GLEN COVE FORMER MGP SITE
GLEN COVE, NEW YORK

DWG. NO. S1

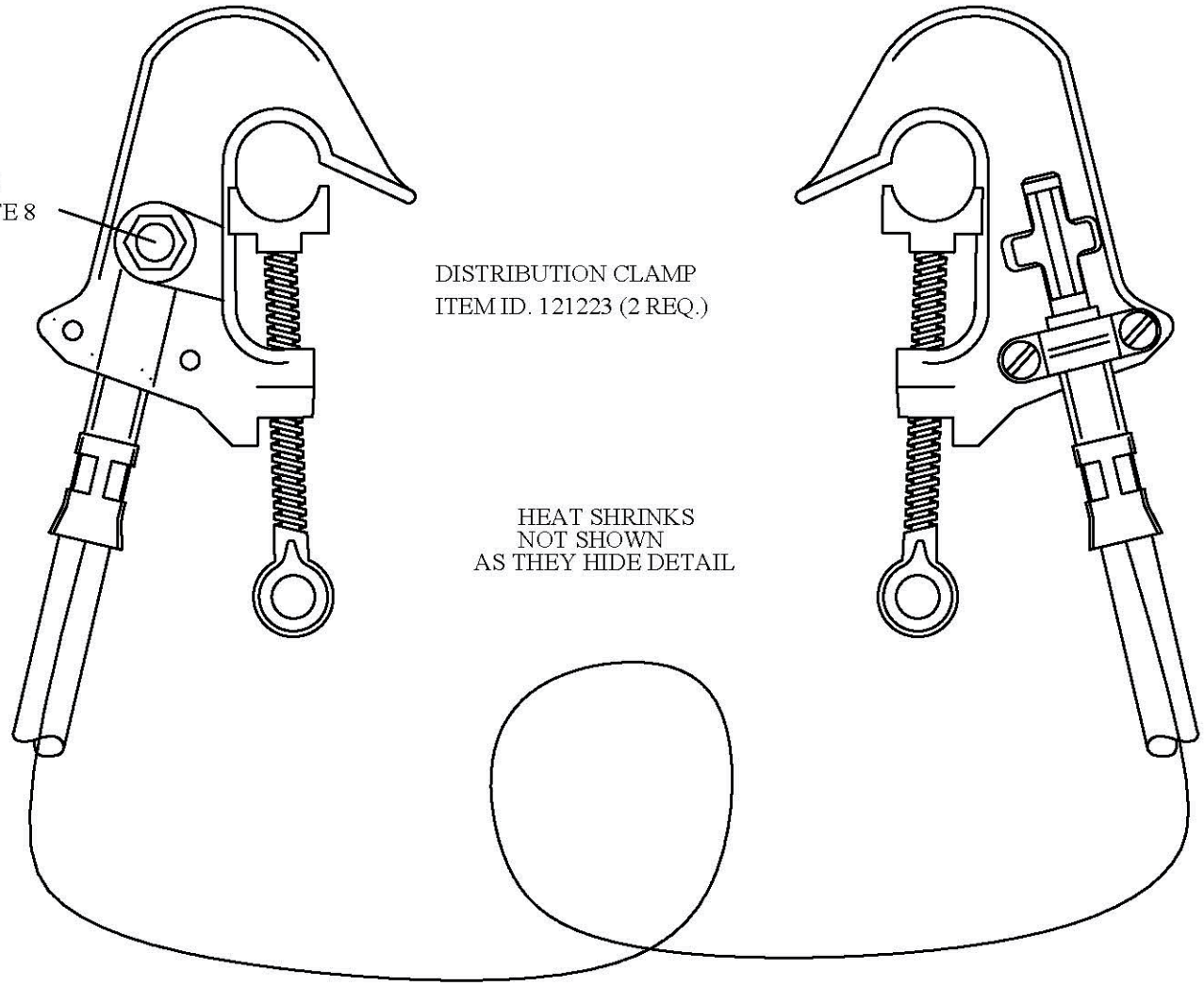
PROPOSED WET MEADOW CONCEPT

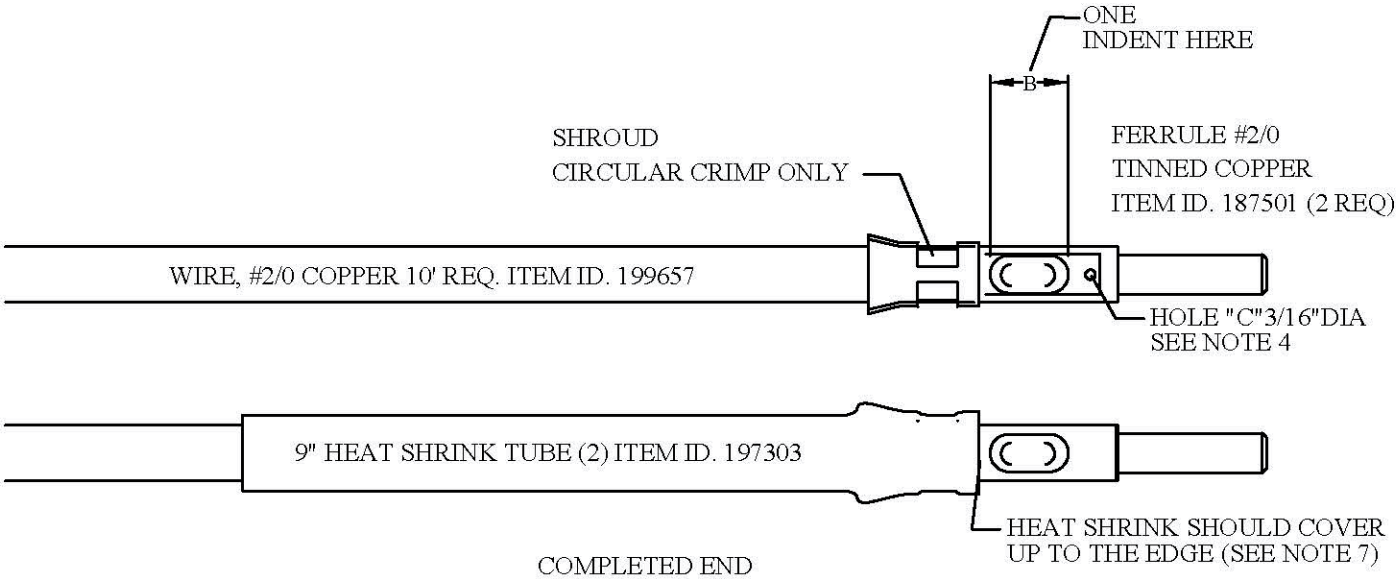
REV B

I:\Project\National Grid\GLEN COVE\123020\Drawings\Glen Cove - Regrading 10-2012

Attachment C

LIPA Safety Documents

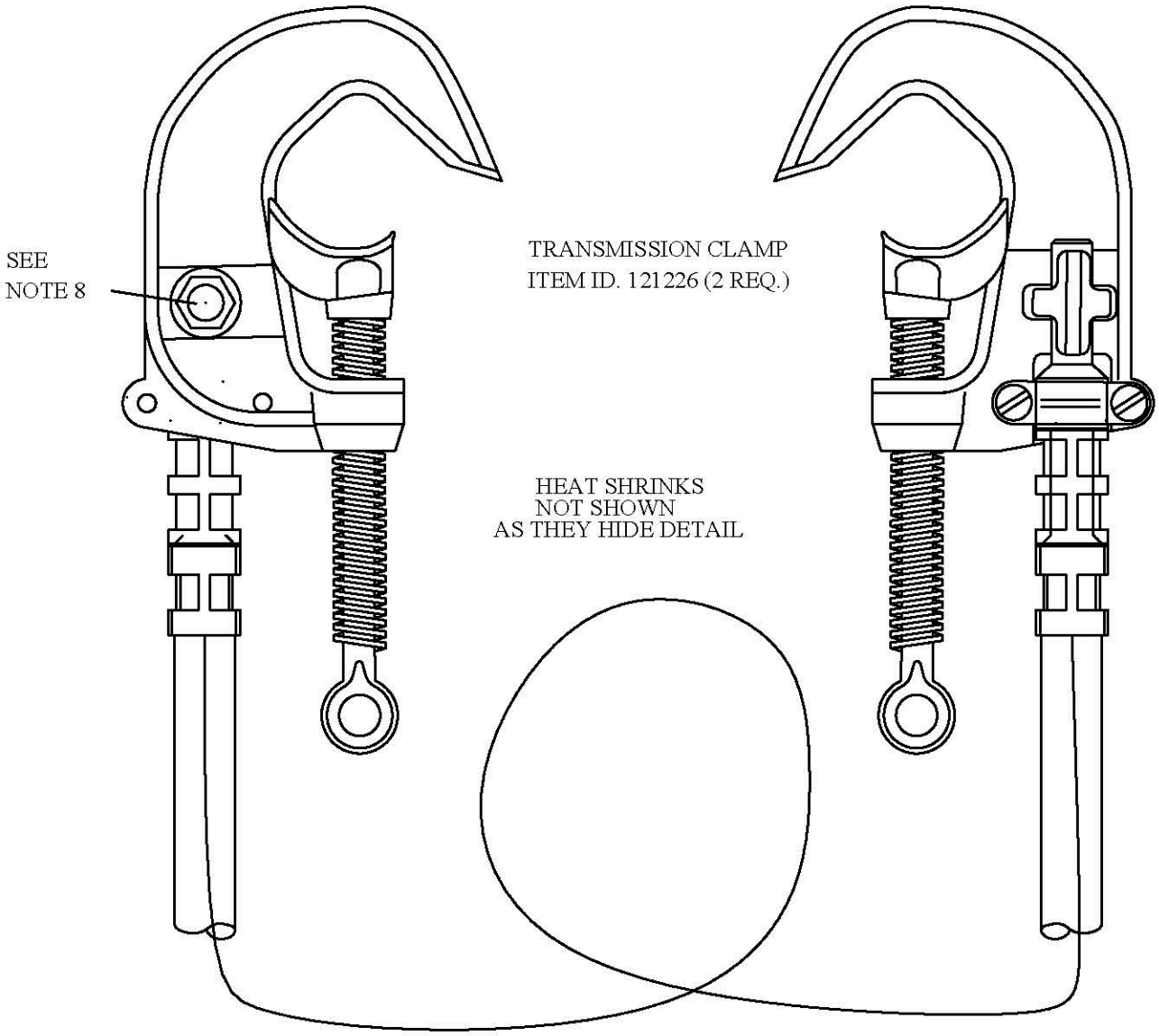


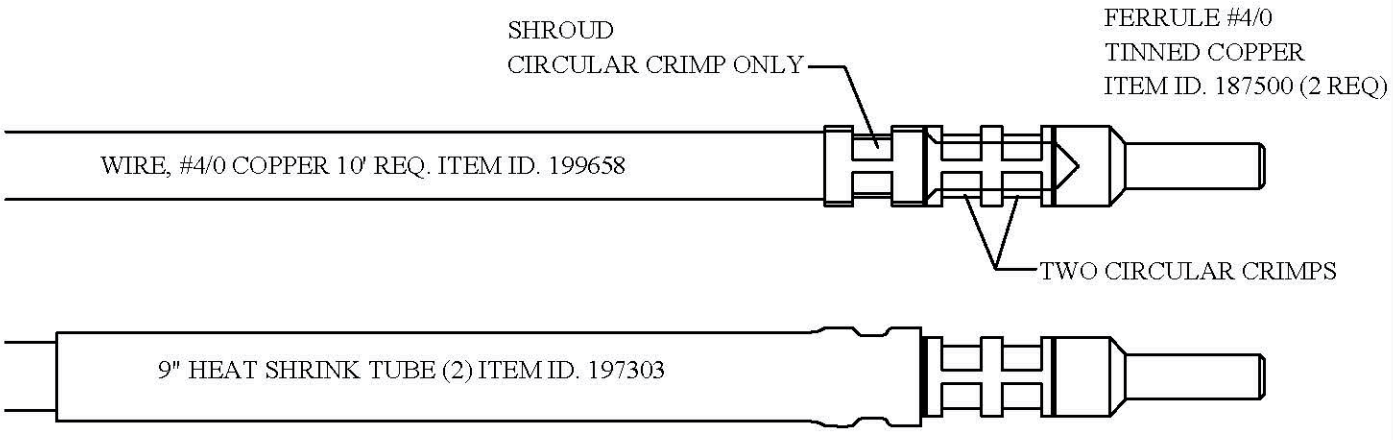


COMPLETED END

SEE SHEET 3 FOR PROCEDURE

APPROVED BY DATE: 09/14/04	REVISION 12. 08/04: GENERAL UPDATE	GROUNDING PRACTICES: GENERAL PORTABLE GROUNDING ASSEMBLIES DISTRIBUTION (#2/0)	CONSTRUCTION STANDARD DRAWN BY AH	
			NUMBER: 3575	SHEET No: 1 of 3
LONG ISLAND POWER AUTHORITY prepared by KeySpan Energy Corporation				REV: 12





COMPLETED END

SEE SHEET 3 FOR PROCEDURE

REVISION		GROUNDING PRACTICES: GENERAL	CONSTRUCTION STANDARD DRAWN BY AH		
	12. 08/04: GENERAL UPDATE	PORTABLE GROUNDING ASSEMBLIES TRANSMISSION (#4/0)	NUMBER	SHEET No	REV
LONG ISLAND POWER AUTHORITY prepared by KeySpan Energy Corporation			3575	2 of 3	12

NOTE: THE TWO CLAMPS FOR ONE ASSEMBLY MUST BE THE SAME.

PROCEDURE

1. CUT CABLE TO 10 FOOT LENGTH.
2. REMOVE NEOPRENE INSULATION AND PAPER SEPARATOR FOR DISTANCE INDICATED IN TABLE I.
3. PENCIL INSULATION FOR A DISTANCE OF 5/16" IF INDICATED IN TABLE I.
4. CHECK HOLE MARKED "C" (IF AVAILABLE) TO BE SURE THAT CONDUCTOR IS SNUG IN FERRULE.
5. APPLY INDENT OR CIRCULAR CRIMP WITH APPROPRIATE TOOL IN SECTION MARKED "B".
6. APPLY CIRCULAR CRIMP ON FERRULE COLLAR.
7. APPLY A 9" LONG HEAT SHRINK TO PROVIDE A SEAL BETWEEN THE FERRULE AND CONDUCTOR CONNECTION. IF HOLE "C" DOES EXIST SOLDER FILL THE HOLE COMPLETELY TO SEAL IT.
8. TORQUE 1/2" HARDWARE TO 25 FOOT POUNDS, AFTER ITEMS HAVE BEEN ASSEMBLIED.

TABLE I

FERRULE SIZE	REMOVE INSULATION	PENCIL LENGTH	TOOL	DIE SECTION "B"	DIE SHROUD
4/0	2"	-	Burndy Y-35	U - L	U - L
2/0	1"	5/16"	Burndy Y-35	U - 658 & Y35P3**	U - 658
			Burndy Y-34A ***	Nest A27D Indent Y34PR - 2	A - 658
			Amp 69099M1 *	46767 - 2 (2/0)	-

*For General Shops Use Only
**Must use 1/2 of each die set to make one indent crimp.
***May not work with ferrules from every manufacturer.

REVISION		GROUNDING PRACTICES: GENERAL	CONSTRUCTION STANDARD DRAWN BY AH		
	12. 08/04: GENERAL UPDATE	PORTABLE GROUNDING ASSEMBLIES #2/0 AND #4/0	NUMBER	SHEET No	REV
LONG ISLAND POWER AUTHORITY prepared by KeySpan Energy Corporation			3575	3 of 3	12

Bulletin

Work Methods

Transmission Grounding

Safety
Truck & Tool
Mat'ls & Stds
Work Methods

This bulletin is directed to both the Electric Design and Construction Department and Electric Service Department Lineworkers.

This bulletin is being issued to establish the policy for use of copper portable grounds on the transmission system within the Long Island T&D area. This bulletin identifies the proper grounds to be used for the various transmission system voltages and defines how bundled transmission conductors shall be grounded.

Bundled Transmission

When work requires the grounding of bundled transmission conductors, both conductors shall be grounded utilizing the guidelines of this bulletin listed under Portable Grounding below. The spacers between the conductors are designed to physically keep the two paralleled conductors at a specified distance apart. These spacers are not intended to carry current or fault current. In addition, some of the newer spacers utilize rubber grommets ensuring that they do not conduct.

Portable Grounding

A review has been conducted by Electric Planning on the maximum fault duties that can be expected on LIPA's 345kV, 138kV, 69kV, 33kV and 23kV systems. These values are based upon planned system configurations through the year 2010. Engineering has reviewed the short circuit capabilities of existing copper portable grounds consisting of either 2/o or 4/o wire sizes built as per CS-3575. The information is based upon a maximum short circuit temperature of 300°C, operating temperature of 35°C and trip time of 200ms. Please reference the table below for values.

As required per the chart below, 1 set of 2/o portable grounds SHALL be used when working on the 23kV system, 2 sets of 2/o portable grounds or 1 set of 4/o portable grounds SHALL be used when working on the 33kV or 345kV systems, 2 sets of 2/o portable grounds SHALL be used when working on the 69kV system and 2 sets of 4/o portable grounds SHALL be used when working on the 138kV systems.

These ratings will be reviewed again at the request of the ED&C Overhead Work Methods Committee in the 2009 – 2010 time period to insure continued application and methodology. Engineering shall also notify Electric Design and Construction and Electric Service if planned system configurations alter these values prior to that time frame.

Maximum Fault Duties

Transmission Voltage	Fault Duties
345 kV	35 kA
138 kV	80 kA
69 kV	55 kA
33 kV	32 kA
23 kV	14 kA

Short Circuit Capabilities

Portable Ground Size	
2/o Cu	27.9 kA
4/o Cu	44.4 kA

Grounding Requirements

Transmission Voltage	Portable Ground Size
345 kV	2 sets of 2/o or 1 set of 4/o
138 kV	2 sets of 4/o
69 kV	2 sets of 2/o
33 kV	2 sets of 2/o or 1 set of 4/o
23 kV	1 set of 2/o

Note: Based on the above ratings, 4/o grounds are no longer suitable for the 69 kV systems. If 2 sets of 2/o grounds are not available then 2 sets of 4/o grounds SHALL be used.

Appendix D

Health and Safety Plan (electronic only)

GEI Consultants

Geotechnical
Environmental and
Water Resources
Engineering

Health and Safety Plan

Glen Cove
Former MGP Site

Town of Oyster Bay
Glen Cove, New York

GEI Consultants, Inc.
110 Walt Whitman Road, Suite 204
Huntington Station, NY 11746
631-760-9300

July 2012
093270

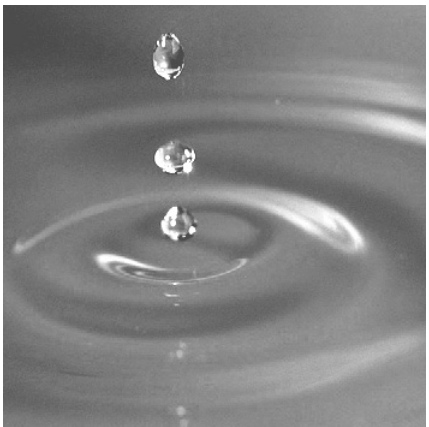


Table of Contents

RECORD OF CHANGE		
Revision	**Date**	**Description**
0	**January 2010**	**Initial Draft**
1	**June 2010**	**Revision**
2	**April 2012**	**Revision. Updated to GEI format.**
3	**July 2012**	**Revision**

Health and Safety Plan

1. Background Information

1.1 General

Engineer GEI Consultants, Inc. (GEI)
110 Walt Whitman Road, Suite 204
Huntington Station, NY 11746

Project Name Glen Cove Former MGP Site
Glen Cove, NY

This Health and Safety Plan (HASP) establishes policies and procedures to protect GEI personnel from the potential hazards posed by the activities at the Glen Cove Former Manufactured Gas Plant (MGP) Site located in Glen Cove, within the Town of Oyster Bay, Nassau County, New York (see **Appendix A** – Site-Specific Information). The site is currently owned by National Grid.

Reading of and adherence to the HASP is required of all onsite GEI personnel. Subcontractors for this project will be required to develop their own HASP for protection of their employees, but at a minimum must adhere to applicable requirements set forth in this HASP. GEI will verify that its subcontractor's HASP includes National Grid's site-specific requirements as outlined in this HASP. Additionally, federal, state and local representatives, as well as National Grid employees may be required to sign and adhere to this HASP for hazard communication purposes only, depending on the nature of their presence onsite during activities conducted by GEI.

The plan identifies measures to minimize accidents and injuries, which may result from project activities, emergencies, or during adverse weather conditions. Activities performed under this HASP will comply with applicable parts of OSHA Regulations, primarily 29 Code of Federal Regulations (CFR) Parts 1910 and 1926, and National Grid policies and procedures.

1.2 Project Description

Activities conducted at the Glen Cove Former MGP Site consist of several tasks. These tasks include:

<u>Mobilization/Demobilization</u>

- Mobilization/Demobilization of Equipment and Supplies
- Establishment of Site Security, Work Zones and Staging Areas

Pre-Construction Activities

- Locate All Utilities to and from the Site
- Locate All Active Utility Lines on Site

Investigation and OM&M Activities

- Installation of Soil Borings, Groundwater Probes, and Monitoring Wells
- Sampling of Groundwater and Soil
- DNAPL Recovery and Gauging
- Groundwater Treatment System Operations and Maintenance

Construction Activities

- Installation of Excavation Support System
- Excavation of Impacted Soils
- Construction Dewatering
- Community Air Monitoring
- Excavation and Trenching
- Groundwater Treatment ~~Injection~~ System Installation

1.3 Site Description

MGP operations at the site began in 1905 under the ownership of the Sea Cliff and Glen Cove Gas Company. The facility's footprint was relatively small and remained unchanged through its operational period, which ended in 1929. Facility structures were located on the northern section of the property, and consisted of a 60,000 cubic foot gas holder, boilers, purifiers, retorts, coal shed, engine room, tar and oil tank, and approximately eight gas tanks. A 40,000 cubic foot high pressure Hortonsphere gas holder was added to the facility in the southwestern portion of the site in 1925 for gas distribution purposes. In 1923, Sea Cliff and Glen Cove Gas Company was purchased or merged with the Long Island Lighting Company (LILCO).

In 1929, LILCO terminated MGP operations and demolished the facility's surface structures sometime thereafter. Site activities following 1929 consisted solely of natural gas storage in the Hortonsphere gas holder through the 1950s. The Hortonsphere was decommissioned and demolished between 1959 and 1966. In 1998, Brooklyn Union Gas (BUG) and LILCO merged to form the KeySpan Corporation, at which time the ownership of the substation was transferred to Long Island Power Authority (LIPA). Currently, the site is owned by LIPA and operated by KeySpan under contract to LIPA as a major electrical substation, which was constructed in the mid-1960s.

In 2007, National Grid acquired responsibility for the former MGP property through the acquisition of KeySpan. Currently, the site is owned by LIPA and operated by National Grid under contract to LIPA. The substation footprint is coincidental with the majority of the main operations area of the former MGP. High voltage transmission lines transverse the

fenced substation area and the west and northwest sections of the site both aerially and below grade.

Through the 2007 acquisition of KeySpan, National Grid has accepted responsibility for addressing the environmental issues at the site. As such, National Grid will be referenced in the performance of all past and future work throughout the remainder of the document.

The Glen Cove Former MGP site is an inverted L-shaped parcel of approximately 1.9 acres presently occupied by an active electrical substation which services Glen Cove and the surrounding area. Topographically, the Site is a flat depression bounded by approximately 20-foot high slopes to the north, south and east.

To the west, the property slopes downward about 17 feet to Glen Cove Creek, a channelized stream, which eventually discharges to Hempstead Bay. The Site is bordered by a health club parking area to the north, with the Long Island Railroad (LIRR) tracks to the northwest, mixed commercial/residential properties to the south and east, and Glen Cove Arterial Highway (Route 107) right-of-way (ROW) to the west. Glen Cove Creek flows in a general south to north direction along the western property line. It approaches the property via a culvert which passes beneath Route 107 and flows along the property line in an open channelized section. The creek leaves the property boundary at the northwest corner of Construction Manager the Site through a box culvert that directs flow beneath the LIRR tracks. The creek eventually discharges to Mosquito Cove (Hempstead Bay).

The Site is located in a flat depression bounded by approximately 20-foot high slopes to the north, south and east. Vehicle access to the Site is limited to a one-lane steeply-graded access road from Grove Street from a residential neighborhood terminating at the flat area in the center of the Site. The active LIPA substation, located on the flat portion of the Site, is an important component of the utility's infrastructure. The substation is fenced, as is access to the wooded western portion of the Site, and access from Grove Street. An easement runs along the north boundary of the property parallel to the health club property terminating to the east at Cedar Swamp Road.

1.4 Hazard/Risk Analysis

1.4.1 Physical Hazards

Physical hazards associated with heavy equipment operations may be present should the need arise to excavate, trench, or install or abandon groundwater monitoring wells, oxygen injection wells, or soil vapor points. These activities would require the use of heavy equipment by subcontractors such as a backhoe or a drill rig, which is associated with, but not limited to, the following hazards:

- bodily injuries
- slipping, tripping or falling
- heavy lifting

1.4.2 Fire and Explosion

The presence of oxygen tanks in the oxygen injection system sheds can present a hazard if a fire occurred in or near the oxygen injection shed. No smoking is permitted onsite and employees conducting any work within the shed (such as OM&M) should be cognizant of any hazards that may contribute to a fire. A fire extinguisher is located within each system shed. All fires should be reported to 911 emergency services. In the event of an emergency, staff should attempt to disconnect the power supply to the systems, however if a fire is present staff should immediately evacuate the system and contact 911. National Grid and the GEI project manager will determine if it is necessary to shut down any of the injection systems due to intrusive activities.

1.4.3 Cold Stress

During the winter months, workers may be exposed to the hazards of working in cold environments. Potential hazards in cold environments include frostbite, trench foot or immersion foot, hypothermia as well as slippery surfaces, brittle equipment, and poor judgment. The procedures to be followed regarding the avoidance of cold stress are provided in **Appendix B** – Cold Stress Guidelines.

1.4.4 Heat Stress

A heat stress prevention program will be implemented when ambient temperatures exceed 70ºF. The procedures to be followed are provided in **Appendix C** – Heat Stress Guidelines.

1.4.5 Noise

Noise is a potential hazard associated with the operation of heavy equipment, power tools, pumps and generators. Site workers who will perform suspected or established high noise tasks and operations for short durations (less than 1-hour) shall wear hearing protection. If deemed necessary by the Site Safety Officer (SSO), the Corporate Health & Safety Officer (CHSO) will be consulted on the need for additional hearing protection and the need to monitor sound levels for site activities. Other workers who do not need to be in proximity of the noise should distance themselves from the equipment generating the noise.

1.4.6 Hand and Power Tools

In order to complete the various tasks for the project, personnel will use hand and power tools. The use of hand and power tools can present a variety of hazards, including physical harm from being struck by flying objects, being cut or struck by the tool, fire, and electrocution. Work gloves, safety glasses, and hard hats will be worn by the operating

personnel at all times when using hand and power tools and Ground Fault Indicator (GFI)-equipped circuits will be used for all power tools.

1.4.7 Slips, Trips, and Falls

Working in and around the site will pose slip, trip and fall hazards due to slippery surfaces. Excavation at the sites will cause uneven footing in the trenches and around the spoil piles. GEI employees will wear proper footwear (i.e. steel toe boots) and will employ good work practice and housekeeping procedures to minimize the potential for slips, trips, and falls.

1.4.8 Manual Lifting

Manual lifting of objects and equipment may be required. Failure to follow proper lifting technique can result in back injuries and strains. Site workers should use power equipment (such as a forklift) to lift heavy loads whenever possible and should evaluate loads before trying to lift them (i.e., they should be able to easily tip the load and then return it to its original position). Carrying heavy loads with a buddy and proper lifting techniques include:

1) make sure footing is solid
2) make back straight with no curving or slouching
3) center body over feet
4) grasp the object firmly and as close to your body as possible
5) lift with legs
6) turn with your feet, don't twist

1.4.9 Projectile Objects and Overhead Dangers

Overhead dangers, including but not limited to falling debris and equipment, can occur while heavy machinery is in operation. GEI staff will be instructed to maintain a minimum distance from large overhead operations. Staff must also maintain proper communication with heavy equipment operators and their handlers, especially if work necessitates their presence beyond the minimum safe distance. Additionally, employees should be cognizant of low-hanging overhead power lines, as these can snag on vehicles entering and exiting the site. Vehicles that are large enough to damage overhead power lines require spotters when entering and exiting the site. Proper PPE will be worn at all times during these types of activities including steel-toed or equivalent boots, safety vests and hard hats.

1.4.10 Heavy Equipment Operation

Heavy equipment will not be operated by GEI personnel, but may be present onsite due to continuing projects. GEI personnel should be cautious when working near operating heavy equipment, and maintain a safe distance from the equipment. Personnel should maintain eye contact with the vehicle spotter or operator before traversing any paths that may cross that of the machinery.

1.4.11 Excavation and Trenching

GEI personnel will not enter a trench or excavation that is greater than 4 feet deep.

The safety requirements for each excavation must be determined by a competent person who is capable of identifying existing and predictable hazards and work conditions that are unsanitary, hazardous, or dangerous to employees. The competent person must also have the authorization to take prompt corrective measures to eliminate unsatisfactory conditions.

The following are general requirements for work activities in and around excavations:

- Prior to initiation of any excavation activity (or ground intrusive activity, such as drilling), the location of underground installations will be determined. The New York State one-call center will be contacted by the Contractor / Subcontractor a minimum of 72 hours prior to excavation activities. It may also be necessary to temporarily support underground utilities during excavation. When excavations approach the estimated location of underground installations, the exact location of the underground installations shall be determined by means that are safe to workers, i.e., hand dig, test pits, etc.
- All excavations will be inspected daily by the competent person prior to commencement of work activities. Evidence of cave-ins, slides, sloughing, or surface cracks or excavations will be cause for work to cease until necessary precautions are taken to safeguard employees.
- Excavated and other materials or equipment that could fall or roll into the excavation shall be placed at least 5 feet from the edge of the excavation.
- Vehicular traffic and heavy equipment shall remain at least 5 feet from the face of the excavation.
- All excavation operations will cease immediately during hazardous weather conditions such as high winds, heavy rain, lightning and heavy snow.

1.4.12 Excavation Entry Safety

- The sides of all excavations in which personnel will be exposed to the danger of moving ground or potential cave-in will be adequately sloped, shored or contained within a trench box, or similar support structure designed and sealed by a professional engineer.
- The air in the excavation will be tested for oxygen deficiency, explosivity, organic vapors, carbon monoxide and hydrogen sulfide. The bottom, middle, top and corners of the excavation will be tested prior to entry and continuously during excavation entry.
- Ramps or ladders will be used to provide access and sufficient egress to the excavation. Ladders must be supplied for every 25 feet of lateral travel. Ladders must be securely anchored at the top or bottom and must extend at least 3 feet above the ground surface. A competent person is required to design ramps (those used exclusively for employee access/egress). Such ramps are constructed of wood, steel

or earth. Structural ramps, used for vehicle/equipment access (steel or wood) must be designed by a competent person qualified in structural design. Vehicle ramps built of earth are not considered "structural ramps".

- Employees shall not work in excavations where there is an accumulation of water or in excavations where water is accumulating unless adequate precautions have been taken to protect employees against the hazards posed by water accumulation.
- Emergency rescue equipment such as breathing apparatus, a safety harness and line, or a basket stretcher shall be readily available where hazardous atmospheric conditions exist or may reasonably be expected to develop during work in an excavation.

1.4.13 Line Breaking Activities

During line breaking activities, the potential exists for exposure to suspect asbestos containing materials (ACM). If suspect ACM is encountered, work will stop and will not resume until asbestos trained personnel have been upgraded to the proper PPE, and water is available to keep the work area and the suspect ACM wetted. All workers are to have completed asbestos awareness training prior to working with suspect ACM. The project management team (National Grid Project Manager, Consultant Project Manager, Contractor Project Manager, and CHSO) is to be notified if suspect ACM is encountered.

1.4.14 Additional Physical Hazards

GEI personnel should verify that all electric, gas, water, steam, sewer, and other utility service lines are located and marked before any intrusive work is started. In each case, any utility company that is involved should be notified in advance by the Contractor according to markout procedures, and its approval or services, if necessary, shall be obtained.

1.4.15 Electrical Hazards

The most serious physical hazard onsite is the electrical hazards present in the LIPA electrical substation. There are several monitoring wells that are either located within the LIPA electrical substation or in an area that can only be accessed by traversing through the substation. Additionally, several monitoring wells are located on the exterior perimeter of the LIPA substation. Oxygen injection wells and system lines will be installed on the exterior perimeter of the substation. The substation proper is enclosed by a perimeter fence and a locked gate. If GEI employees need access to the well point located within the substation they will be escorted by a LIPA representative. Underground distribution electrical components of the substation generate 33 kilovolts of electricity, while aboveground transmission components generate between 69 kilovolts. Both the underground and aboveground electrical components occur inside and outside of the substation proper.

Electrical hazards are typically the most serious physical hazards associated with working on or near an electric substation. Most OM&M activities at the Glen Cove Former MGP Site are conducted outside of the substation perimeter and measures to mitigate exposure to

overhead and subsurface electrical transmission and distribution lines should still be adhered to at all times due to the overhead and underground utilities onsite. These measures include:

- When working within the perimeter of the substation, or while conducting intrusive work inside or outside the substation, Electrical Hazard (EH)-rated footwear, a hardhat, rubber gloves, and flame resistant clothing that meet NFPA 70E standards is to be worn. See Section 13 for information regarding PPE.
- A LIPA representative or designate must perform oversight during OM&M activities within the substation.
- Avoid carrying tools/equipment above waist height if overhead electric hazards exist.
- Maintain a minimum clearance of 16 feet from bus bars, transformer/capacitor electrodes and overhead transmission/distribution lines.
- Avoid working within the perimeter of the LIPA substation in conditions of high humidity or rain or thunderstorms.
- Stop work immediately and vacate the work area in the event lightning is observed.

Measures of protection that should be adhered to, should work be conducted **within the substation perimeter, or if work adjacent to the substation perimeter includes intrusive activities,** include:

- Contact DigNet of New York City and Long Island at 1-800-272-4420 at least 72 hours prior to any invasive activities for mark out of underground public utilities.
- Complete utility clearance documentation included in **Appendix D**.
- Obtain the most recent as-built drawings of the transmission/distribution line layout from National Grid.
- Mark out of underground transmission/distribution lines by National Grid survey/mark out personnel. Markouts must be checked every 10 days and updated as necessary.
- Conduct work under the supervision of a LIPA Health and Safety representative as required.
- Use hand digging tools specifically designed for use on substation property (i.e. insulated digging bar, long-handled spoon shovel, etc.). In addition, rubber gloves and flame resistant clothing are required if hand digging in a substation in/or around energized conductors, which is not anticipated to be the case.
- Use insulated lineman's gloves (NFPA 70E) when handling equipment that may come into contact with underground utilities.
- Electrical Hazard (EH)-rated footwear is required when working within the substation perimeter.
- Avoid carrying tools/equipment above waist height if overhead electric hazards exist.
- GEI vehicles will be parked outside of the substation proper during sampling activities.
- Maintain a minimum clearance of 16 feet from bus bars, transformer/capacitor electrodes and overhead transmission/distribution lines.

- Maintain a minimum offset of five feet from marked underground transmission/ distribution lines.
- Avoid working on substation in conditions of high humidity or rain or thunderstorms.
- Stop work immediately and vacate the work area in the event lightning is observed.

Additional LIPA requirements for working in and around electrical substations include:

- Gate to substation must remain closed and locked unless access is granted and observed by LIPA or LIPA-approved personnel
- safety vests cannot have any zippers (Nomex vests are recommended)
- Be aware of exposed cables, transformers and other electrical structures. Many of these are not insulated and are at ground level or a level within bodily reach.
- Equipment in control houses may be exposed/uninsulated.
- LIPA oversight personnel must be notified if a lever is hit or touched. Do not turn the lever back to its original position.

Site personnel will assume that all electrical equipment at surface, subsurface, and overhead locations is energized, until the equipment has been designated as de-energized by a National Grid/LIPA representative. LIPA representatives will be responsible for de-energizing and lock out/tag out of all electrical equipment. If the equipment cannot be de-energized, work will stop and the Field Representative (FR) and/or SSO will consult with the GEI Project Manager (PM) and CHSO. All GEI employees will use proper PPE when working within the active substation including EH-rated safety boots, a hardhat, rubber gloves, and flame resistant clothing that meet NFPA 70E standards. GEI will notify National Grid prior to working adjacent to this equipment, and will verify that the equipment is energized or de-energized.

All power lines, which have been indicated by LIPA to be de-energized, must be locked out by a National Grid/LIPA representative, such that the lines cannot be energized when personnel are working near them. The lines shall not be unlocked and re-energized until GEI notifies National Grid that they have completed work in the area and that all personnel are clear of the area. National Grid representatives will provide GEI personnel with site-specific lockout/tagout documentation prior to onsite activities.

If power lines cannot be de-energized, the SSO will consult with National Grid to discuss how to proceed. Work tasks will only commence after determination that a safe working distance can be maintained and all personnel working in the area have been informed of the limitation. All work performed within the substation boundaries requires the use of task-specific PPE, as described in Section 13.

The subcontractor should verify that all electric, gas, water, steam, sewer, and other utility service lines are located and marked before any intrusive work is started. GEI must verify that the subcontractor has completed a utility mark out checklist prior to intrusive work in

accordance with the appropriate work plan. In each case, any utility company that is involved should be notified in advance by the subcontractor according to markout procedures, and its approval or services, if necessary, shall be obtained.

Smoking is prohibited at or in the vicinity of hazardous operations or materials.

The potential hazards for this project are listed in the following Activity Hazard Analysis and Site Hazards sections.

Activity Hazard Analysis

Activity: Site Investigations/Site Remediations		
Task	Potential Hazard	**Control Measure**
Mobilization and demobilization. Utility location. Excavation and trenching oversight. Construction oversight. Air monitoring.	**Silica Dust Inhalation (From Concrete Break-Up, Grout/Cement Mixing)**	Stay upwind of concrete break-up and grout mixing areas. Wear a dust mask if necessary.
	Loud Noise	Wear hearing protection.
	Proximity of Impacted Stockpiles	Maintain safe distance from stockpiles. Wear respiratory protection if necessary.
	Heavy Equipment Operations (Debris, Crushing, Pinch Points)	Wear proper PPE, including impact resistant safety glasses. Maintain awareness of location of equipment. Make eye-contact with operators to make sure they are aware of your position when navigating in the vicinity of heavy equipment.
	Slips, Trips and Falls	Keep trafficked areas free of slip/trip/fall hazards. Maintain awareness of excavation and trench perimeters.
	Traffic	Follow traffic safety guidelines in **Appendix F**.
	Contaminant Contact	Wear proper PPE including nitrile gloves and safety glasses. Dispose of gloves after use and wash hands.
	Cave Ins, Objects Rolling Into Trench	Verify that appropriate trenching guidelines are being followed.
	Exposure of Underground Utilities	Utility location should be carried out prior to start of project.

Activity: Installation/Abandonment of Soil Borings, Groundwater Probes, Groundwater Monitoring Wells, and/or Oxygen Injection Wells		
Task	**Potential Hazard**	**Control Measure**
Soil borings, groundwater probes, monitoring well, and/or oxygen injection well installation and abandonment. Associated oversight. Replacement of well boxes and associated concrete on monitoring wells and/or oxygen injection wells.	**Contaminant Contact**	Wear proper PPE including nitrile gloves and safety glasses. Dispose of gloves after use and wash hands.
	Slips, Trips, and Falls	Keep trafficked areas free of slip/trip/fall hazards.
	Silica Dust Inhalation (From Grout/Cement Mixing)	Stay upwind of mixing area. Wear a dust mask if necessary.
	Heavy Machinery Proximity (Pinch Points, Crushing, Non-Secure Equipment)	Maintain awareness of location of equipment. Subcontractor use of a spotter for equipment operation.
	Loud Noise	Wear hearing protection.
	Electrical Substation Proximity	Wear proper PPE when working within the substation. Follow National Grid/LIPA and OSHA guidelines for working distance to equipment.
Waste Management	Contaminant Contact	Wear proper PPE including nitrile gloves and safety glasses. Dispose of gloves after use and wash hands.
	Cuts or Abrasions (Handling Drums)	Wear work gloves over nitrile gloves.
Waste Characterization Sampling	**Contaminant Contact**	Wear proper PPE during sampling including nitrile gloves and safety glasses. Dispose of gloves after use and wash hands.
	Cuts or abrasions (handling drums)	Wear work gloves over nitrile gloves.
	Traffic	Follow traffic safety guidelines in Appendix F.
Drum Removal	Contaminant Contact	Wear proper PPE during sampling including nitrile gloves and safety glasses. Dispose of gloves after use and wash hands.
	Cuts or Abrasions (handling drums)	Wear work gloves over nitrile gloves.

	Heavy Lifting-Strains and Sprains	Use proper lifting techniques and equipment for the job. Ask fellow worker for help.
Trenching	**Loud Noise**	Wear hearing protection.
	Slips, Trips and Falls	Keep trafficked areas free of slip/trip/fall hazards.
	Electrical Hand Tools	Ensure electrical equipment is connected to a Ground Fault Circuit Interrupter (GFCI).
	Electrical Substation Proximity	Wear proper PPE when working within the substation. Follow National Grid/LIPA and OSHA guidelines for working distance to equipment.
	Drill Rig Proximity (Pinch Points, Crushing, Non-Secure Equipment)	Maintain awareness of location of equipment. Subcontractor use of a spotter for equipment operation.
	Contaminant Contact	Wear proper PPE including nitrile gloves and safety glasses. Dispose of gloves after use and wash hands.
	Cuts or Abrasions	Wear work gloves over nitrile gloves.
	Silica Dust Inhalation (From Grout/Cement Mixing)	Stay upwind of mixing area. Wear a dust mask if necessary.
	Traffic	Follow Traffic Safety Guidelines in Appendix F.
	Heavy Lifting-Strains and Sprains	Use proper lifting techniques and equipment for the job. Ask fellow worker for help.
	Insect Bites	Use insect repellant.
	Repetitive Motion Injury (Standing, Squatting and Bending Over)	Take regular breaks and do not work in unusual positions for long periods of time. Walk and stretch between tasks.
	Jackhammer Proximity (Debris, Crushing, Pinch Points)	Wear proper PPE, including impact resistant safety glasses. Maintain awareness of location of equipment.

Activity: Groundwater Monitoring		
Task	**Potential Hazard**	**Control Measure**
Groundwater sample collection.	Traffic	Follow traffic safety guidelines in **Appendix F**.
	Contaminant contact	Wear proper PPE during sampling including nitrile gloves and safety glasses. Dispose of gloves after use and wash hands.
	Insect Bites	Use insect repellant. Avoid areas where insects may be prevalent.
	Slips, Trips and Falls	Keep trafficked areas free of slip/trip/fall hazards.
	Electrical Substation Interior	Wear proper PPE when working within the substation. Follow National Grid/LIPA and OSHA guidelines for working distance to equipment.
	Heavy Lifting-Strains and Sprains	Use proper lifting techniques. Ask fellow worker for help.
	Poisonous Plants	Avoid heavily wooded areas. Staff should be able to identify common poisonous plants.
	Wild Animals	Avoid contact with wild animals.

Activity: DNAPL Gauging and Recovery (OM&M)		
Task	**Potential Hazard**	**Control Measure**
DNAPL Gauging & Recovery	**Repetitive Motion Injury (Standing, squatting and bending over)**	Take regular breaks and do not work in unusual positions for long periods of time. Walk and stretch between tasks.
	Contaminant Contact	Wear proper PPE during sampling including nitrile gloves, face shield (recovery only) and safety glasses. Dispose of gloves after use and wash hands.
	Slips, Trips, and Falls	Keep trafficked areas free of slip/trip/fall hazards.

Activity: Oxygen Injection Systems Check and Maintenance (O&M)		
Task	**Potential Hazard**	**Control Measure**
Monthly System Check	**Oxygen Explosion Hazard**	No smoking in and around injection shed. Assure fire hazards are removed from in and around shed. Maintain system components to avoid oxygen leaks and electrical shorts that may spark a fire.
	Slips, Trips and Falls	Keep trafficked areas free of slip/trip/fall hazards. Maintain a safe distance from unprotected fall areas (south side of site next to 36 N. New York Avenue parking lot).

Site-Wide Potential Hazards	**Control Measures**
Inclement Weather	Weather reports, proper clothing, and work stoppage.
Heat/Cold Stress	Proper clothing, acclimatization, regular work breaks, fluid intake, watch for signs of heat/cold stress.

1.5 Evaluation of Potential Chemical Hazards

The characteristics of compounds at the Site are discussed below for information purposes. Adherence to the safety and health guidelines in this HASP should reduce the potential for exposure to the compounds discussed below. Table 1-1 presents chemical data regarding potential exposure and monitoring for the chemical types listed below. Chemicals defined as "present" or "not present" at the site were determined based upon post-remediation data that reflects the current state of contaminants monitored at the site.

1.5.1 Volatile Organic Compounds (VOCs)

VOCs, such as benzene, toluene, ethyl benzene, and xylene (BTEX) are present in soil and groundwater and in some cases chemical components in non-aqueous phase liquids (NAPL) such as oil or tar within soils and underground structures. At high concentrations, these compounds generally have a depressant effect on the central nervous system (CNS), may cause chronic liver and kidney damage, and some are suspected human carcinogens. Benzene is a known human carcinogen. Acute exposure may include headache, dizziness, nausea, and skin and eye irritation. The primary route of exposure to VOCs is through inhalation and therefore respiratory protection is the primary control against exposure to VOCs.

1.5.2 Coal Tar and Coal Tar Products

Coal tar products, which are semi-volatile organic compounds (SVOCs), typically consist of a mixture of acenaphthene, acenaphthylene, anthracene, benz(a)anthracene, benzo(b)fluoranthene, benzo(k)fluorethene, benz(a)pyrene, benzo(e)pyrene, benzo(g,h,i)peryline, chrysene, dibenz(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3cd)pyrene, 2-methyl naphthalene, naphththalene, phenanthrene, phenols, pyrene.

Coal tar products and other SVOCs are present at the site within impacted soil and groundwater and as a DNAPL by-product of gas production within soils, former MGP structures, and abandoned pipelines.

Coal tar products such as those listed above may cause contact dermatitis. Direct contact can be irritating to the skin and produce itching, burning, swelling and redness. Direct contact or exposure to the vapors may be irritating to the eyes. Conjunctivitis may result from prolonged exposure. Coal tar is considered to be very toxic, if ingested. High levels of exposure to coal tar, though not anticipated during work activities conducted during this project, may increase the risk of cancer including lung, kidney and skin cancer. Naphthalene is also an eye and skin irritant and can cause nausea, headache, fever anemia, liver damage, vomiting convulsions and coma. Poisoning may occur by ingestion of large doses, inhalation or skin absorption.

The major route of entry for the work activities to be conducted at this site is through direct contact. Exposure is most likely when handling soil and water samples. Inhalation may occur when the soil is disturbed causing respirable and nuisance dust particles to become airborne. Details for monitoring procedures can be found in Section 2.

1.5.3 Heavy Metals

The Site potentially contains elevated levels of non-MGP related metals. These metals appear to be naturally occurring, associated with background anthropogenic sources and/or associated with historic fill of unknown origin as detailed. These metals include arsenic, antimony, barium, beryllium, cadmium, chromium, copper, iron, manganese, lead, mercury, nickel, selenium, sodium and zinc.

Exposure to high concentrations of arsenic can cause dermatitis, gastrointestinal disturbances, peripheral neuropathy, respiratory irritation, and hyperpigmentation of skin. Chronic exposure to arsenic has resulted in lung cancer in humans.

Exposure to high concentrations of antimony can irritate the eyes, skin, and nose. Ingestion can irritate the throat, mouth and lead to coughing and dizziness. Additional symptoms of exposure can include nausea, vomiting, diarrhea, stomach cramps, insomnia and the inability to smell properly.

Exposure to high concentrations of beryllium and beryllium compounds can cause irritation of the eyes and skin. Long term/chronic exposure can lead to low weight, weakness, chest pain, clubbing of the fingers cyanosis, and pulmonary insufficiency.

Exposure to high concentrations of cadmium and cadmium compounds can cause pulmonary edema, cough, chest tightness, headaches, chills, muscle aches, nausea, vomiting, diarrhea, mild anemia, substernal pain, anosmia (loss of the sense of smell), emphysema, and proteinuria.

Exposure to high concentrations of chromium and chromium compounds can causes irritation to the eyes, skin, and respiratory system. Additional symptoms may include nasal septum perforation, liver and kidney damage, skin ulceration, leukocytosis, leucopenia, eosinophilia, eye injury and conjunctivitis.

Exposure to high concentrations of copper through inhalation can cause irritation of the eyes, nose, pharynx, nasal septum. Ingestion may cause a metallic taste. Skin irritation may result from direct contact with skin. Damage to the liver and kidneys may occur.

Exposure to high concentrations of iron through ingestion can cause salivation nausea, vomiting, diarrhea, and abdominal pain. Chronic exposure to mercury can cause liver damage.

Exposure to high concentrations of manganese through ingestion or inhalation can cause tremors, lethargy, impaired coordination, speech difficulties, and an awkward gait similar to the symptoms of Parkinson's disease.

Exposure to high concentrations of lead may lead to lassitude (weakness, exhaustion), insomnia, facial pallor, anorexia, weight loss, malnutrition, constipation, abdominal pain, colic, anemia, gingival lead line, tremor, paralysis of the wrist and/or ankles, encephalopathy, kidney disease, eye irritation, and hypertension.

Exposure to high concentrations of mercury can cause eye and skin irritation, cough, chest pain, dyspnea (breathing difficulty), bronchitis, pneumonitis, tremor, insomnia, irritability, indecision, headache, lassitude (weakness, exhaustion), stomatitis, salivation, gastrointestinal disturbance, anorexia, weight loss, and proteinuria

Exposure to high concentrations of nickel may cause sensitization dermatitis, allergic asthma, pneumonitis.

Exposure to high concentrations of selenium can cause mucous membrane irritation, coughing, sneezing, shortness of breath, chills, headaches, hypotension, and CNS depression. Chronic exposure to selenium could cause bronchial irritation, gastrointestinal distress, excessive fatigue, and skin discoloration.

Exposure to high concentrations of zinc through ingestion can cause abdominal pain, nausea, vomiting, and diarrhea. Chronic exposure can lead to low blood pressure, jaundice, and seizures.

As with VOCs, the primary route of exposure is through inhalation of dust particles when soil is disturbed and becomes airborne.

1.5.4 Asbestos-Containing Materials

As asbestos containing materials (ACM) have not been identified onsite, they are not currently monitored for at the site.

1.5.5 Polychlorinated Biphenyls

As polychlorinated Biphenyls (PCBs) have not been identified onsite, they are not currently monitored for at the site.

1.5.6 Cyanide

Cyanide compounds are common by-products of manufactured gas production. Hydrogen cyanide is toxic because it is a chemical asphyxiant. It replaces the oxygen in the blood and thereby suffocates the cells. Ferrocyanides are not considered toxic because the hydrogen cyanide ion is bound to tightly to the iron and cannot therefore replace the oxygen. It takes a great amount of heat and/or acid to release cyanide gas from the ferrocyanide molecule. Therefore, hydrogen cyanide is not a concern at the Site. However, it is National Grid policy to monitor for hydrogen cyanide in the work zone during earth-disturbing activities at sites where MGP-related contaminants have been found.

1.5.7 Hydrogen Sulfide

Hydrogen sulfide is another common by-product of manufactured gas production. Exposure to lower concentrations can result in eye irritation, a sore throat and cough, shortness of breath, and fluid in the lungs. These symptoms usually go away in a few weeks. Long-term, low-level exposure may result in fatigue, loss of appetite, headaches, irritability, poor memory, and dizziness. Breathing very high levels (>800 ppm) of hydrogen sulfide can cause death within just a few breaths. The primary route of exposure is through inhalation and therefore respiratory protection is the primary control against exposure to hydrogen sulfide.

1.5.8 Evaluation of Organic Vapor Exposure

During intrusive activities, the requirement for air monitoring reduces the risk of overexposure by indicating when action levels have been exceeded and when PPE must be upgraded or changed. Action levels for VOCs and associated contingency plans for the work zone are discussed within Section 2. Air monitoring will be conducted during intrusive

activities (such as drilling) and PID screening of well head spaces will be conducted during groundwater sampling activities.

Exposure to organic vapors shall be evaluated and/or controlled by:

- Monitoring air concentrations for organic vapors in the breathing zone with a photo-ionization detector (PID).
- When possible, engineering control measures will be utilized to suppress the volatile organic vapors. Engineering methods can include utilizing a fan to promote air circulation, utilizing volatile suppressant foam, providing artificial ground cover or covering up the impacted material with a tarp to mitigate volatile odors.
- When volatile suppression or other engineering controls are not effective and organic vapor meters indicate concentrations above the action levels, then appropriate respiratory protection (i.e., air purifying respirator with organic vapor cartridge) will be employed.

Specific chemical hazards information from the Material Safety Data Sheet (MSDS) and Occupational Health Guidelines are summarized in Table 1-1. MSDSs for decontamination chemicals, calibration gases, sample preservation chemicals, or other chemicals that may be used onsite, are kept in a separate MSDS binder onsite.

Chemical Data							
Compound	**CAS #**	**ACGIH TLV/ NIOSH REL**	**OSHA PEL**	**Route of Exposure**	**Symptoms of Exposure**	**Target Organs**	**Physical Data**
Arsenic	7440-38-2	0.01 mg/m^3	0.01 mg/m^3 A.L. .005mg/m3	Inhalation Skin Absorption Ingestion Skin Contact	Ulceration of nasal septum, dermatitis, GI disturbances, peripheral neuropathy, respiratory irritation, hyperpigmentation of skin, potential carcinogen	Liver, kidneys, skin, lungs, lymphatic system	Metal: Silver-gray or tin-white, brittle, odorless solid FP: NA IP: NA LEL: NA UEL: NA VP: 0 mm
Benzene	71-43-2	0.5 ppm (Skin)	1 ppm TWA 5 ppm STEL	Inhalation Skin Absorption Ingestion Skin Contact	Irritation of eyes, skin, nose, respiratory system, giddiness, headache, nausea; staggering gait, fatigue, anorexia, weakness, dermatitis, bone marrow depression, potential carcinogen	Eyes, skin, CNS, bone marrow, blood	FP: 12^o F IP: 9.24 eve LEL: 1.2% UEL:7.8% VP: 75 mm
Chromium (Chromic Acid and Chromates)	1333-82-0	0.05 mg/m^3	0.1 mg/m^3	Inhalation Ingestion Skin Contact	Irritates respiratory system, nasal, septum perforation, liver and kidney damage, leucocytosis (increased blood leucocytes), leukopenis (reduced blood leucocytes), moncytosis (increased monocytes), Eosinophilia, eye injury, conjunctivitis, skin ulcer, sensitivity dermatitis, potential carcinongen	Blood, respiratory system, liver, kidney, eyes, skin, lung cancer	FP:NA IP:NA VP: Very Low LEL: NA UEL: NA
Ethylbenzene	100-41-4	100 ppm	100 ppm	Inhalation Ingestion Skin Contact	Eye, skin, mucous membrane irritation; headache; dermatitis, narcosis; coma	Eyes, skin, respiratory system, CNS	FP: 55^o F IP: 8.76 eV LEL: 0.8% UEL:6.7% VP: 7 mm
Hydrogen cyanide	74-90-8	4.7 ppm (5 mg/m^3) STEL [skin]	10 ppm (11 mg/m^3) [skin]	Inhalation Ingestion Absorption Skin/Eye Contact	Asphyxia; weekness, headache, confusion; nausea, vomiting; increased reate and depth of respiration or respiration slow and gasping; thyroid, blood-changes	CNS, CVS, thyroid, blood	Colorless or pale-blue liquid or gas (above 78°F) with a bitter, almond-like odor. VP: 630 mmHg IP: 13.60 eV

Chemical Data							
Compound	**CAS #**	**ACGIH TLV/ NIOSH REL**	**OSHA PEL**	**Route of Exposure**	**Symptoms of Exposure**	**Target Organs**	**Physical Data**
Hydrogen sulfide	7783-06-4	10 ppm TWA, 15 ppm STEL	20 ppm C, 50 ppm [10-min. Maximum peak]	Inhalation Skin/Eye Contact	Irritation eyes, respiratory system; apnea, coma, convulsions; conjunctivitis, eye pain, lacrimation (discharge of tears), photophobia (abnormal visual intolerance to light), corneal vesiculation; dizziness, headache, fatigue, irritability, insomnia; gastrointestinal disturbance; liquid: frostbite	Eyes, respiratory system, CNS	Colorless gas with a strong odor of rotten eggs. VP: 17.6 atm IP: 10.46 eV
Lead	7439-92-1	0.050 mg/m^3	0.05 mg/m^3 A.L. 0.03 mg/m3	Inhalation Ingestion Skin Contact	Weakness, insomnia; facial pallor; pal eye, anorexia, weight loss, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremor; paralysis of wrist and ankles; irritates eyes, hypo tension	Eyes, GI tract, CNS, kidneys, blood, gingival tissue	A heavy, ductile, soft, gray solid. FP: NA IP: NA LEL: NA UEL: NA VP: 0 mm
Mercury	7439-97-6	0.025 mg/m^3	0.10 mg/m3	Inhalation Ingestion Skin Contact Skin Absorption	Irritates eyes and skin, chest pain, cough, difficulty breathing, bronchitis, pneumonitis, tremor, insomnia, irritability, indecision, headache, fatigue, weakness, stomatitis, salivation, Gastrointestinal disturbance, weight loss, proteinuria	Eyes, skin, respiratory tract, central nervous system	Silver-white, heavy odorless liquid FP: NA IP:? LEL: NA UEL:NA VP: 0.0012 mm
Naphthalene	91-20-3		10 ppm (50 mg/m^3) TWA	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes; headache, confusion, excitement, malaise (vague feeling of discomfort); nausea, vomiting, abdominal pain; irritation bladder; profuse	Eyes, skin, blood, liver, kidneys, central nervous system	FP: 174 F IP: 8.12 eV, LEL: 0.8% UEL:6.7%, VP: 0.08 mm

Chemical Data							
Compound	**CAS #**	**ACGIH TLV/ NIOSH REL**	**OSHA PEL**	**Route of Exposure**	**Symptoms of Exposure**	**Target Organs**	**Physical Data**
					sweating; jaundice; hematuria (blood in the urine), renal shutdown; dermatitis, optical neuritis, corneal damage		
PAH's as Coal tar pitch Volatiles (CTPV)	65996-93-2	0.2 mg/m3	0.2 mg/m3	Inhalation Skin contact Ingestion	Irritant to eyes, swelling, acne contact dermatitis, chronic bronchitis	Respiratory system, CNS, liver, kidneys, skin, bladder, carc	Black or dark brown amorphous residue.
Selenium	7782-49-2	0.2 mg/m^3	0.2 mg/m^3	Inhalation Ingestion Skin Contact	Irritant to eyes, skin, nose and throat, visual disturbance, headache, chills, fever, breathing difficulty, bronchitis, metallic taste, garlic breath, GI disturbance, dermatitis, eye and skin burns,	Eyes, skin, respiratory system, liver, kidneys, blood spleen	Amphorous or crystalline, red to gray solid FP: NA IP: NA LEL: NA UEL: NA VP: 0 mm
Toluene	108-88-3	50 ppm	200 ppm	Inhalation Skin Absorption Ingestion Skin Contact	Eye, nose irritation; fatigue, weakness, confusion, euphoria, dizziness, headache; dilated pupils, tearing of eyes; nervousness, muscle fatigue, insomnia, tingling in limbs; dermatitis	Eyes, skin, respiratory system, CNS, liver, kidneys	FP: 40^{o}F IP: 8.82 eV LEL: 1.1% UEL:7.1% VP: 21 mm
1,2,4-Trimethyl-benzene	95-63-6	NIOSH REL TWA 25 ppm	None	Inhalation, ingestion, skin and/or eye contact	irritation eyes, skin, nose, throat, respiratory system; bronchitis; hypochromic anemia; headache, drowsiness, lassitude (weakness, exhaustion), dizziness, nausea, incoordination; vomiting, confusion; chemical pneumonitis (aspiration liquid)	Eyes, skin, respiratory system, central nervous system, blood	FP: 112°F BP: 337°F LEL: 0.9% UEL: 6.4% VP: 1 mmHg
Portland Cement	65997-15-1	10 µg/m^3 (total) TWA 5	TWA 50 mppcf	Inhalation, Ingestion, Skin and/or Eye Contact	Irritation eyes, skin, nose; cough, expectoration; exertional dyspnea (breathing difficulty),	Eyes, skin, respiratory system	Gray, odorless powder FP: NA IP: NA LEL: NA UEL: NA

Chemical Data							
Compound	**CAS #**	**ACGIH TLV/ NIOSH REL**	**OSHA PEL**	**Route of Exposure**	**Symptoms of Exposure**	**Target Organs**	**Physical Data**
		µg/m^3 (resp)			wheezing, chronic bronchitis; dermatitis		VP: 0 mmHg
Iron	1309-37-1	Iron oxide dust and fume (Fe2O3) as Fe: 5 mg/m3 (TWA);	Iron oxide dust and fume: 10 mg/m3	Inhalation, ingestion, eye contact	Respiratory tract irritation, coughing, shortness of breath, overdose of iron may cause vomiting, abdominal pain, bloody diarrhea, vomiting blood, lethargy, and shock; acidity in the blood, bluish skin discoloration, fever, liver damage, and possibly death; eye and cornea irritation and discoloration	Eyes, respiratory system, GI tract, liver	Reddish brown solid FP: NA LEL: NA UEL: NA VP: 0 mmHg
Zinc	1314-13-2	5 mg/m3 (TWA), 10 mg/m3 (STEL) for zinc oxide fume	10 mg/m3 (TWA), for zinc oxide fume	Inhalation	Metal fume fever: chills, muscle ache, nausea, fever, dry throat, cough; lassitude (weakness, exhaustion); metallic taste; headache; blurred vision; low back pain; vomiting; malaise (vague feeling of discomfort); chest tightness; dyspnea (breathing difficulty), rales, decreased pulmonary function	Respiratory system	Colorless liquid FP: NA? IP: 11 eV LEL: 7.5% UEL: 12.5% VP: 100 mmHg
Manganese	7439-96-5	TWA 1 mg/m^3 ST 3 mg/m^3	C 5 mg/m^3	Inhalation, ingestion	Manganism; asthenia, insomnia, mental confusion; metal fume fever: dry throat, cough, chest tightness, dyspnea (breathing difficulty), rales, flu-like fever; low-back pain; vomiting; malaise (vague feeling of discomfort); lassitude (weakness, exhaustion); kidney damage	Respiratory system, central nervous system, blood, kidneys	A lustrous, brittle, silvery solid. FP: NA LEL: NA UEL: Na VP: 0 mmHg

Chemical Data							
Compound	**CAS #**	**ACGIH TLV/ NIOSH REL**	**OSHA PEL**	**Route of Exposure**	**Symptoms of Exposure**	**Target Organs**	**Physical Data**
Antimony	7440-36-0	0.50 mg/m3 8-hour TWA		Inhalation, ingestion, skin and or eye contact	Ulceration of nasal septum, GI disturbances, peripheral neuropathy, respiratory irritation, hyperpigmentation of skin, potential carcinogen	Liver, kidney, skin, lungs, lymphatic system	Metal: Vapor Pressure: 0 mmHg, Ionization Potential: NA
VOCs[1]	NA	0.5 ppm (Skin)	0.5 ppm TWA 2.5 ppm STEL	Inhalation, Skin Absorption, Ingestion, Skin Contact	Irritate eyes and skin; headaches; dizziness; nausea; kidney; liver damage; depress CNS	Skin, eyes, liver, kidney, CNS	Colorless volatile liquid, sometimes with a sweet or solvent odor

Abbreviations	
C = ceiling limit, not to be exceeded	LEL = Lower explosive limit
CNS = Central Nervous System	mm = millimeter
CVS = Cardiovascular System	ppm = parts per million
eV = electron volt	Skin = significant route of exposure
FP = Flash point	STEL = Short-term exposure limit (15 minutes)
IP = Ionization Potential	TWA = Time-weighted average (8 hours)
GI = Gastro-intestinal	UEL = Upper explosive limit
A.L. Action Level	VP = vapor pressure approximately 68° F in mm Hg (mercury)

1.6 Biological Hazards

During the course of the project, there is a potential for workers to come into contact with biological hazards such as animals, insects and plants. Workers will be instructed in hazard recognition, health hazards, and control measures during site-specific training.

1.6.1 Animals

During the conduct of site operations, wild animals such as stray dogs or cats, raccoons, and mice may be encountered. Workers shall use discretion and avoid all contact with wild animals. If these animals present a problem, efforts will be made to remove these animals from the site by contacting a licensed animal control technician.

1.6.2 Insects

Insects, including bees, wasps, hornets, and spiders, may be present at the Site making the chance of a bite possible. Some individuals may have a severe allergic reaction to an insect bite or sting that can result in a life threatening condition. Any individuals who have been bitten or stung by an insect should notify the SSO. The following is a list of preventive measures:

- Apply insect repellent prior to performing any field work and as often as needed throughout the work shift.
- Wear proper protective clothing (work boots, socks and light colored pants).
- When walking in wooded areas, avoid contact with bushes, tall grass, or brush as much as possible.
- Field personnel who may have insect allergies should have bee sting allergy medication onsite and should provide this information to the SSO prior to commencing work.

1.6.2.1 Tick Borne Illnesses

Lyme disease is caused by infection from a deer tick that carries a spirochete. During the painless tick bite, the spirochete may be transmitted into the bloodstream that could lead to the worker contracting Lyme disease.

Lyme disease may cause a variety of medical conditions including arthritis, which can be treated successfully if the symptoms are recognized early and medical attention is received. Treatment with antibodies has been successful in preventing more serious symptoms from developing. Early signs may include a flu-like illness, an expanding skin rash, and joint pain. If left untreated, Lyme disease can cause serious nerve or heart problems, as well as a disabling type of arthritis.

Symptoms can include a stiff neck, chills, fever, sore throat, headache, fatigue and joint pain. This flu-like illness is out of season, commonly happening between May and October when ticks

are most active. A large expanding skin rash may develop around the area of the bite. More than one rash may occur. The rash may feel hot to the touch and may be painful. Rashes vary in size, shape, and color, but often look like a red ring with a clear center. The outer edges expand in size. It's easy to miss the rash and the connection between the rash and a tick bite. The rash develops from three days to as long as a month after the tick bite. Almost one third of those with Lyme disease never get the rash.

Joint or muscle pain may be an early sign of Lyme disease. These aches and pains may be easy to confuse with the pain that comes with other types of arthritis. However, unlike many other types of arthritis, this pain seems to move or travel from joint to joint.

Lyme disease can affect the nervous system. Symptoms include stiff neck, severe headache, and fatigue usually linked to meningitis. Symptoms may also include pain and drooping of the muscles on the face, called Bell's Palsy. Lyme disease may also mimic symptoms of multiple sclerosis or other types of paralysis.

The disease can also cause serious but reversible heart problems, such as irregular heartbeat. Finally, Lyme disease can result in a disabling, chronic type of arthritis that most often affects the knees. Treatment is more difficult and less successful in later stages. Often, the effects of Lyme disease may be confused with other medical problems.

It is recommended that personnel check themselves when in areas that could harbor deer ticks, wear light color clothing and visually check themselves and their buddy when coming from wooded or vegetated areas. If a tick is found biting an individual, the PM should be contacted immediately. The tick can be removed by pulling gently at the head with tweezers. The affected area should then be disinfected with an antiseptic wipe. The employee will be offered the option for medical treatment by a physician, which typically involves prophylactic antibiotics. If personnel feel sick or have signs similar to those above, they should notify the PM immediately.

The deer tick can also cause **Babesiosis**, an infection of the parasite Babesia Microti. Symptoms of Baesiosis may not be evident, but may also include fever, fatigue and hemolytic anemia lasting from several days to several months. Babesiosis is most commonly diagnosed in the elderly or in individuals whose immune systems are compromised.

Ehrlichiosis is a tick-borne disease which can be caused by either of two different organisms. Human monocytic ehrlichiosis (HME) is caused by *Ehrlichia chaffeensis*, which is transmitted by the lone star tick (*Amblyomma americanum*). Human granulocytic anaplasmosis (HGA), previously known as human granulocytic ehrlichiosis (HGE), is caused by *Anaplasma phagocytophilia*, which is transmitted by the deer tick (*Ixodes scapularis*).

In New York State, most cases of ehrlichiosis have been reported on Long Island and in the Hudson Valley. Ehrlichiosis is transmitted by the bite of infected ticks, including the deer tick and the lone star tick. The symptoms of HME and HGE are the same and usually include fever,

muscle aches, weakness and headache. Patients may also experience confusion, nausea, vomiting and joint pain. Unlike Lyme disease or Rocky Mountain spotted fever, a rash is not common. Infection usually produces mild to moderately severe illness, with high fever and headache, but may occasionally be life-threatening or even fatal. Symptoms appear one to three weeks after the bite of an infected tick. However, not every exposure results in infection.

Rocky Mountain spotted fever (RMSF) is a tick-borne disease caused by a rickettsia (a microbe that differs somewhat from bacteria and virus). Fewer than 50 cases are reported annually in New York State. In the eastern United States, children are infected most frequently, while in the western United States, disease incidence is highest among adult males. Disease incidence is directly related to exposure to tick-infested habitats or to infested pets. Most of the cases in New York State have occurred on Long Island. RMSF is characterized by a sudden onset of moderate to high fever (which can last for two or three weeks), severe headache, fatigue, deep muscle pain, chills and rash. The rash begins on the legs or arms, may include the soles of the feet or palms of the hands and may spread rapidly to the trunk or rest of the body. Symptoms usually appear within two weeks of the bite of an infected tick.

*(Information on Ehrlichiosis, Babesiosis, and Rocky Mountain Spotted Fever was derived from the New York State Department of Health).

1.6.3 Plants

The potential for contact with poisonous plants exists when performing field work in undeveloped and wooded areas. Poison ivy, sumac, and oak may be present onsite. Poison ivy can be found as vines on tree trunks or as upright bushes. Poison ivy consists of three leaflets with notched edges. Two leaflets form a pair on opposite sides of the stalk, and the third leaflet stands by itself at the tip. Poison ivy is red in the early spring and turns shiny green later in the spring. Poison sumac can be present in the form of a flat-topped shrub or tree. It has fern-like leaves, which are velvety dark green on top and pale underneath. The branches of immature trees have a velvety "down." Poison sumac has white, "hairy" berry clusters. Poison oak can be present as a sparingly branched shrub. Poison oak is similar to poison ivy in that it has the same leaflet configuration, however, the leaves have slightly deeper notches. Prophylactic application of Tecnu may prevent the occurrence of exposure symptoms. Post exposure over the counter products are available and should be identified at the local pharmacist. Susceptible individuals should be identified to the PM.

Contact with poison ivy, sumac, or oak may lead to a skin rash, characterized by reddened, itchy, blistering skin which needs first aid treatment. If a field worker believes they have contacted one of these plants, immediately wash skin thoroughly with soap and water, taking care not to touch your face or other body parts.

1.7 Personal Safety

Field activities have the potential to take site workers into areas which may pose a risk to personal safety. The following website (source) has been researched to identify potential crime activity in the area of the project:

- http://www.cityrating.com/crime-statistics/new-york/glen-cove.html

2009 crime statistics show that the violent crime rate in Glen Cove was 73% lower than the national violent crime rate, and 70% lower than the New York violent crime rate. The property crime rate of Glen Cove was 68% lower than the national property crime rate, and lower than the New York property crime rate by 50%.

To protect yourself, take the following precautions:

- Use the buddy system (teams of a minimum of two persons present);
- Let the Site Safety Officer (SSO) know when you begin work in these areas and when you leave;
- Call in regularly;
- Pay attention to what is going on around you; and
- If you arrive in an area and it does not look safe to get out of your vehicle, lock the doors and drive off quickly but safely.

Site workers must not knowingly enter into a situation where there is the potential for physical and violent behaviors to occur. If site workers encounter hostile individuals or a confrontation develops in the work area, suspend work activities, immediately leave the area of concern, and contact local 911 for assistance. Notify the SSO and CHSO of any incidents once you are out of potential danger.

In the event of an emergency, prompt communications with local emergency responders is essential. At least one charged and otherwise functioning cell phone to facilitate emergency communications will be on site. Confirmation of cellular phone operation and site worker safety will be confirmed at the start, mid-point, and near the end of each working day.

2. Air Monitoring

Air monitoring shall be performed to identify and quantify airborne levels of hazardous substances and safety and health hazards in order to determine the appropriate level of worker protection needed on site in the event that intrusive work is conducted. Work requiring air monitoring includes the installation and/or abandonment of monitoring wells, DNAPL recovery wells, oxygen injection wells, and soil vapor points.

GEI may conduct perimeter air monitoring, and work zone monitoring for onsite workers during intrusive activities only. Activities requiring air monitoring will be conducted in accordance with a pre-approved work plan. GEI will monitor and document daily site conditions and operations and inform field representatives (FR) of results.

GEI will provide the following equipment for health and safety monitoring of onsite personnel:

- PID with 10.6 eV lamp or equivalent
- Drager Chip Measurement System (CMS) with appropriate gas detection chips
- Dust Meter
- Combustible Gas Indicator (CGI): LEL / Oxygen (O2) / hydrogen sulfide (H_2S) / hydrogen cyanide (HCN) meter
- Sound Level Meter if deemed necessary by the PM and CHSO, type to be appropriate to the activities performed.

All air monitoring equipment will be calibrated and maintained in accordance with manufacturer's requirements. All calibrations will be recorded in the project notes daily or on a daily calibration form.

Organic vapor concentrations will be measured using the PID during intrusive activities. During intrusive operations, organic vapor concentrations shall be measured continuously. Organic vapor concentrations will be measured upwind of the work site(s) to determine background concentrations at least twice a day, (once in the morning and once in the afternoon). The FR will interpret monitoring results using professional judgment and according to the alert and action limits set forth in the associated site work plan.

A dust meter will be used to measure airborne particulate matter during intrusive activities. Monitoring will be continuous and readings will be averaged over a 15-minute period for comparison with the action levels. Monitoring personnel will make a best effort to collect dust monitoring data from downwind of the intrusive activity. If off-site sources are considered to be the source of the measured dust, upwind readings will also be collected.

A combustible gas indicator (CGI) meter shall be used to monitor for combustible gases and oxygen content during intrusive activities. The CGI will also be equipped with an H_2S sensor

and an HCN sensor. H_2S monitoring will be completed every 15 minutes or, if a sulfur odor is present, monitoring will be continuous. HCN monitoring will be completed every 15 minutes or, if an almond odor is detected, monitoring will be continuous.

Guidelines have been established by the National Institute for Occupational Safety and Health (NIOSH) concerning the action levels for work in a potentially explosive environment. These guidelines are as follows: 10-percent of the lower explosive limit (% LEL) - Limit all activities to those which do not generate sparks and 20% LEL - Cease all activities in order to allow time for the combustible gases to vent.

Perimeter and work zone air monitoring will be conducted during intrusive activities such as monitoring well installation and abandonment, recovery well installation and abandonment, soil borings and groundwater probes. Table 2-1 provides a summary of real time air monitoring action levels and contingency plans for work zone activities. The below action levels are determined by halving the permissible exposure limits (PELs) or Threshold Limit Values (TLVs) as set forth by the Occupational Safety and Health Administration (OSHA) and the American Conference of Government Industrial Hygienists (ACGIH). Oxygen values are based on the maximum use limits of a full face respirator if oxygen were being displaced by a chemical.

TABLE 3
WORK ZONE AIR MONITORING ACTION LEVELS

Air Monitoring Instrument	Monitoring Location	Action Level	Site Action
PID	Breathing Zone	1.0 ppm	Use Dräger Chip Measurement System (CMS) or tube for benzene or Z-nose® to verify if concentration is benzene. No respiratory protection is required if benzene is not present.
		10 ppm	Use Dräger Chip Measurement System (CMS) or tube for naphthalene or Z-nose® to verify if concentration is naphthalene. No respiratory protection is required if naphthalene is not present.
		10 - 50 ppm	No respiratory protection is required if benzene or naphthalene is not present.
		50 - 100 ppm	Stop work, withdraw from work area, institute engineering controls, if levels persist, upgrade to Level C.
		> 100 ppm	Stop work, withdraw from work area; notify PM & CHSO.

3. Statement of Safety and Health Policy

TABLE 2-1
REAL TIME WORK ZONE AIR MONITORING ACTION LEVELS

Air Monitoring Instrument	Monitoring Location	Action Level (above background)	Site Action
PID	Breathing Zone	1.0 ppm	Use Dräger Chip Measurement System (CMS) or tube for benzene or Z-nose® to verify if concentration is benzene. No respiratory protection is required if benzene is not present.
PID	Work Zone	10 ppm	Use Dräger Chip Measurement System (CMS) or tube for naphthalene or Z-nose® to verify if concentration is naphthalene. No respiratory protection is required if naphthalene is not present.
		10 - 50 ppm	No respiratory protection is required if benzene or naphthalene is not present.
		50 - 100 ppm	Stop work, withdraw from work area, institute engineering controls, if levels persist, upgrade to Level C.
Oxygen meter	Work Zone	< 20.7%	Stop work; withdraw from work area; ventilate area, notify SSO & CHSO.
		> 21.1%	Stop work; withdraw from work area; notify SSO & CHSO.
H_2S meter	Work Zone	<5 ppm	No respiratory protection is required
		>5 ppm	Stop work, cover excavation, withdraw from work area, institute engineering controls, notify SSO & CHSO
HCN meter	Work Zone	<1.0 ppm	Run CMS Drager tube. Continue monitoring with real time meter, and continue work if CMS Drager Tube Reading is less than 2ppm.
		1.0< HCN Conc.<2.0 ppm	Run CMS Drager tube and confirm concentration is less than 2.0 ppm, notify SSO and CHSO. Run CMS 30 tube for sulfur dioxide, hydrogen sulfide, and phosphine chip potential interferences. Continue to monitor with real time meter.
		>2.0 ppm	Stop work, and move (with continuous HCN monitoring meter) at least 25 ppm upwind of the excavation until continuous meter reads less than 1 ppm, Notify SSO & CHSO. Run CMS Drager hydrogen cyanide chip and re-evaluate activity, continue monitoring with a real time meter, resume work if concentrations read less than 1.0 ppm.
CGI	Work Zone	< 10 % LEL	Investigate possible causes, allow excavation to ventilate; use caution during procedures.
		> 10% LEL	Stop work; allow excavation, borehole to ventilate to < 10% LEL; if ventilation does not result in a decrease to < 10% LEL, withdraw from work area; notify SSO & CHSO.
Particulate Meter	Work Zone	150 µg/m^3	Implement work practices to reduce/minimize airborne dust generation, e.g., spray/misting of soil with water

GEI is committed to providing a safe and healthy work environment for its employees. To maintain a safe work environment, GEI has established an organizational structure and a Corporate Health and Safety Program to promote the following objectives:

- Reduce the risk of injury, illness, and loss of life to GEI employees.
- Maintain compliance with federal, state, and other applicable safety regulations.
- Minimize GEI employees' work exposure to potential physical, chemical, and biological hazards.

4. Key Project Personnel/Responsibilities and Lines of Authority

GEI Personnel		
Errol Kitt	Long Island MGP Program Manager	Office: 631-759-2964 Cell: 631-513-7191
Mike Zukauskas	Project Manager (PM)	Office: 973-873-7113 Cell: 908-458-3230
Matt O' Neil	Task Manager	Office: 401-533-5152 Cell: 860-608-9725
Mike Quinlan	Task Manager	Office: 631-759-2972 Cell: 631-708-8063
Chris Anastasiou	Task Manager	Office: 631-759-2976 Cell: 631-609-7085
Tess Landgraff	Local Health and Safety Coordinator	Office: 631-759-2963 Cell: 631-356-2287
Various Staff (Activity Dependent)	Site Safety Officer (SSO), Field Representative(FR)	
Steve Hawkins	Regional Health and Safety Officer (RHSO)	Office: 860-368-5348 Cell: 860-916-4167
Robin DeHate	Corporate Health and Safety Officer (CHSO)	Office: 813-774-6564 Cell: 813-323-6220

Lines of Authority will be as follows:

Onsite – GEI will have responsibility for safety of its employees during the work performed at the site. GEI's FR will have a cell phone available to contact the appropriate local authorities, in the event of an emergency. The FR will be available for communication with the SSO and PM and with the National Grid representative. The FR and/or SSO may change due to the nature of work being conducted onsite.

4.1 Project Manager (PM)

Responsibilities of the PM include the following:

- Verifies implementation of the HASP
- Conducts periodic inspections and documents these in the field book
- Participates in incident investigations
- Verifies the HASP has all of the required approvals before any site work is conducted
- Verifies that the National Grid site manager is informed of project changes, which require modifications of the HASP
- Has overall responsibility for project health and safety
- Acts as the primary point of contact with National Grid for site related activities and coordination with non-project related site operations
- Overseeing of performance of project tasks as outlined in the scope of work
- Plans field work using appropriate safe procedures and equipment
- Verifies and documents current training and medical monitoring clearance for GEI project staff
- Verifies that subcontractor has a site-specific HASP

4.2 Corporate Health and Safety Officer (CHSO)

The CHSO is a qualified health and safety professional with experience in hazardous waste site remediation activities. Responsibilities of the CHSO include the following:

- Provides support for the development and approval of the HASP
- Serves as the primary contact to review health and safety matters that may arise
- Approves revised or new safety protocols for field operations
- Coordinates revisions of this HASP with field personnel
- Coordinates upgrading or downgrading of PPE with the site manager
- Leads the investigation of all accidents/incidents
- Provide the necessary training of GEI field crews in accordance with OSHA regulations and provides proof of training to the SSO prior to GEI personnel entering the site

4.3 Site Safety Office (SSO)

Responsibilities of the SSO include the following:

- Verifies that the HASP is implemented and that all health and safety activities identified in the HASP are conducted and/or implemented
- Verifies that field work is scheduled with adequate personnel and equipment resources to complete the job safely and enforces site health and safety rules
- Verifies that adequate communications between field crews and emergency response personnel is maintained during emergency situations
- Verifies that field site personnel are adequately trained and qualified to work at the site and that proper PPE is utilized by field teams
- Investigate and report all accidents/incidents to the CHSO and PM
- Stop work if necessary
- Identifies operational changes which require modifications to the HASP and ensures that the procedure modifications are implemented and documented through changes to the HASP, with CHSO and National Grid approval
- Determines upgrades or downgrades of PPE based on site conditions and/or real-time monitoring results with CHSO and National Grid approval
- Reports to the CHSO and provides summaries of field operations and progress

4.4 Field Representative (FR)

The FR is responsible for carrying out field work on a monthly, quarterly, or as-needed basis. Responsibilities of the FR include:

- Conducts routine safety inspection of the work area
- Documenting occurrences of unsafe activity and what actions were taken to rectify the situation
- Reports any unsafe or potentially hazardous conditions to the SSO and PM
- Maintains familiarity of the information, instructions, and emergency response actions contained in the HASP
- Complies with rules, regulations and procedures set forth in the HASP
- Prevents admittance to work site by unauthorized personnel
- Inspects all tools and equipment, including PPE, prior to use and documents inspection on the daily safety meeting form or in the appropriate field book
- Ensures that monitoring instruments are calibrated
- Stops work if necessary

5. Subcontractors

GEI subcontracts with various companies to conduct various work onsite on an as-needed basis. Contact information for these subcontractors will be available when such work is being conducted.

GEI requires its subcontractors to work in a responsible and safe manner. Subcontractors for this project will be required to develop their own HASP for protection of their employees and must adhere to applicable requirements set forth in this HASP. GEI will verify that its subcontractor's HASP includes National Grid's site specific requirements as outlined in this HASP.

6. Emergency Contact List

<table>
<tr><th colspan="4">EMERGENCY INFORMATION</th></tr>
<tr><td colspan="2"><u>Important Phone Numbers</u></td><td colspan="2">Directions to:
Glen Cove Hospital
101 Saint Andrews Lane
Glen Cove, NY 11542</td></tr>
<tr><td>Police</td><td>911</td><td colspan="2" rowspan="4">• Head east on Grove Street toward Cedar Swamp Road
• Left on Cedar Swamp Road
• Continue onto Glen Street after 0.2 miles
• Turn right onto Pearsall Ave. after 0.2 miles
• Bear left onto Walnut Road and continue 0.6 miles
• Turn left onto Saint Andrews Lane
• Hospital will be on the left

Refer to Hospital Route Map in Appendix A.</td></tr>
<tr><td>Fire Department</td><td>911</td></tr>
<tr><td>Ambulance</td><td>911</td></tr>
<tr><td>Occupational Health Clinic
Plainview Medical Group</td><td>(516) 822-2541</td></tr>
<tr><td>Local Hospital
Glen Cove Hospital</td><td>(516) 674-7325
Emergency
(516) 674-7300
General</td><td colspan="2">(973) 873-7113 office
(908) 458-3230 cell</td></tr>
<tr><td>Project Manager</td><td>Mike Zukauskas</td><td colspan="2">(973) 873-7113 office
(908) 458-3230 cell</td></tr>
<tr><td>Site-Wide Task Manager</td><td>Matt O’Neil</td><td colspan="2">(401) 533-5152 office
(860) 608-9725 office</td></tr>
<tr><td>NYSDEC Spill Hotline</td><td></td><td colspan="2">(518) 457-7362</td></tr>
<tr><td>Corporate H&S Officer</td><td>Robin DeHate</td><td colspan="2">(813) 323-6220 cell
(813) 774-6564 office</td></tr>
<tr><td>Regional H&S Officer</td><td>Steve Hawkins</td><td colspan="2">(860) 916-4167 cell
(860) 368-5348 office</td></tr>
<tr><td>Local H&S Coordinator</td><td>Tess Landgraff</td><td colspan="2">(631) 356-2287 cell
(631) 759-2965 office</td></tr>
<tr><td colspan="4">Client Contacts</td></tr>
<tr><td>Ted Leissing</td><td colspan="2">(516) 545-2563-office</td><td>(917) 734-3244-cell</td></tr>
<tr><td>Sarah Aldridge</td><td colspan="2">(516) 545-2568-office</td><td>(516) 790-1660-cell</td></tr>
</table>

7. Training Program

7.1 HAZWOPER Training

In accordance with 29 CFR 1910.120, hazardous waste site workers shall, at the time of job assignment, have received a minimum of 40 hours of initial health and safety training for hazardous waste operations and emergency response (HAZWOPER). At a minimum, the training shall have consisted of instruction in the topics outlined in the standard and can include applicable sections of 29 CFR 1926. Personnel who have not met the requirements for initial training shall not be allowed to work in any site activities in which they may be exposed to hazards (chemical or physical). Proof of training shall be submitted to the CHSO or her representative prior to the start of field activities.

7.2 Annual Eight-Hour Refresher Training

Annual eight-hour refresher training will be required of all hazardous waste site field personnel in order to maintain their qualifications for fieldwork. The training will cover a review of 29 CFR 1910.120 requirements and related company programs and procedures. Proof of current 8-hour refresher training shall be submitted to the CHSO or her representative prior to the start of field activities.

7.3 Site-Specific Training

Prior to commencement of field activities, the CHSO or her representative will ensure all field personnel assigned to the project are familiarized with the activities, procedures, monitoring, and equipment used in the site operations. This includes site and facility layout, hazards associated with site tasks and activities, and emergency services at the site and will highlight all provisions contained within this HASP. This training will also allow field workers to clarify anything they do not understand and to reinforce their responsibilities regarding safety and operations for their particular activity. Personnel that have not received site-specific training will not be allowed onsite. All GEI personnel working on site will have current First Aid and CPR training.

7.4 Supervisor Training

Personnel acting in a supervisory capacity will have received 8 hours of instruction in addition to the initial 40 hours training. In addition, supervisors will have 1 year of field experience and training specific to work activities (i.e., sampling, construction observation, etc.).

7.5 Onsite Safety Briefings

Other onsite GEI personnel will be given health and safety briefings by a FR to assist GEI personnel in safely conducting work activities. The briefings will include information on new operations to be conducted, changes in work practices or changes in the site's environmental

conditions, as well as periodic reinforcement of previously discussed topics. The briefings will also provide a forum to facilitate conformance with safety requirements and to identify performance deficiencies related to safety during daily activities or as a result of safety inspections. The meetings will also be an opportunity to periodically update the workers on monitoring results. These safety briefing will be documented in the GEI field book or on the daily safety briefing form.

8. Medical Surveillance Program

GEI maintains a continuous, corporate, medical surveillance program that includes a plan designed specifically for field personnel engaged in work at sites where hazardous or toxic materials may be present. Robin DeHate is GEI's CHSO and is responsible for the administration and coordination of medical evaluations conducted for GEI's employees at all branch office locations. Comprehensive examinations are given to all GEI field personnel participating in hazardous waste operations on an annual or biennial basis (as determined to be appropriate by the CHSO). The medical results of the examinations aid in determining the overall fitness of employees participating in field activities.

Under the CHSO's supervision, all field personnel undergo a complete initial physical examination, including a detailed medical and occupational history, before they participate in hazardous waste site investigations. Extensive annual/biennial reexaminations are also performed. Upon completion of these tests, personnel are certified by an occupational health physician as to whether they are fit for field work in general, and fit to use all levels of respiratory protection, in particular.

If a GEI employee or other project worker shows symptoms of exposure to a hazardous substance and wishes to be rechecked, he/she will be directed to the nearest area hospital or medical facility.

All GEI subcontractor personnel that will enter any active waste handling or other potentially impacted area must certify that they are participating in a medical surveillance program that complies with OSHA regulations for hazardous waste operations (i.e., 29 CFR 1910.120 and 29 CFR 1926.65). Proof of medical clearance shall be submitted to the CHSO or their representative prior to the start of field activities.

9. Site Control Measures

9.1 Site Zones

During intrusive activities, site zones are intended to control the potential spread of contamination and to assure that only authorized individuals are permitted into potentially hazardous areas. Barricade tape and cones will be used to designate work zone areas. Decontamination will be conducted as outlined in Section 12. If any heavily contaminated soils

are encountered during intrusive work, separate wash areas for heavy equipment and personal PPE will be established.

10. Incident Reporting

GEI will report incidents involving GEI personnel or subcontractor personnel, such as lost time injuries, injuries requiring medical attention, near miss incidents, fires, fatalities, accidents involving the public, and property damage. The report shall be made to the GEI PM verbally within 2 hours of the incident. The PM will immediately inform the CHSO, the Director of Human Resources and a Project-Specific National Grid Representative for the incident. The Project-Specific National Grid Representative will be immediately notified with a phone call. An Incident Report Form (see **Appendix E**) will be completed and submitted to the CHSO and the Project-Specific National Grid Representative within 24 hours.

11. Medical Support

In case of minor injuries, onsite care shall be administered with the Site first aid kit. Staff may also go to the nearest occupational health provider (Plainview Medical Group) located at 87 Cold Spring Road, in Syosset, NY. Directions to Plainview Medical Group can be found in **Appendix A**.

For serious injuries, call 911 and request emergency medical assistance. Seriously injured persons should not be moved, unless they are in immediate danger.

Section 6 and **Appendix A** contain detailed emergency information, including directions to the nearest hospital, and a list of emergency services and their telephone numbers. GEI field personnel will carry a cellular telephone.

12. Decontamination Procedures

12.1 Personnel Decontamination Station

As needed, a personnel decontamination station where workers can drop equipment and remove PPE will be set up at the decontamination pad by the Contractor when intrusive activities are conducted at the site. It will be equipped with basins for water and detergent, and trash bag(s) or cans for containing disposable PPE and discarded materials. Once personnel have decontaminated at this station and taken off their PPE, they will proceed to a portable sink where they will wash themselves wherever they have potentially been exposed to any contaminants (e.g., hands, face, etc.).

Contaminated PPE (gloves, suits, etc.) will be decontaminated and stored for reuse or placed in plastic bags (or other appropriate container) and disposed of in an approved facility.

Decontamination wastewater and used cleaning fluids will be collected and disposed of in accordance with all applicable state and federal regulations.

12.2 Decontamination Equipment Requirements

If heavily contaminated soils are encountered during intrusive work, the following equipment, as needed, will be in sufficient supply to implement decontamination procedures for GEI's equipment.

- Buckets
- Alconox™ detergent concentrate
- Hand pump sprayers
- Long handle soft bristle brushes
- Large sponges
- Cleaning wipes for respirators
- Bench or stool(s)
- Methanol
- Liquid detergent and paper towels
- Plastic trash bags

13. Personal Protective Equipment

PPE required for each level of protection is as follows.

Safety Equipment	Level A	Level B	Level C	Level D
Tyvek® suit or work overalls as appropriate for work being performed and materials handled				•
Hard hats with splash shields or safety glasses			•	•
Steel-toe boots with overboots as appropriate for work being performed and materials handled			•	•
Chemical-resistant gloves			•	•
Reflective Vest			•	•
Half- or full-face respirators with HEPA cartridges as approved by the CHSO			•	
Tyvek® splash-resistant suit			•	
Chemical-resistant clothing		•		
Long Pants	•	•	•	•
Pressure-demand, full-face SCBA or pressure-demand supplied air respirator with escape SCBA	•	•		
Inner and outer chemical-resistant gloves	•	•		
Chemical-resistant safety boots or shoes	•	•		
Two-way radio	•	•		
Hard hat	•	•	•	•
Fully encapsulating chemical-resistant suit	•			

PPE requirements for field activities are as follows.

Activity	Level of Protection	Backup Protection
Groundwater monitoring	D	C
DNAPL gauging and recovery	D	C
Install/Abandon wells and sample points	D	C
Oxygen injection system check	D	C
Intrusive activities (i.e. excavation, trenching)	D	C
Site investigation and remediation (including oversight)	D	C
Site Maintenance	D	C

PPE can include hardhats, safety glasses or face shields, steel toe/steel shank boots, hearing protection, nitrile gloves, and leather gloves as necessary.

OSHA Requirements for PPE

All PPE used during the course of this field investigation must meet the following OSHA standards:

Type of Protection	Regulation	Source
Eye and Face	29 CFR 1910.133	ANSI Z87.1 1968
Respiratory	29 CFR 1910.134	ANSI Z88.1 1980
Head	29 CFR 1910.135	ANSI Z89.1 1969
Foot	29 CFR 1910.136	ANSI Z41.1 1999 or ASTM F-2412-2005, and ASTM F-2413-2005

CRF = Code of Federal Regulations
ANSI = American National Standards Institute
ASTM = American Society For Testing and Materials

Any onsite personnel who have the potential to don a respirator must have a valid fit test certification and documentation of medical clearance. The CHSO will maintain such information on file for onsite personnel. The PM will obtain such information from the subcontractor's site supervisor prior to the initiation of any such work. Both the respirator and cartridges specified for use in Level C protection must be fit-tested prior to use in accordance with OSHA regulations (29 CFR 1910.134). Air purifying respirators cannot be worn under the following conditions:

- Oxygen deficiency;
- IDLH concentrations; and
- If contaminant levels exceed designated use concentrations.

For most work conducted at the site, Level D PPE will include long pants, hard hats, safety glasses with side shields, and steel toe safety boots. When work is conducted in areas where NAPL or tar-saturated soil is anticipated, workers shall wear, at a minimum, modified Level D PPE, which can include Tyvec® coveralls and safety boots with overboots. The use of respirators is not anticipated.

Use of Level A or Level B PPE is not anticipated. If conditions indicating the need for Level A or Level B PPE are encountered, personnel will leave the work zone and this HASP will be revised with oversight of the CHSO, GEI personnel will not re-enter the work zone until conditions allow.

14. Supplemental Contingency Plan Procedures

14.1 Hazard Communication Plan

GEI personnel have received hazard communication training as part of their 40-hour HAZWOPER training. All hazardous materials used on the Site will be properly labeled, stored, and handled. MSDS will be available to onsite staff.

14.2 Fire

In the event of a fire, all personnel will evacuate the area. GEI's field representative will contact the local fire department and report the fire. Notification of evacuation will be made to the GEI PM and the CHSO. The field representative will account for GEI personnel and subcontractor personnel and report their status to the PM. **Appendix H** contains the Emergency Evacuation Plan should staff need to relocate during an emergency.

14.3 Severe Weather

The contingency plan for severe weather includes reviewing the expected weather to determine if severe weather is in the forecast. Severe weather includes high winds over 30 mph, heavy rains or snow squalls, thunderstorms, hurricanes, and lightning storms. If severe weather is approaching, the decision to evacuate GEI personnel and subcontractor personnel from the site is the responsibility of GEI's field representative. Notification of evacuation will be made to the GEI Project Manager, the CHSO, and the National Grid PM. The field representative will account for GEI personnel and subcontractor personnel and report their status to the PM.

14.4 Spills or Material Release

If a hazardous waste spill or material release, the SSO or their representative will immediately assess the magnitude and potential seriousness of the spill or release based on the following:

- MSDS, if applicable, for the material spilled or released
- Source of the release or spillage of hazardous material
- An estimate of the quantity released and the rate at which it is being released
- The direction in which the spill or air release is moving
- Personnel who may be or may have been in contact with the material, or air release, and possible injury or sickness as a result
- Potential for fire and/or explosion resulting from the situation
- Estimates of area under influence of release

If the spill or release is determined to be within the onsite emergency response capabilities, the SSO will ensure implementation of the necessary remedial action. If the release is beyond the

capabilities of the site personnel, all personnel will be evacuated from the immediate area and the local fire department will be contacted. The SSO will notify the PM, the CHSO and the National Grid PM. Spills related to the OU-1 groundwater treatment facility and DNAPL recovery system are regulated under the Emergency Response and Release Reporting Plan, which can be found in **Appendix I**.

14.5 Alcohol and Drug Abuse Prevention

Alcohol and drugs will not be allowed on the work site. Project personnel under the influence of alcohol or drugs will not be allowed to enter the site.

Health and Safety Plan Sign-Off

All GEI personnel conducting site activities must read this Health and Safety Plan, be familiar with its requirements, and agree to its implementation.

All other personnel onsite for regulatory, observational and other activities not directly associated with remedial activities must read this Health and Safety Plan for hazard communication purposes.

Once the Health and Safety Plan has been read, complete this sign-off sheet, and return it to the Project Manager.

Site Name:
Glen Cove Former MGP Site

Activity:
Mobilization, demobilization, utility location, excavation/trenching/construction oversight, air monitoring, gauging and recovery of Dense Non-Aqueous Phase Liquids (DNAPL), oxygen injection systems checks, installation/abandonment/maintenance of soil borings, groundwater probes, wells and sample points, groundwater monitoring.

GEI Project No: 093270

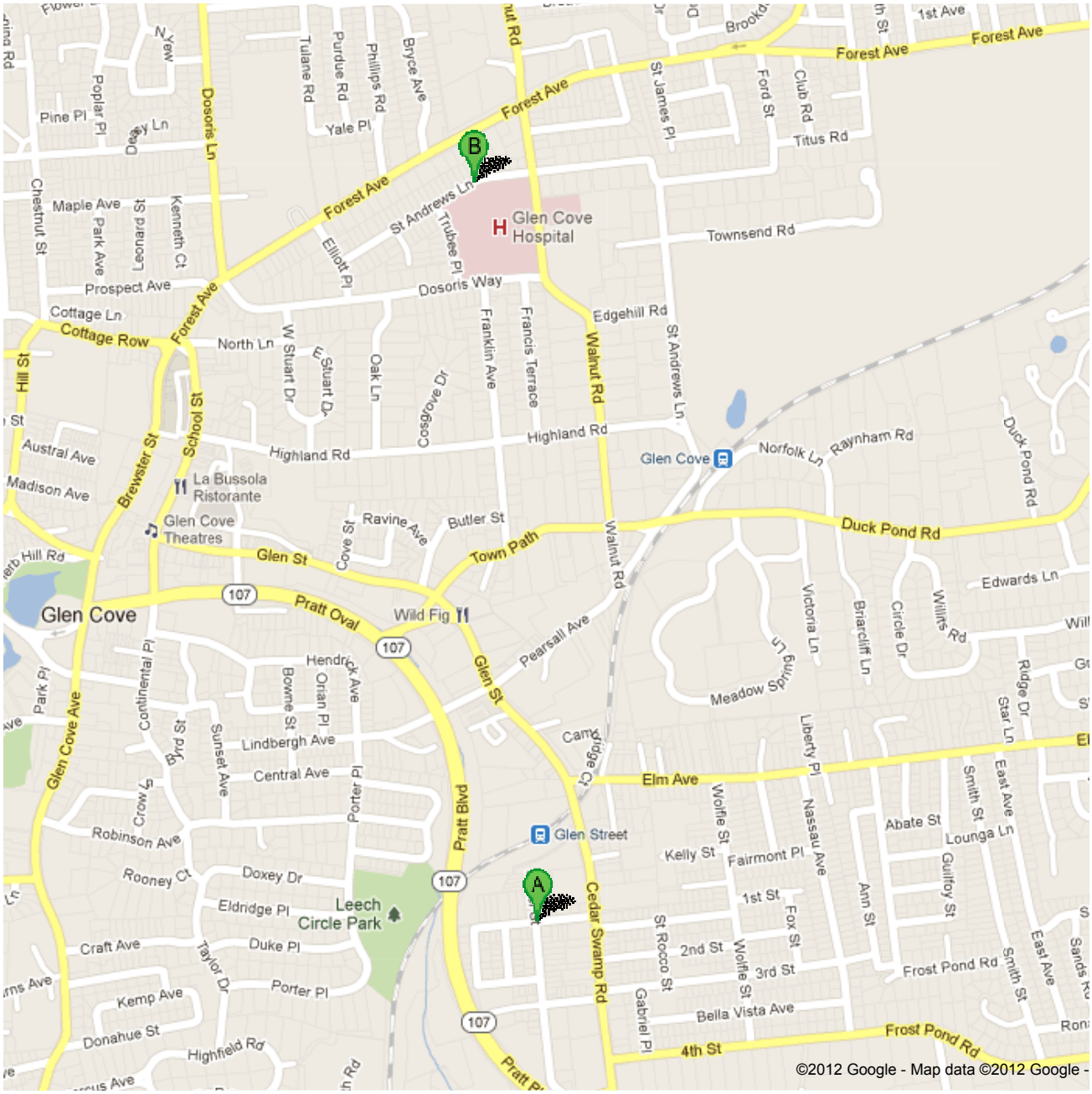
Name	Signature	Date	Company	Check if HAZCOM only

APPENDIX A

SITE-SPECIFIC INFORMATION

Google

Directions to 101 St Andrews Ln, Glen Cove, NY 11542
1.4 mi – about **5 mins**



Grove St, Glen Cove, NY 11542

	1. Head **east** on **Grove St** toward **Cedar Swamp Rd**	go 459 ft total 459 ft
	2. Turn left onto **Cedar Swamp Rd** About 1 min	go 0.2 mi total 0.3 mi
	3. Continue onto **Glen St**	go 0.2 mi total 0.5 mi
	4. Turn right onto **Pearsall Ave**	go 0.2 mi total 0.7 mi
	5. Slight left onto **Walnut Rd** About 2 mins	go 0.6 mi total 1.3 mi
	6. Turn left onto **St Andrews Ln** Destination will be on the left	go 469 ft total 1.4 mi

101 St Andrews Ln, Glen Cove, NY 11542

DIRECTIONS TO:
Occupational Health Provider
Plainview Medical Group
87 Cold Spring Road
Syosset, NY 11791
516-822-2541

- Head east on Grove Street toward Cedar Swamp Road (go 459 ft.)
- Turn right onto Cedar Swamp Road (go 0.4 mi)
- Continue onto Pratt Blvd/Pratt Oval (go 0.8 mi)
- Continue onto Cedar Swamp Road (go 1.8 mi)
- Turn left onto Northern Blvd (go 3.8 mi)
- Turn right onto Split Rock Road (go 1.8 mi)
- Turn left onto Muttontown Eastwoods Road (go276 ft)
- Continue onto Cold Spring Road (go 0.1 mi)
- Destination will be on the left

APPENDIX B

COLD STRESS GUIDELINES

Cold Stress Guidelines

	Symptoms	What to do
Mild Hypothermia	• Body Temp 98-90°F • Shivering • Lack of coordination, stumbling, fumbling hands • Slurred speech • Memory loss • Pale, cold skin	• Move to warm area • Stay active • Remove wet clothes and replace with dry clothes of blankets • Cover the head • Drink warm (not hot) sugary drink
Moderate Hypothermia	• Body temp 90-86°F • Shivering stops • Unable to walk or stand • Confused irrational	• All of the above, plus: • Call 911 • Cover all extremities completely • Place very warm objects, such as hot packs on the victim's head, neck, chest and groin
Severe Hypothermia	• Body temp 86-78°F • Severe muscle stiffness • Very sleepy or unconscious • Ice cold skin • Death	• Call 911 • Treat victim very gently • Do not attempt to re-warm
Frostbite	• Cold, tingling, stinging or aching feeling in the frostbitten area, followed by numbness • Skin color turns red, then purple, then white or very pale skin • Cold to the touch • Blisters in severe cases	• Call 911 • Do not rub the area • Wrap in soft cloth • If help is delayed, immerse in warm, not hot, water
Trench Foot	• Tingling, itching or burning sensation • Blisters	• Soak feet in warm water, then wrap with dry cloth bandages • Drink a warm sugary drink

APPENDIX C

HEAT STRESS GUIDELINES

HEAT STRESS GUIDELINES			
Form	**Signs & Symptoms**	**Care**	**Prevention[3]**
Heat Rash	Tiny red vesicles in affected skin area. If the area is extensive, sweating can be impaired.	Apply mild lotions and cleanse the affected area.	Cool resting and sleeping areas to permit skin to dry between heat exposures
Heat Cramps	Spasm, muscular pain (cramps) in stomach area and extremities (arms and legs).	Provide replacement fluids with minerals (salt) such as Gatorade.	Adequate salt intake with meals[1] ACCLIMATIZATION[2]
Heat Exhaustion	Profuse sweating, cool (clammy) moist skin, dizziness, confusion, pale skin color, faint, rapid shallow breathing, headache, weakness, muscle cramps.	Remove from heat, sit or lie down, rest, replace lost water with electrolyte replacement fluids (water, Gatorade) take frequent sips of liquids in amounts greater than required to satisfy thirst.	ACCLIMATIZATION[2] Adequate salt intake with meals 1 only during early part of heat season. Ample water intake, frequently during the day
Heat Stroke	HOT Dry Skin. Sweating has stopped. Mental confusion, dizziness, nausea, severe headache, collapse, delirium, coma.	HEAT STROKE IS A MEDICAL EMERGENCY - Remove from heat. - COOL THE BODY AS RAPIDLY AS POSSIBLE by immersing in cold (or cool) water, or splash with water and fan. Call for Emergency Assistance. Observe for signs of shock.	ACCLIMATIZATION[2] Initially moderate workload in heat (8 to 14 days). Monitor worker's activities.

Footnotes:

1.) American diets are normally high in salt, sufficient to aid acclimatization. However, during the early part of the heat season, (May, June), one extra shake of salt during one to two meals per day may help, so long as this is permitted by your physician. Check with your personal physician.

2.) ACCLIMATIZATION - The process of adapting to heat is indicated by worker's ability to perform hot jobs less fluid loss, lower concentrations of salt loss in sweat, and a reduced core (body) temperature and heart rate.

3.) Method to Achieve Acclimatization - Moderate work or exercise in hot temperatures during early part of heat season. Adequate salt (mineral) and water intake. Gradually increasing work time in hot temperatures. Avoid alcohol. Normally takes 8 to 14 days to achieve acclimatization. Lost rapidly, if removed from strenuous work (or exercise) in hot temperature for more than approximately five days.

APPENDIX D

UTILITY CLEARANCE FORMS AND PROCEDURES

Utility Clearance Documentation

Client: _____

Project: _____

Site: _____

Drilling Location ID: _____

Driller: _____

GEI PM: _____

GEI Field Team Leader: _____

Utility Drawings Reviewed: _____

Provided By: _____

Reviewed By: _____

One Call Utility Clearance Call Date: _____

Utility Clearance Received back from (list utilities): _____

Completed By (Company): _____ Date: _____

GEI Staff Responsible for Oversight: _____

Metal Detector Survey (yes/no): _____

Drilling Location Cleared by: _____

Contractor: _____ Date: _____

GEI Staff Responsible for Oversight: _____

Physical Test Pit Clearance Required (yes/no): _____

Contractor: _____ Date: _____

GEI Staff Responsible for Oversight: _____

Hand Clearing Performed: _____ Date: _____

Contractor: _____

GEI Staff Responsible for Oversight: _____

Notes:

Based upon the best available information, appropriate utility clearance procedures were performed for the invasive work specified. If client ordered/site specific deviations from existing GEI utility clearance procedures exist, they are approved by the client signature below.

Client Signature (Optional): _____ Date: _____

GEI, Inc. Representative: _____ Date: _____

Call 1-800-272-4480 TOLL FREE!

LOCATION REQUEST FORM

1. Caller's Name_____
2. Telephone Number_____
3. Contractor_____
4. Contractor 's Address_____
5. Work Date ___/___/___ Starting Work Time _____ AM or PM
6. Borough/County_____
7. Street Number_____
8. First Intersection_____
9. Second Intersection_____
10. Type of Work_____
11. Method of Excavation_____
    _____
12. Street _____ Sidewalk _____ Private Property _____

Other (specify)_____
_____
If Private Property: Front _____ Rear _____ Side _____

13. Person to contact_____
14. Telephone Number_____
15. Work Being Done For_____
16. Remarks_____
    _____
17. Serial Number_____
    _____
18. Member
    List_____
    _____

For Your Reference: Today's Date _____ Time_____

Please fill in the above info before you call, it will speed up your response.

APPENDIX E

INCIDENT REPORTING

INCIDENT REPORT FORM

Please attach photographs relating to the incident if possible.

Report No. _____

Site: _____ Project No. _____

Location: _____

Date of Report: _____ Preparer's Name:_____

Name and Address of Injured: _____

Date of Birth _____ Date of Hire: _____ Title/Classification: _____

Division/Department _____ Date of Accident _____ Time: _____

Accident Category: ___ Motor Vehicle ___ Property Damage ___ Fire

___ Chemical Exposure ___ Near Miss ___ Other

For vehicles involved in a motor vehicle incident, please fill out the following information:

MAKE: MODEL: VIN:_____PLATE NO.:_____ ___STATE:_____

MAKE: MODEL: VIN:_____PLATE NO.:_____ ___STATE:_____

MAKE: MODEL: VIN:_____PLATE NO.:_____ ___STATE:_____

MAKE: MODEL: VIN:_____PLATE NO.:_____ ___STATE:_____

Please attach photographs of the area the vehicle incident occurred in and of any damage to vehicles involved.

Severity of Injury or Illness: ____ Non-disabling ___ Disabling

____ Medical Treatment ___ Fatality

Amount of Damage: $_____ Property Damaged: _____

Estimated Number of Days Away from Job: _____

Nature of Injury or Illness: _____

CLASSIFICATION OF INJURY:

____ Fractures	____ Heat Burns	____ Cold Exposure
____ Dislocations	____ Chemical Burns	____ Frostbite
____ Sprains	____ Radiation Burns	____ Heat Stroke
____ Abrasions	____ Bruises	____ Heat Exhaustion
____ Lacerations	____ Blisters	____ Concussion
____ Punctures	____ Toxic Respiratory Exposure	____ Faint/Dizziness
____ Bites	____ Toxic Ingestions	____ Toxic Respiratory
____ Toxic Ingestions	____ Dermal Allergy	

Part of Body Affected: _____

Degree of Disability: _____

Date Medical Care Was Received: _____

Where Medical Care Was Received: _____

Address (if off-site): _____

ACCIDENT LOCATION:

Please provide a sketch of the accident location, vehicles involved, and any details as to how the accident occurred in the space below.

Causative agent most directly related to accident (object substance, material, machinery, equipment conditions):

_____

_____

Was weather a factor? _____

Unsafe mechanical/physical/environmental condition at time of accident (be specific):

Unsafe act by injured and/or others contributing to the accident (be specific, must be answered):

Personal factors (improper attitude, lack of knowledge or skill, slow reaction, fatigue):

Level of personal protection equipment required in Site Safety Plan:

Modifications:

Was injured using required equipment?

If not, how did actual equipment use differ from plan?

What can be done to prevent a recurrence of this type of accident (modification of machine; mechanical guards; correct environment training):

Detailed narrative description (how did accident occur, why; objects, equipment, tools used, circumstance assigned duties) (be specific):

(Use separate sheet as required)

Witnesses to accident _____

Signature of Preparer _____

Signature of Site Leader _____

APPENDIX F

TRAFFIC CONTROL

Utility Work Zone Traffic Control Field Guide Book

nationalgrid
The power of action.℠

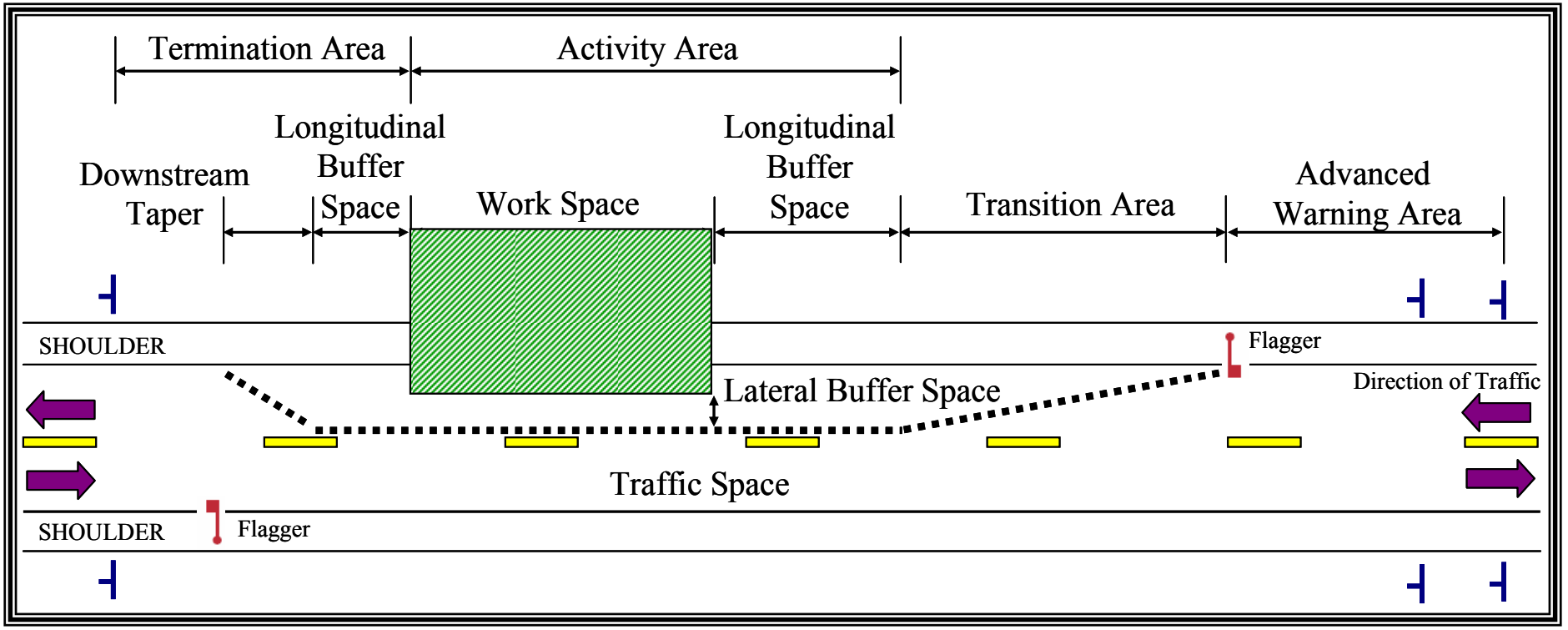
June 2009

- The Work Zone Traffic Control Plans in this guidebook meet the minimum requirements of the federal Manual of Uniform Traffic Control and Devices (MUTCD).

- State and local requirements must be considered when developing specific Work Zone Traffic Control Plans.

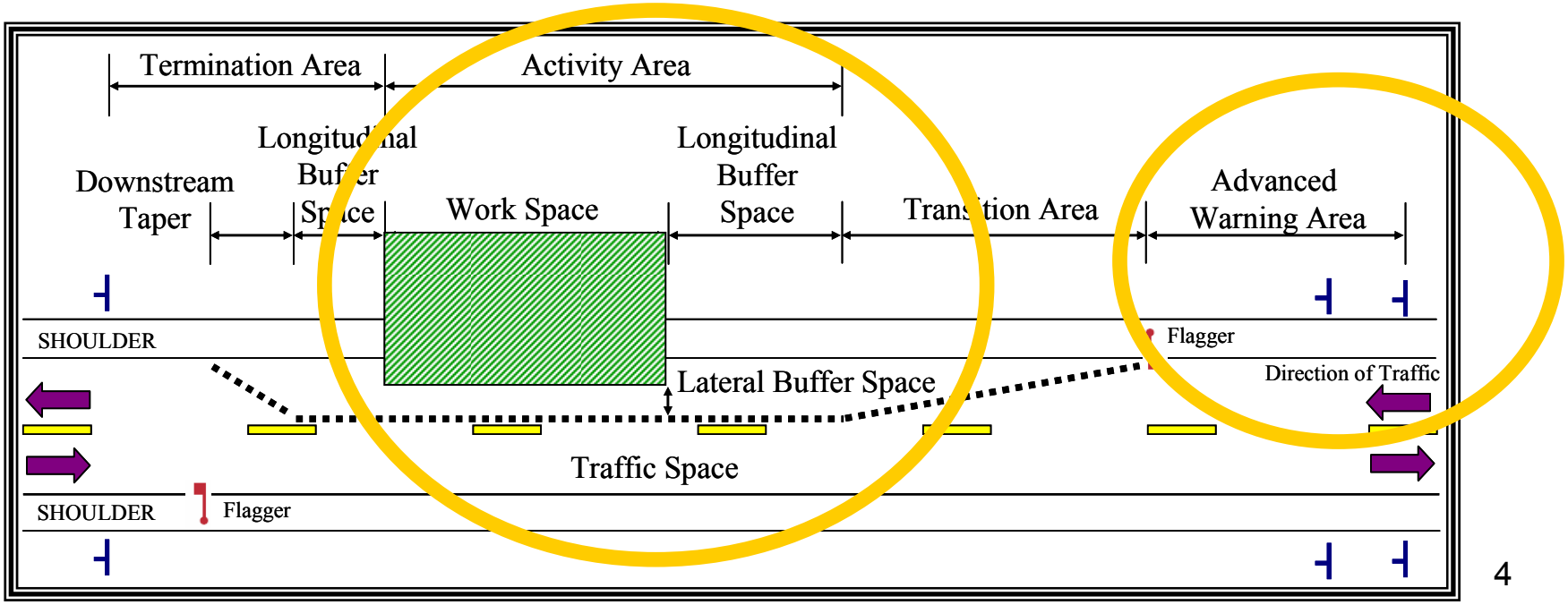
- The Work Zone Traffic Control Plans were developed for the United States Department of Transportation, Federal Highway Administration through a grant to Wayne State University and Bradley University. (August 2008)

Utility Work Zone Temporary Traffic Control Components



Temporary Traffic Control Components

- Activity Area **– work space, traffic space, and buffer space.**
- Advanced Warning Area **– used to provide warning to motorists of an upcoming utility activity.**

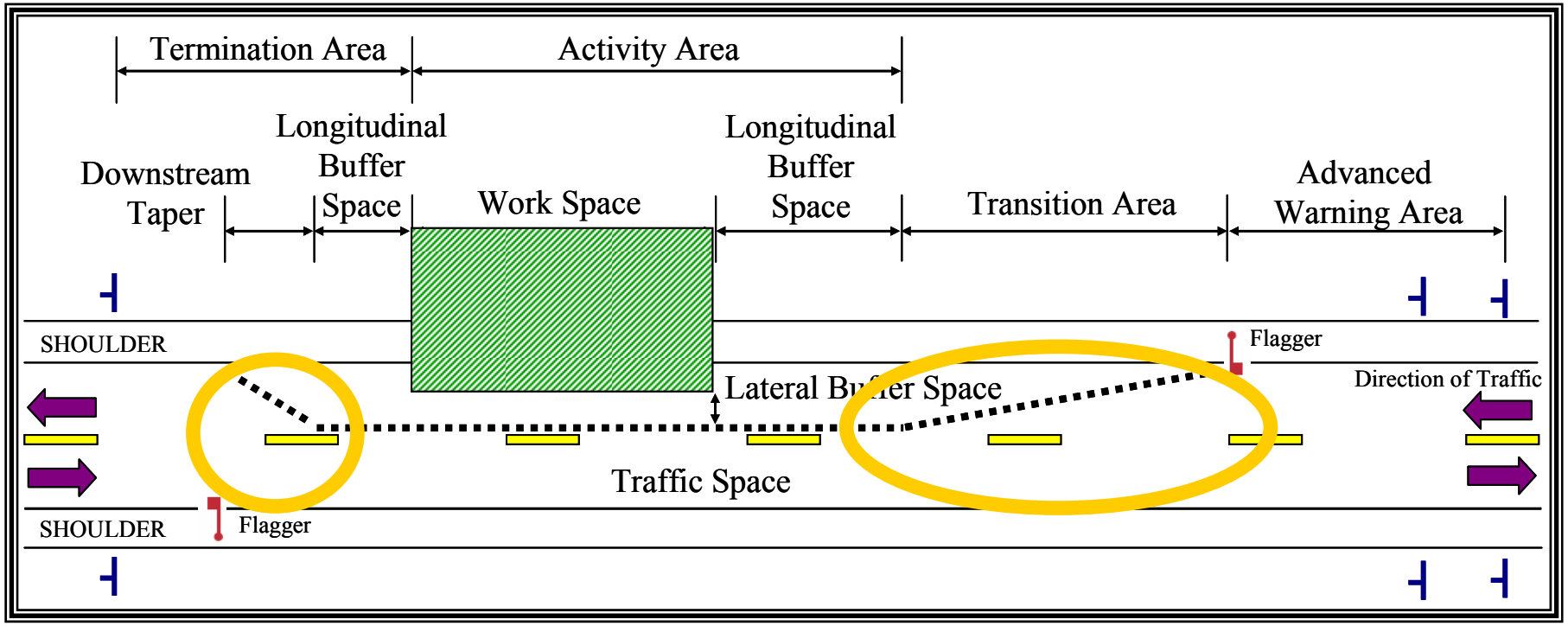


Distance Between Traffic Signs

Road Type	A (Distance Between Signs)
Urban (Low speed)< 45mph	30 m (100 ft)
Urban (High speed) ≥ 45 mph	100 m (350 ft)
Rural	150 m (500 ft)

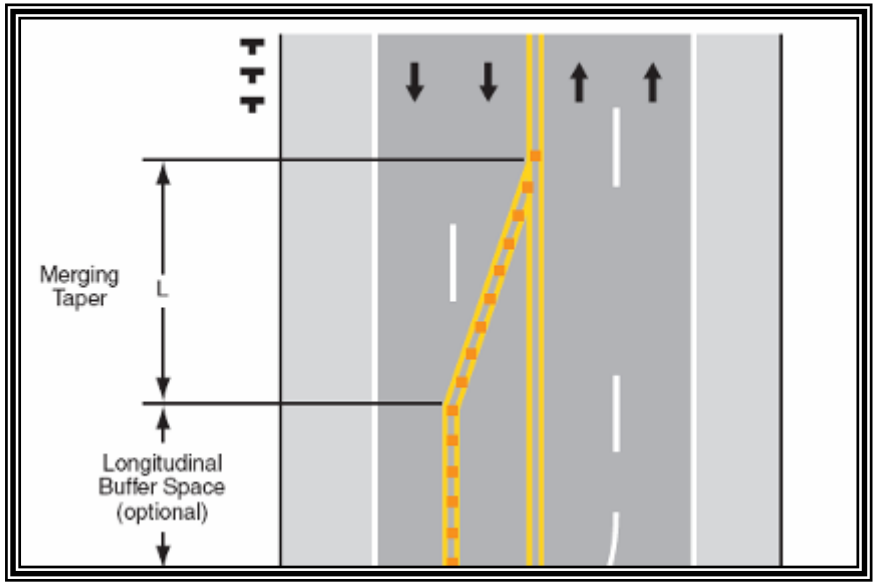
Temporary Traffic Control Components

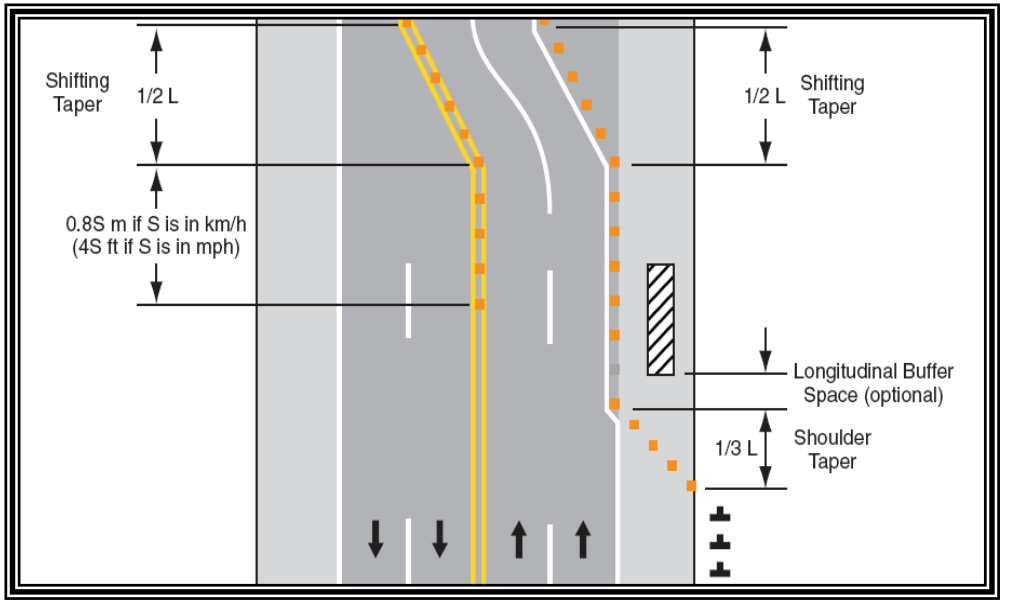
- Tapers – **gradual transition to direct traffic from normal paths to designated path, must be free of workers, vehicles, equipment, etc.**



Different Types of Tapers

Type of Taper	Taper Length (L)*
Merging Taper	at least L
Shifting Taper	at least 0.5L
Shoulder Taper	at least 0.33L
One-Lane, Two-Way Traffic Taper	30 m (100 ft) maximum
Downstream Taper	30 m (100 ft) per lane





Source: MUTCD Figure 6C-2 and Table 6C-3

Formulas for Calculating Taper Lengths

Speed Limit (S)	Taper Length (L) Meters
60 km/h or less	$L = \frac{WS^2}{155}$
70 km/h or more	$L = \frac{WS}{1.6}$

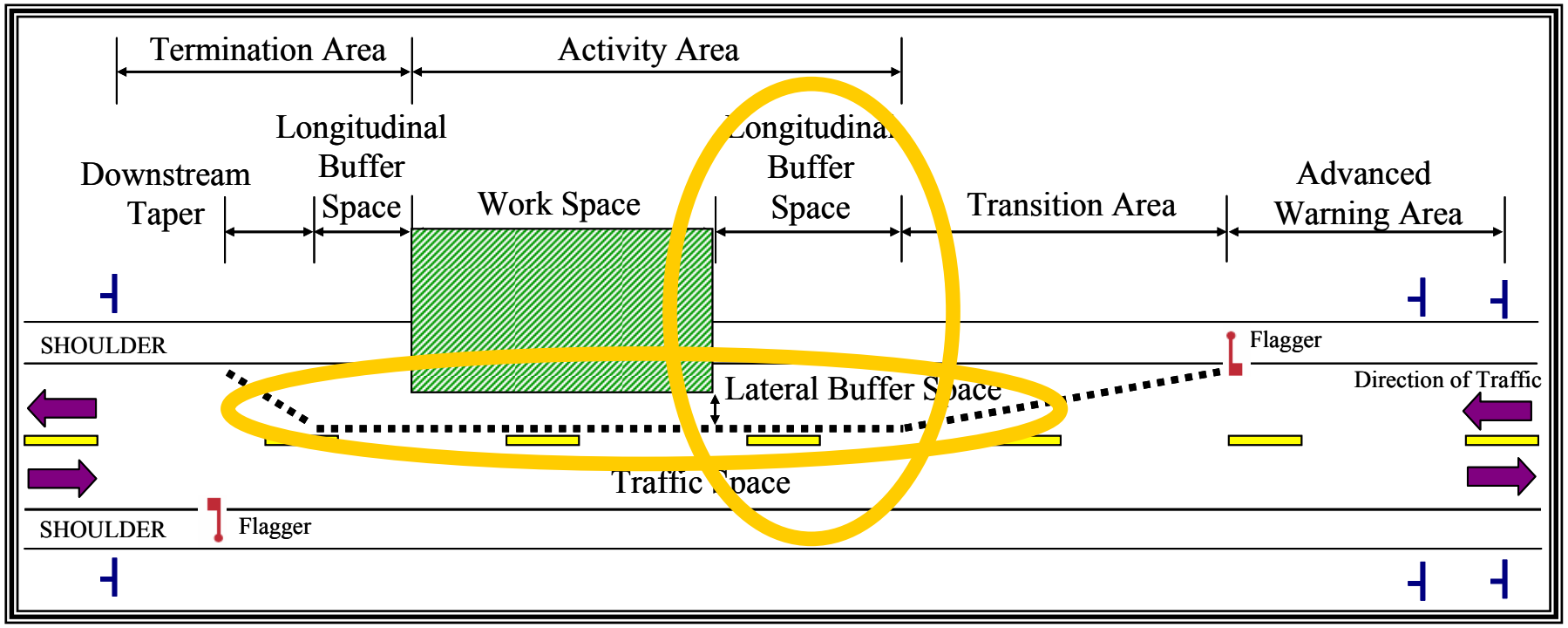
Speed Limit (S)	Taper Length (L) Feet
40 mph or less	$L = \frac{WS^2}{60}$
45 mph or more	L = WS

Where: L = taper length in meters (feet)
W = width of offset in meters (feet)
S = posted speed limit, or off-peak 85th-percentile speed prior to work starting, or the anticipated operating speed in km/h (mph)

Source: MUTCD Table 6C-4

Temporary Traffic Control Components

- Buffer Space (Optional) **– lateral and/or longitudinal area that separates traffic from work space, must be free of workers, vehicles, equipment, etc.**

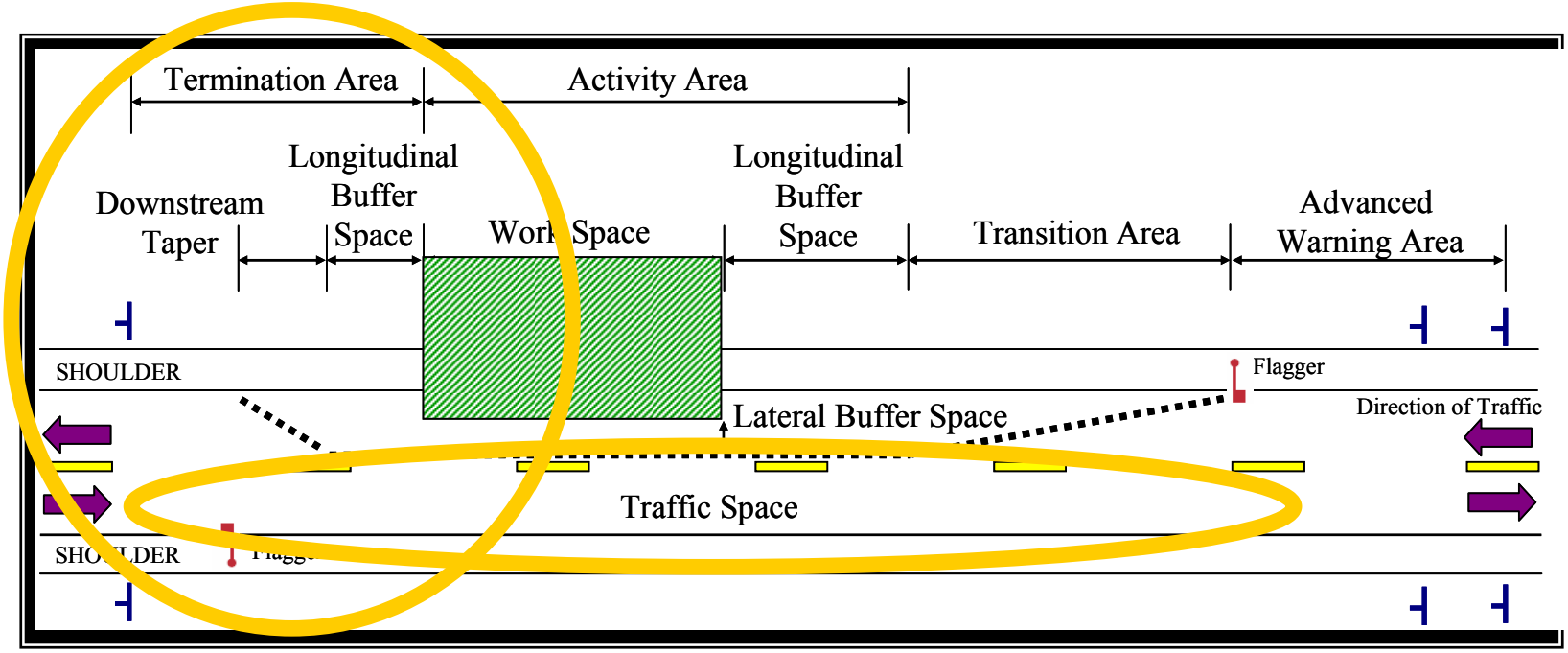


Why Use a Buffer Space?

- Improves worker safety
- Required in some jurisdictions
- May alleviate the need for more complex Traffic Control measures
- Provides additional space between work zone and motorists
- Easy to accommodate into Work Zone plan

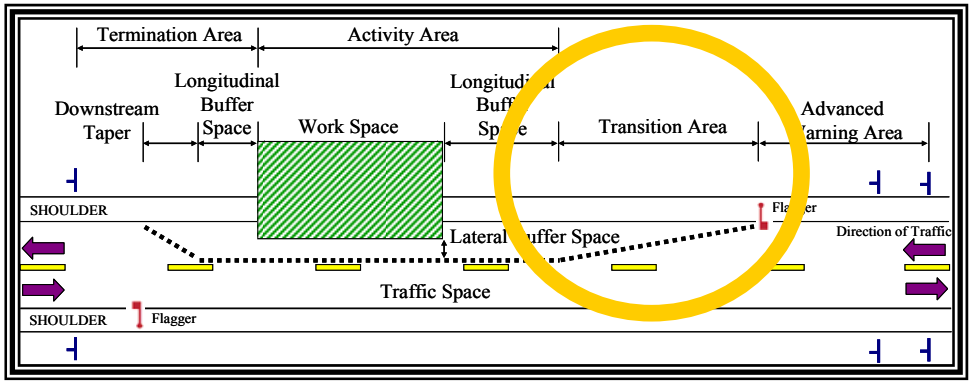
Temporary Traffic Control Components

- Termination Area – **area used to return to normal path**
- Traffic Space – **portion of highway in which road users are routed through the activity area**

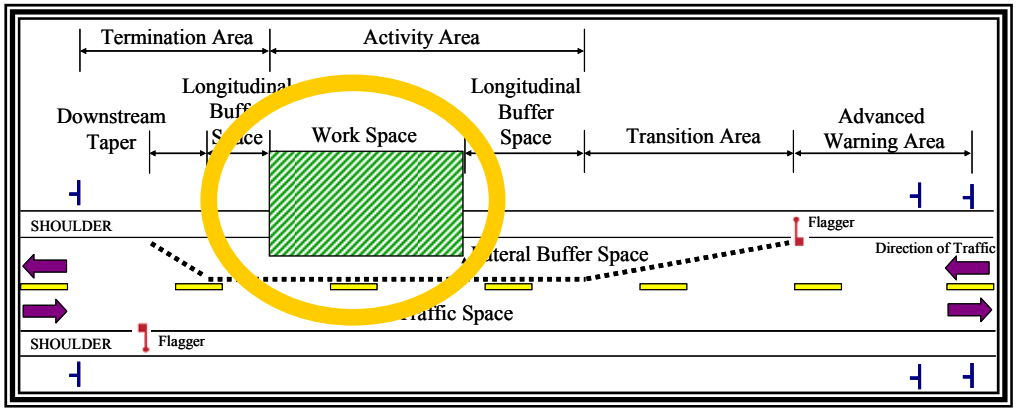


Temporary Traffic Control Components

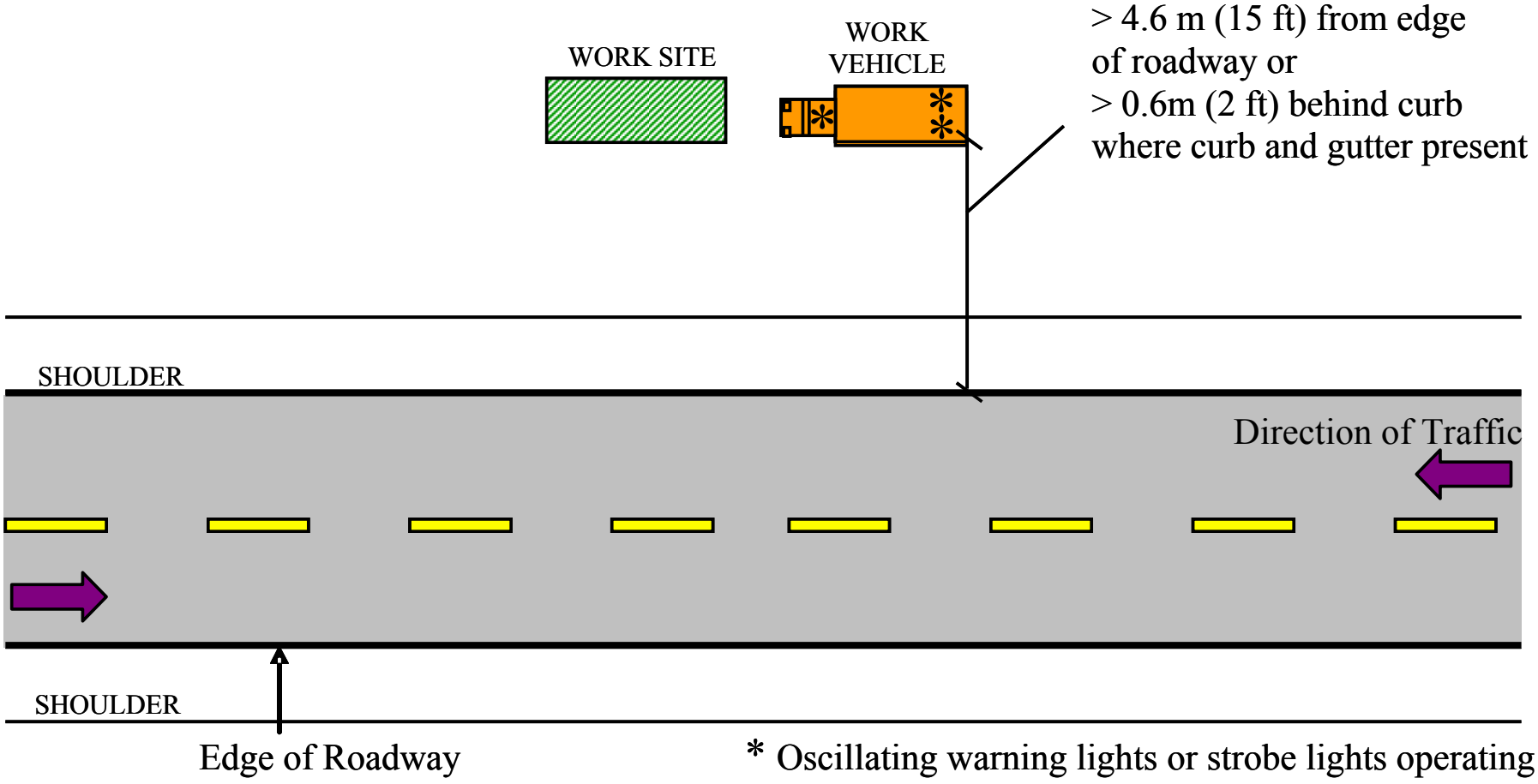
- Transition Area – **area utilized to move motorists from their normal path**



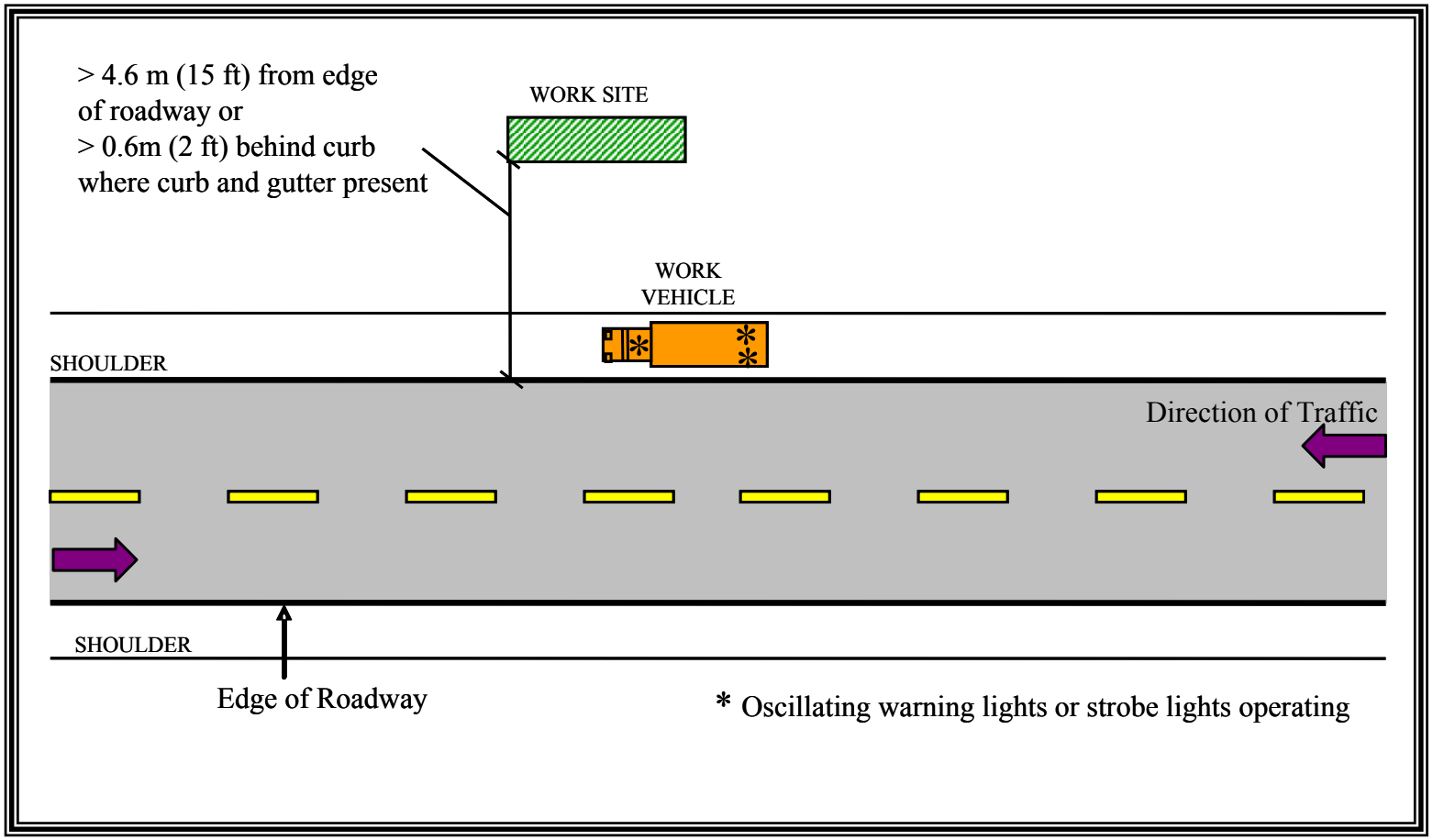
- Work Space – **portion closed to road users – occupied by utility workers, equipment and vehicles.**



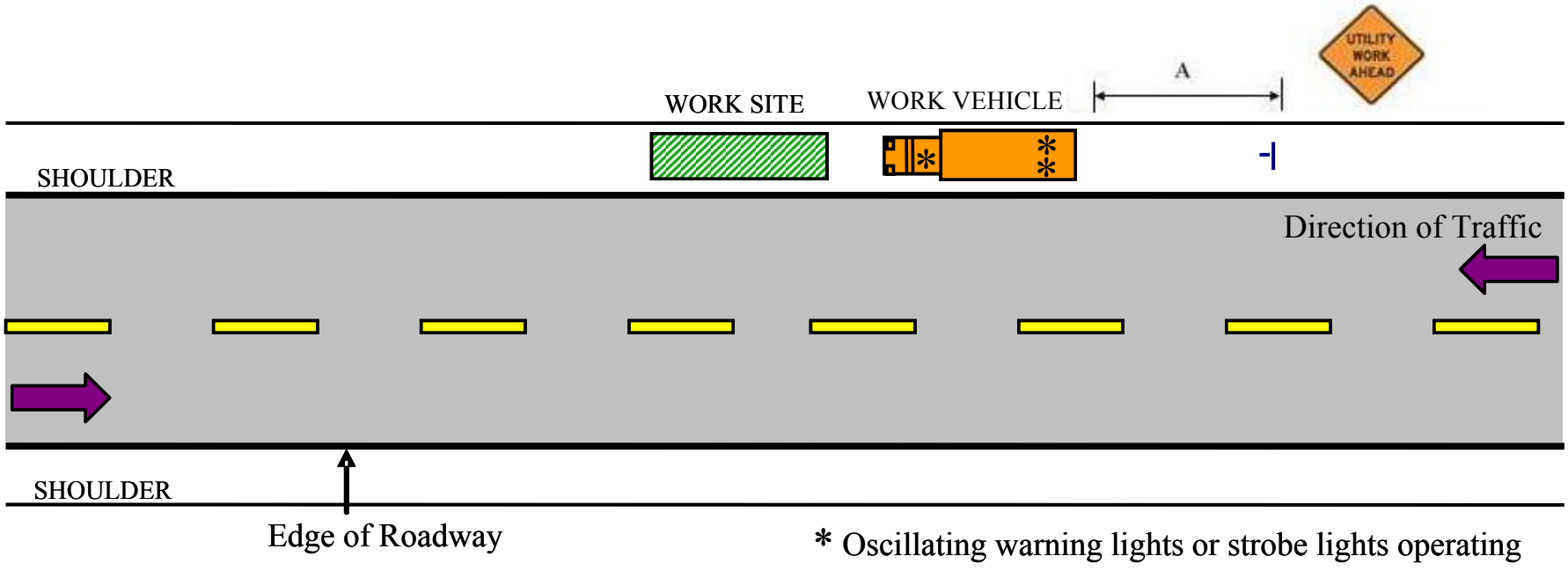
Utility Work Beyond Shoulder



Utility Work Beyond Shoulder with Work Vehicle(s) Parked on Shoulder



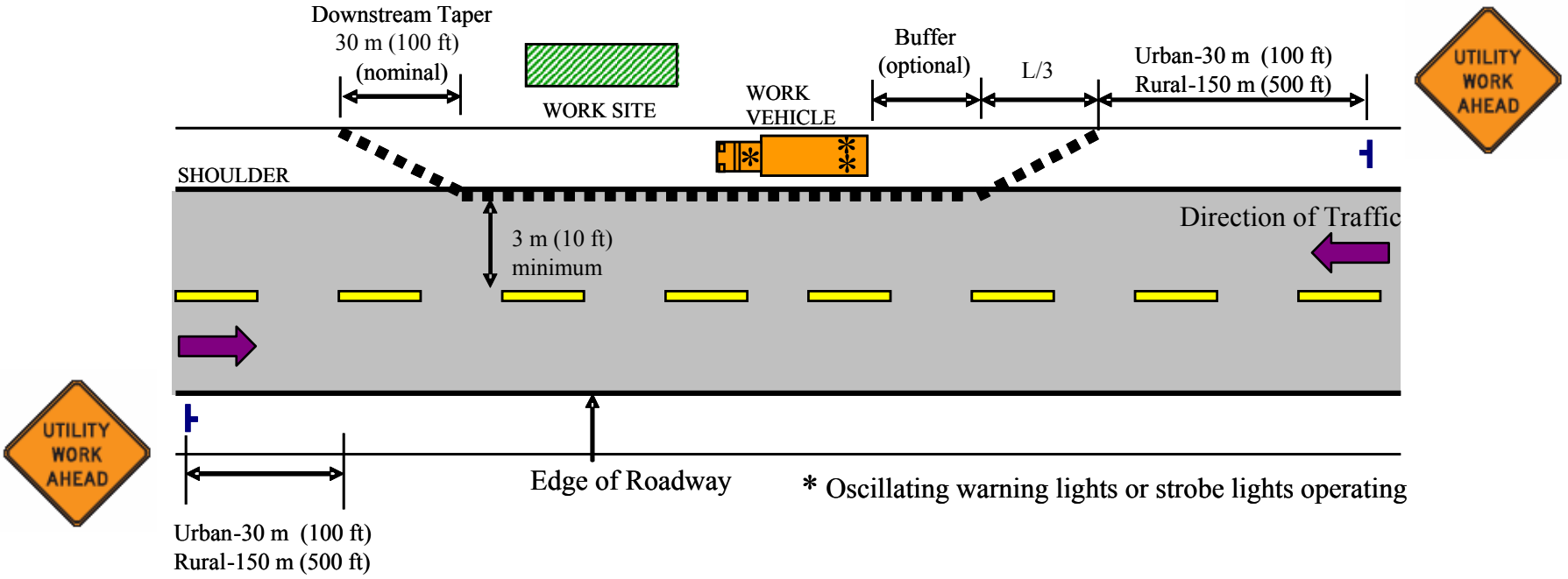
Utility Work on Shoulder
(Low Traffic Volume and Low Speed)



TCP-C

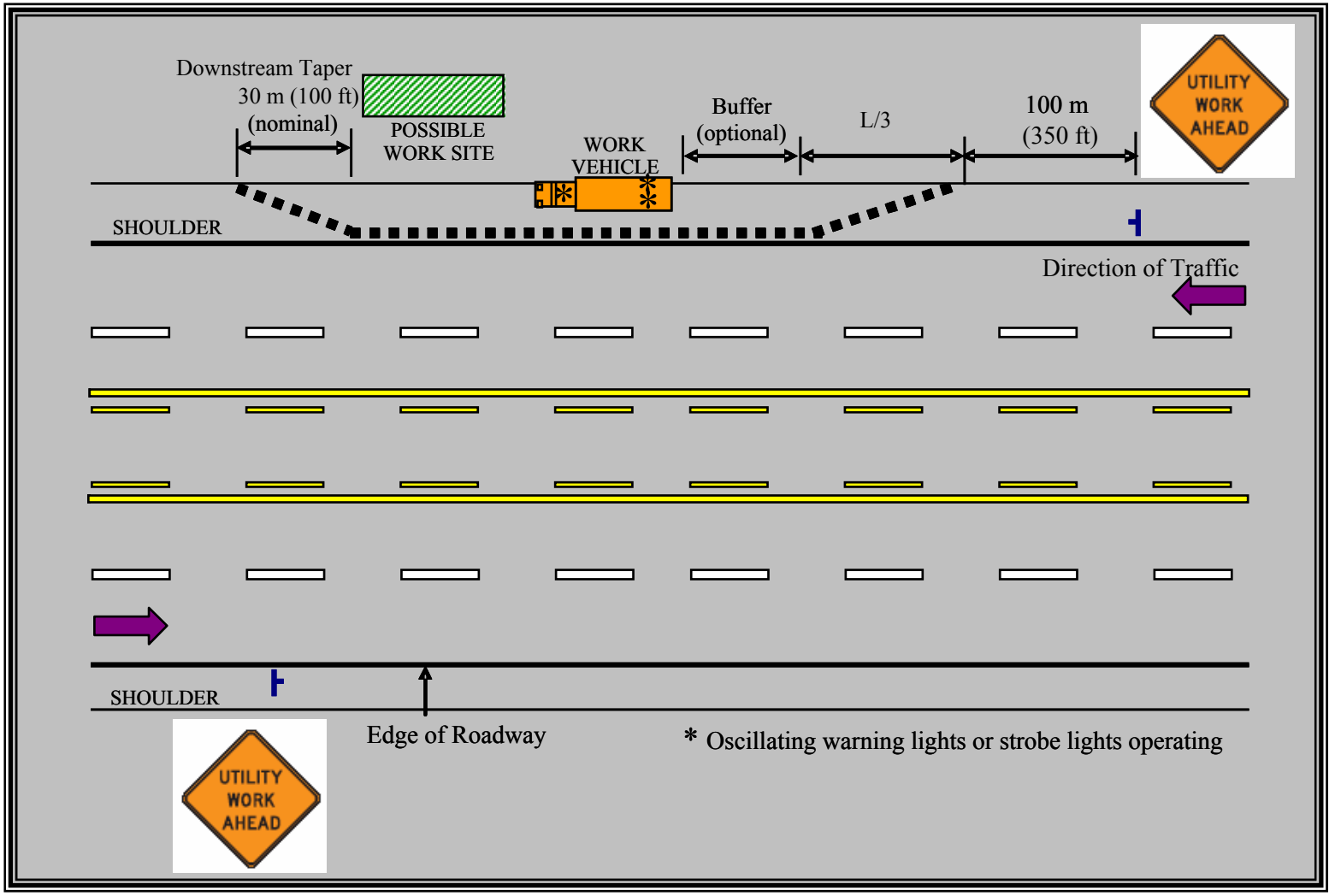
Utility Work Beyond Shoulder with Work Vehicle Parked on Shoulder

(High Traffic Volume and/or High Speed)



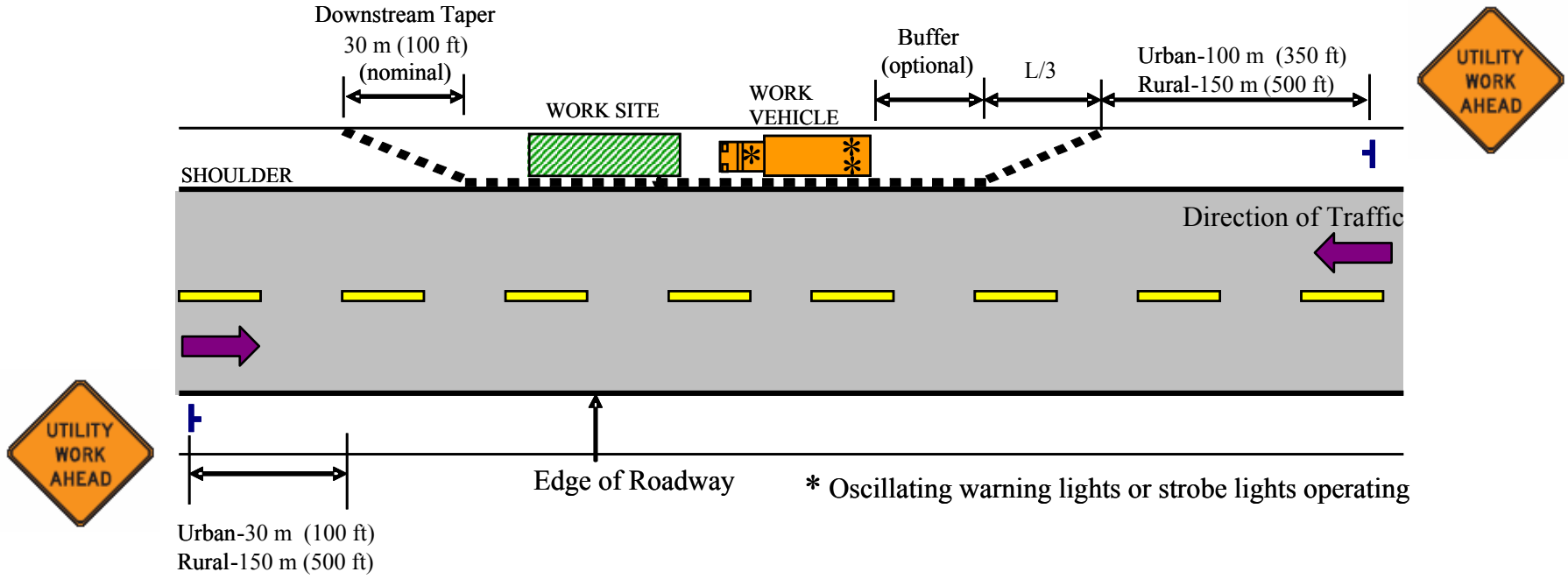
Utility Work Beyond Shoulder with Work Vehicle(s) Parked on Shoulder

(High Traffic Volume and/or High Speed)



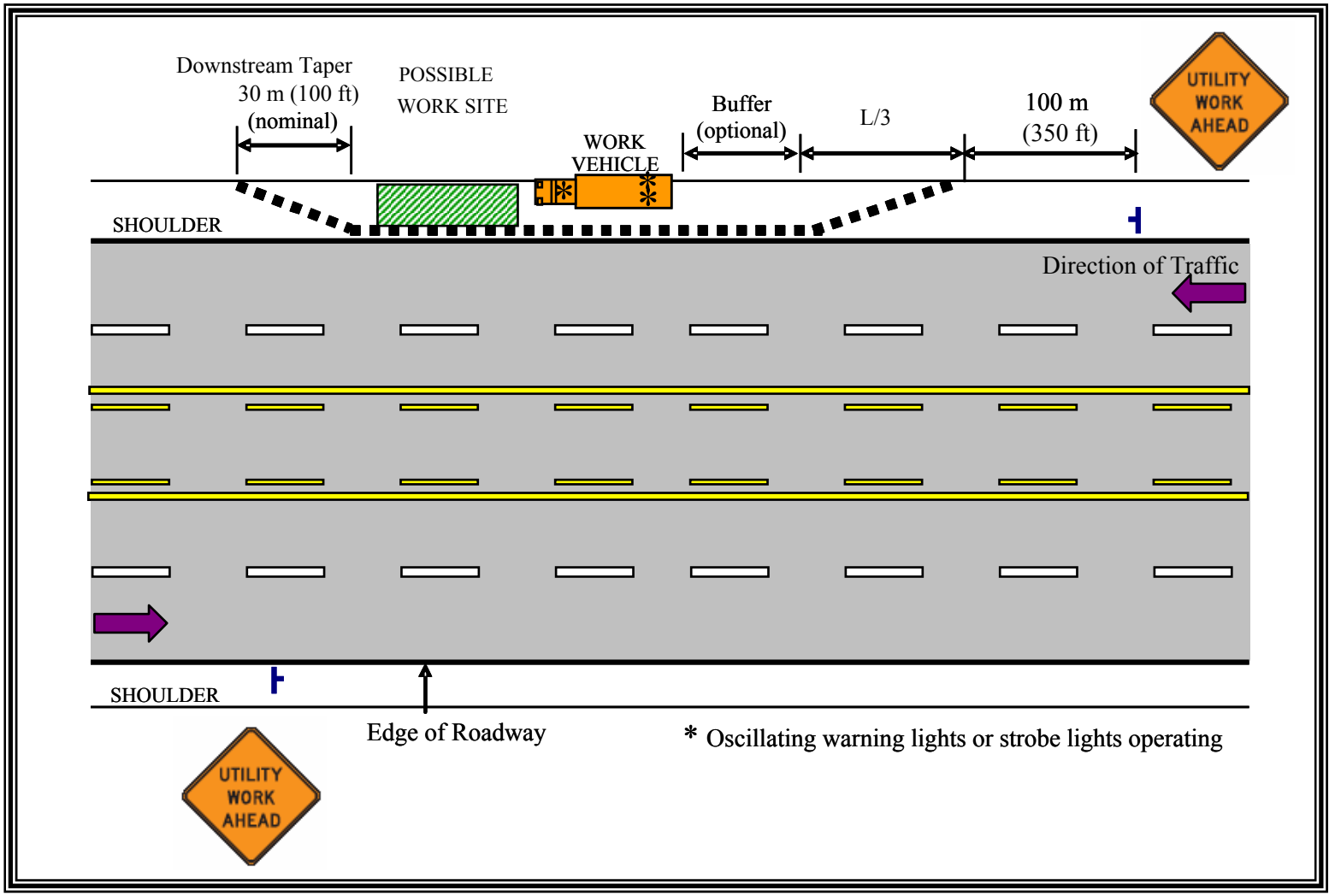
Utility Work on Shoulder with no Encroachment on Roadway

(High Traffic Volume and High Speed)



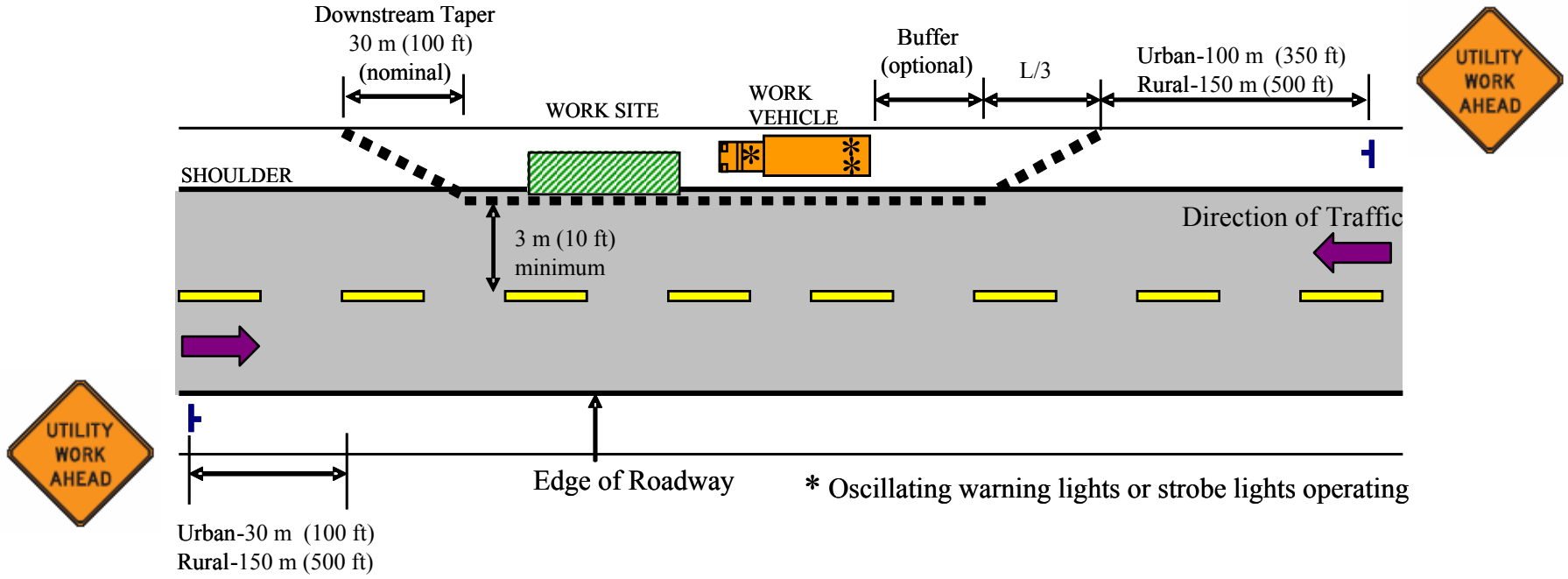
Utility Work on Shoulder with No Encroachment on Roadway

(High Traffic Volume and/or High Speed)



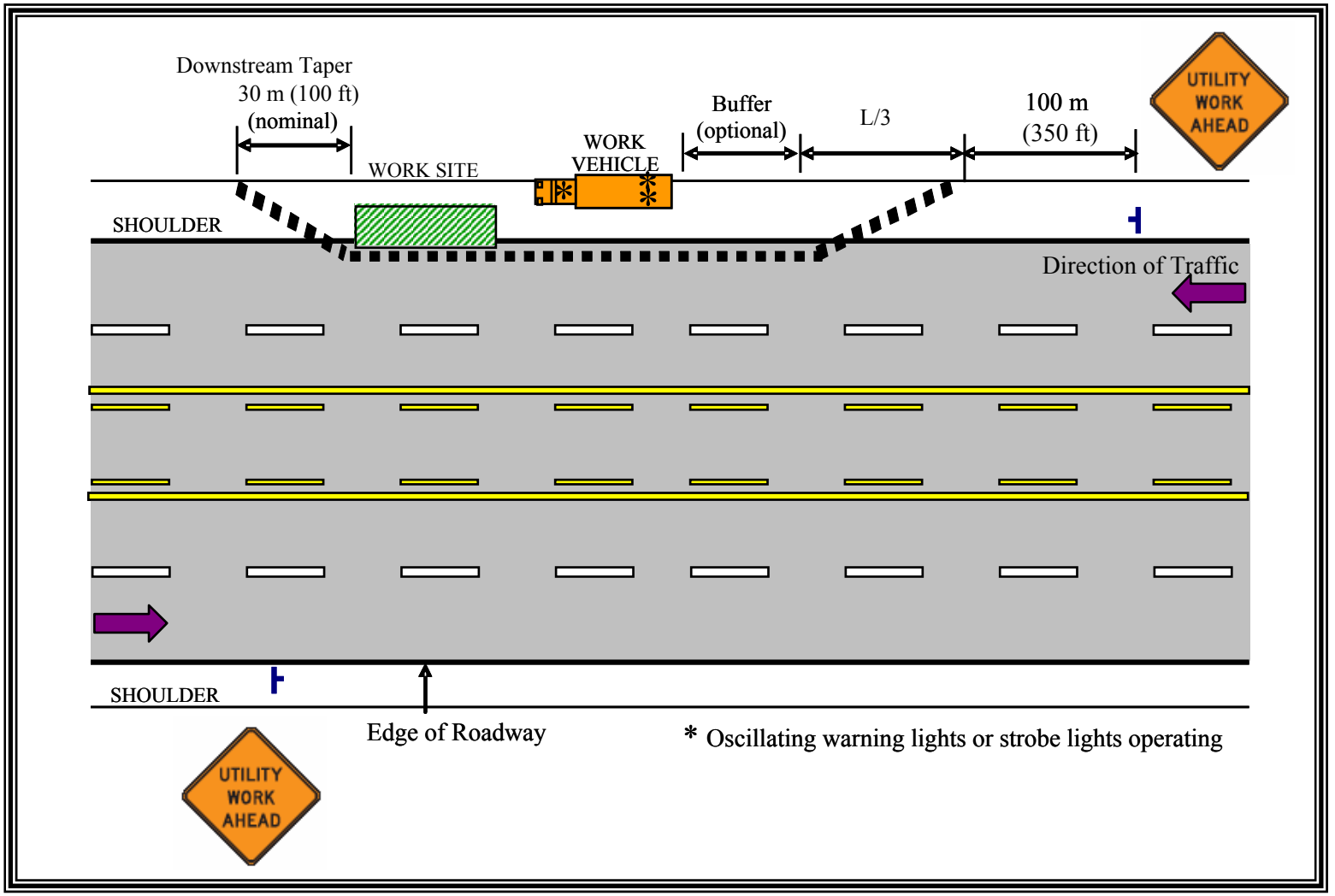
Utility Work on Shoulder with Minor Encroachment

(High Traffic Volume and High Speed)



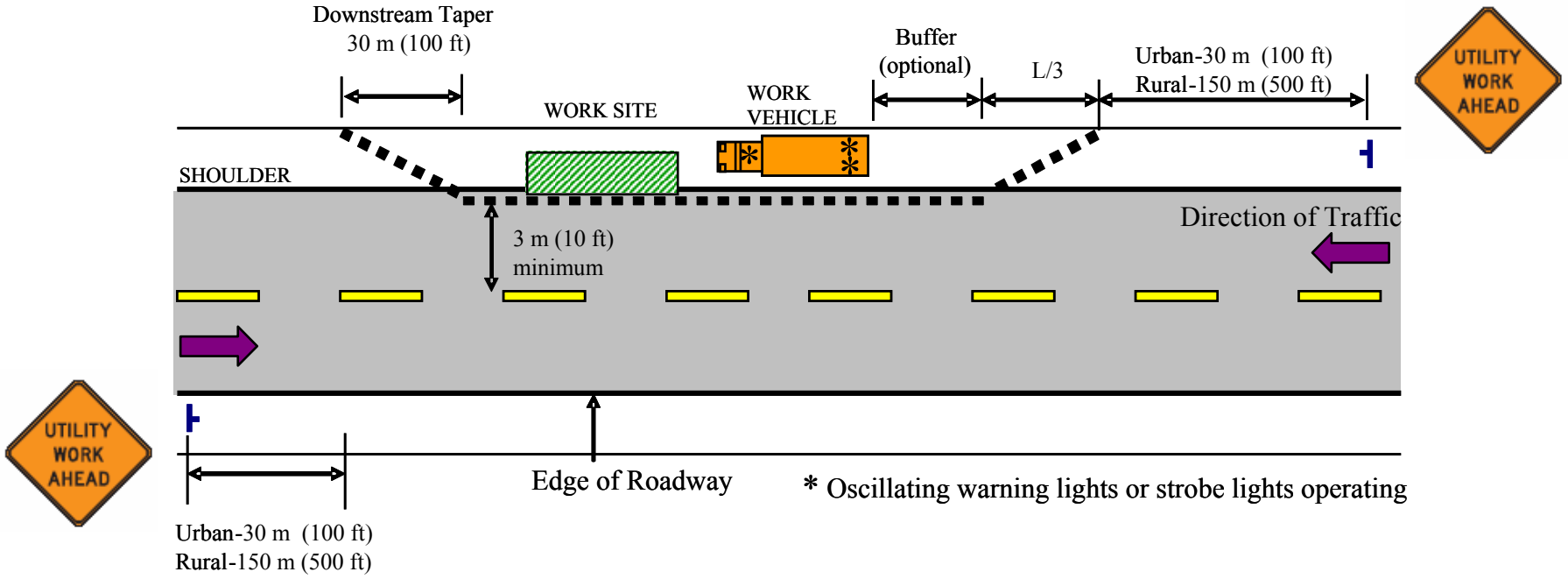
Utility Work on Shoulder with Minor Encroachment on Roadway

(High Traffic Volume and/or High Speed)



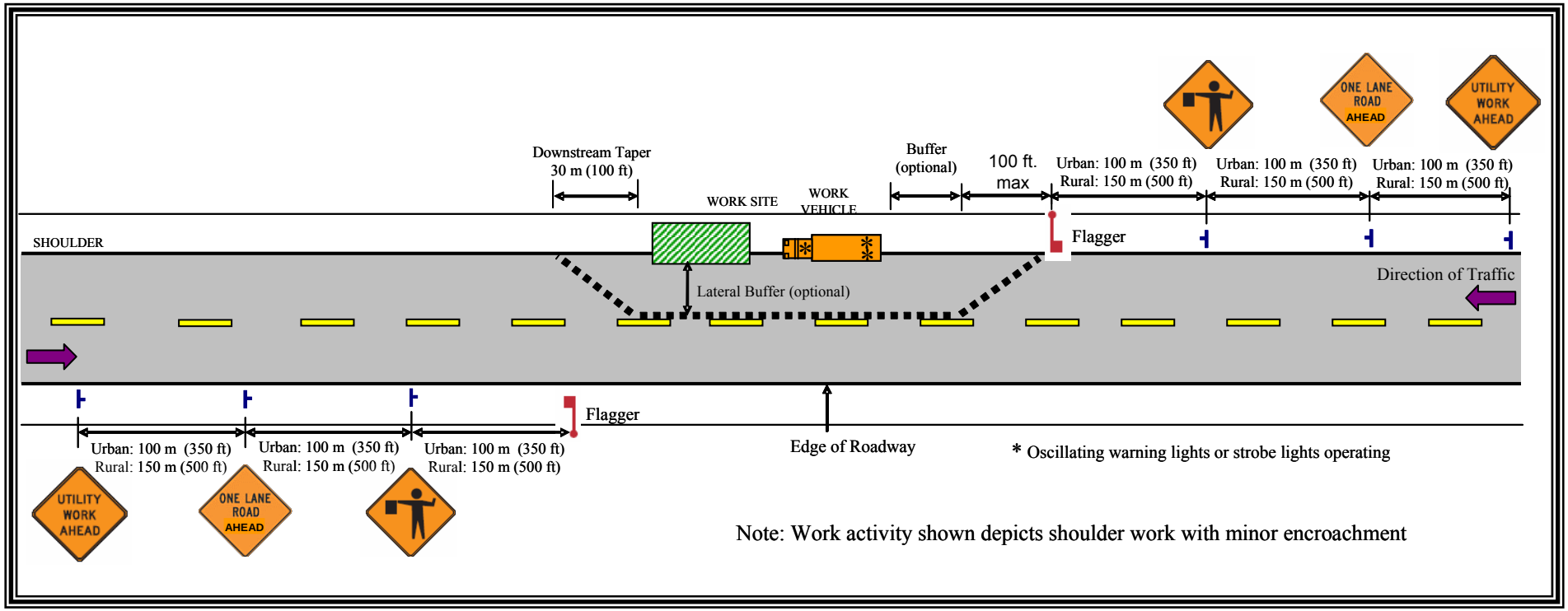
Utility Work on Shoulder with Minor Encroachment

(Low Traffic Volume and Low Speed)

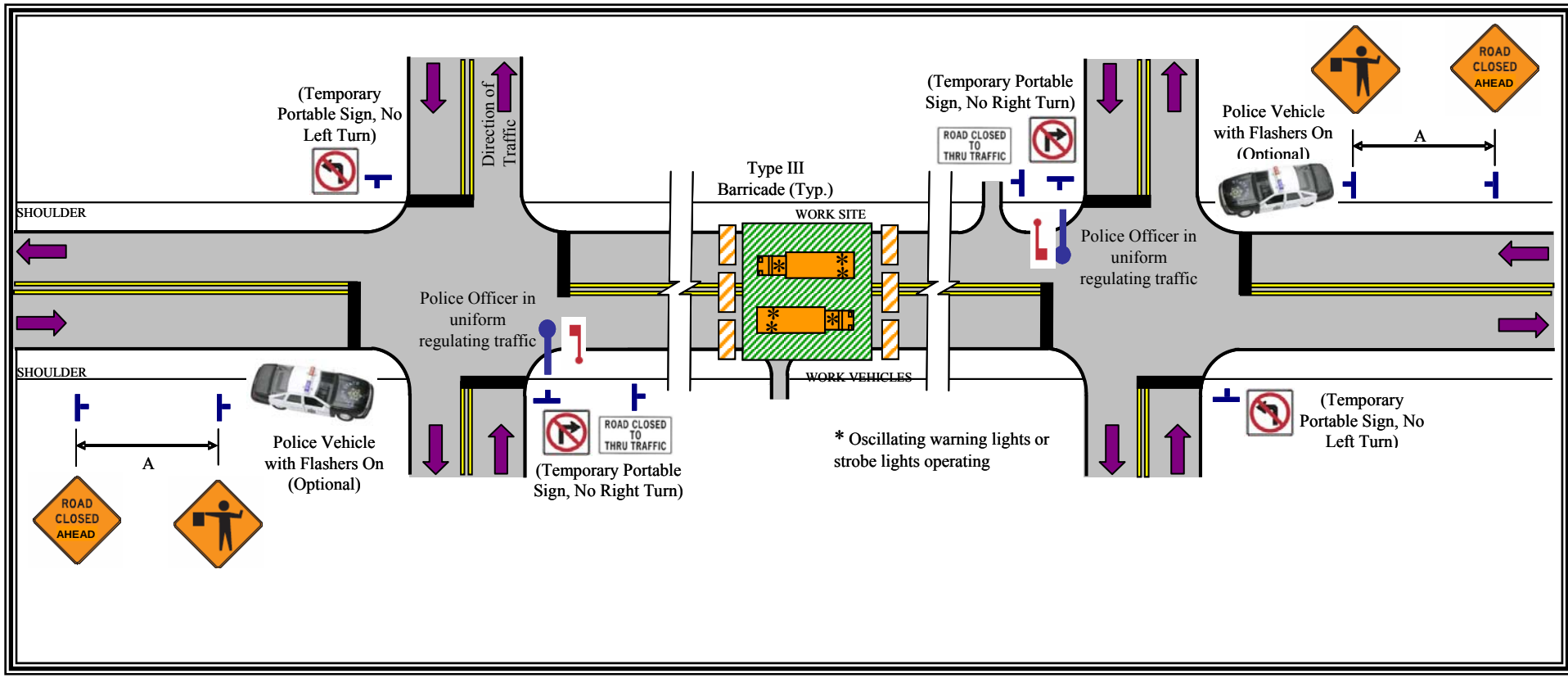


Utility Work on Shoulder with Minor Encroachment or Lane Closure on Two-Lane Road

(High Traffic Volume and/or High Speed)



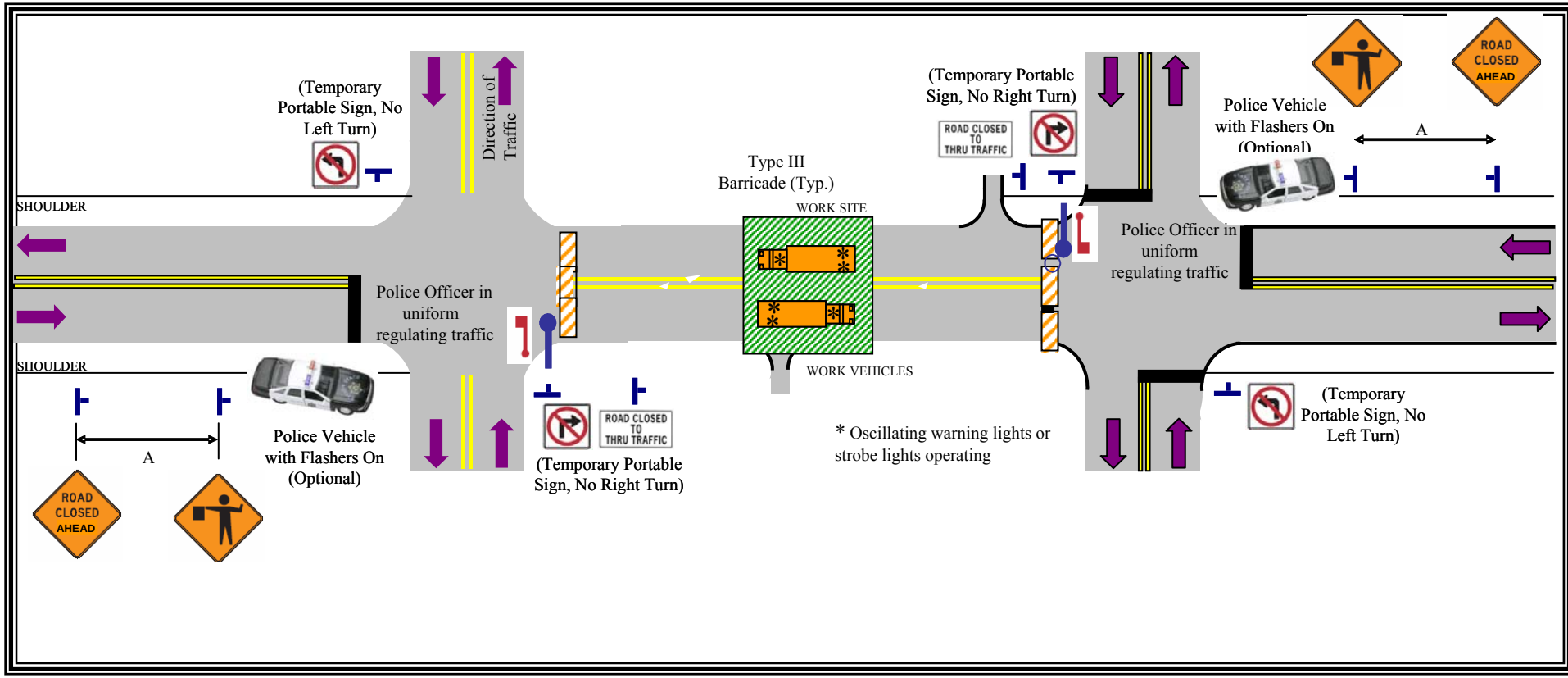
Temporary Road Closure
Mid Block



1. Planned Closure less than 20 minutes – Flagger or Police Vehicle Required
2. More than 20 minutes – Type III Barricades and appropriate traffic control signs shall be used – Use Flaggers where deemed appropriate.
3. White Road Closed Signs may have different wording such as Road Closed, Local Traffic Only

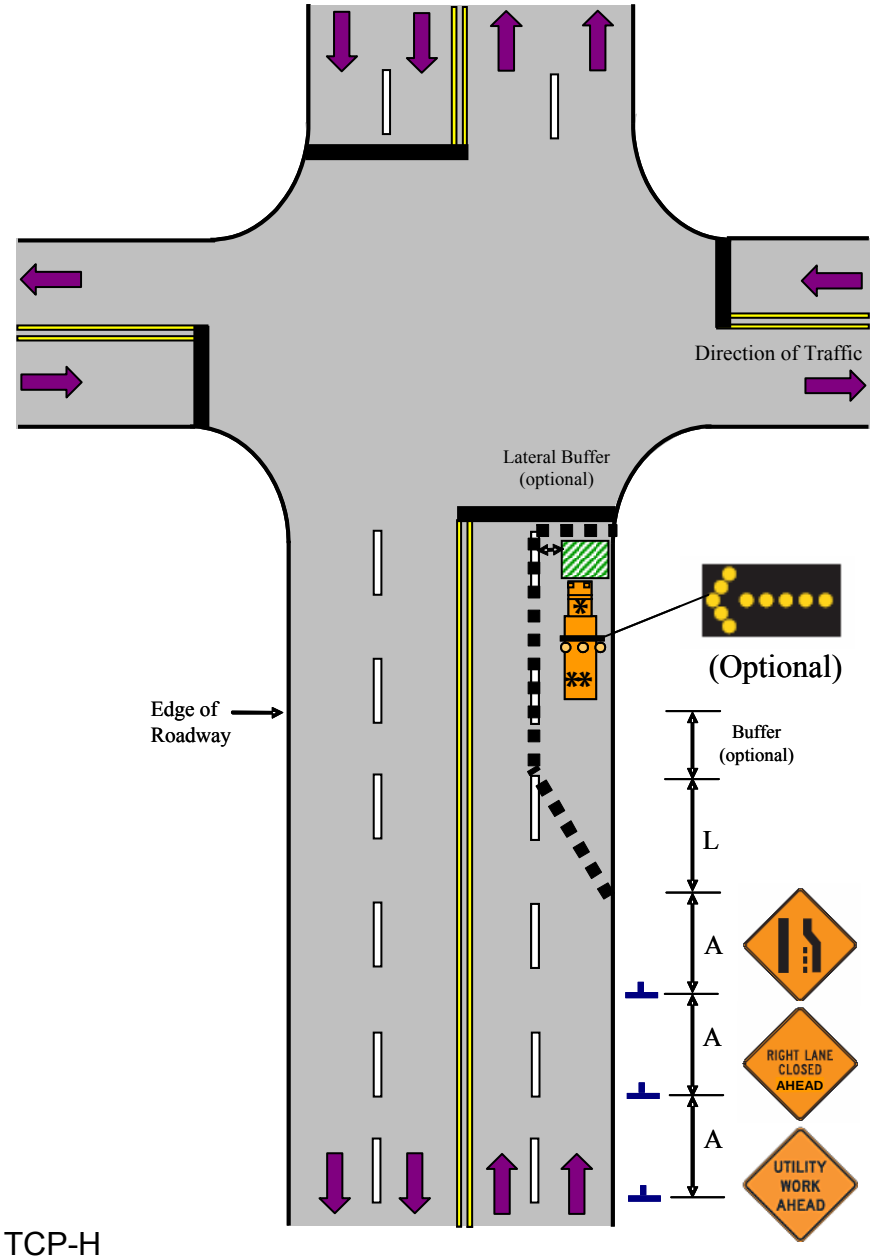
TCP-F

Temporary Road Closure
Full Block Closure



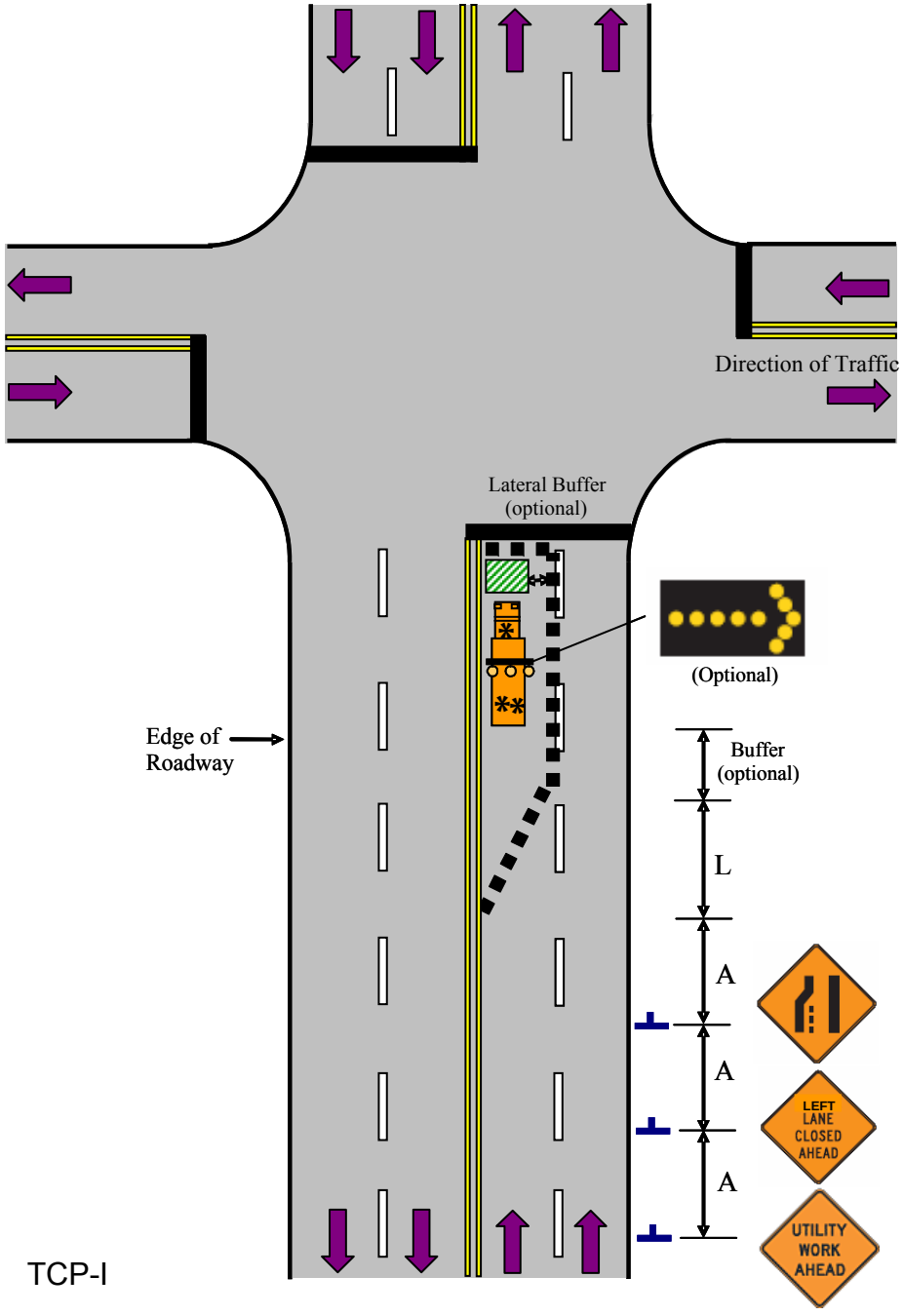
1. Planned Closure less than 20 minutes – Flagger or Police Vehicle Required
2. More than 20 minutes – Type III Barricades and appropriate traffic control signs shall be used – Use Flaggers where deemed appropriate.
3. White Road Closed Signs may have different wording such as Road Closed, Local Traffic Only

Right Lane Closure on Near Side of Intersection

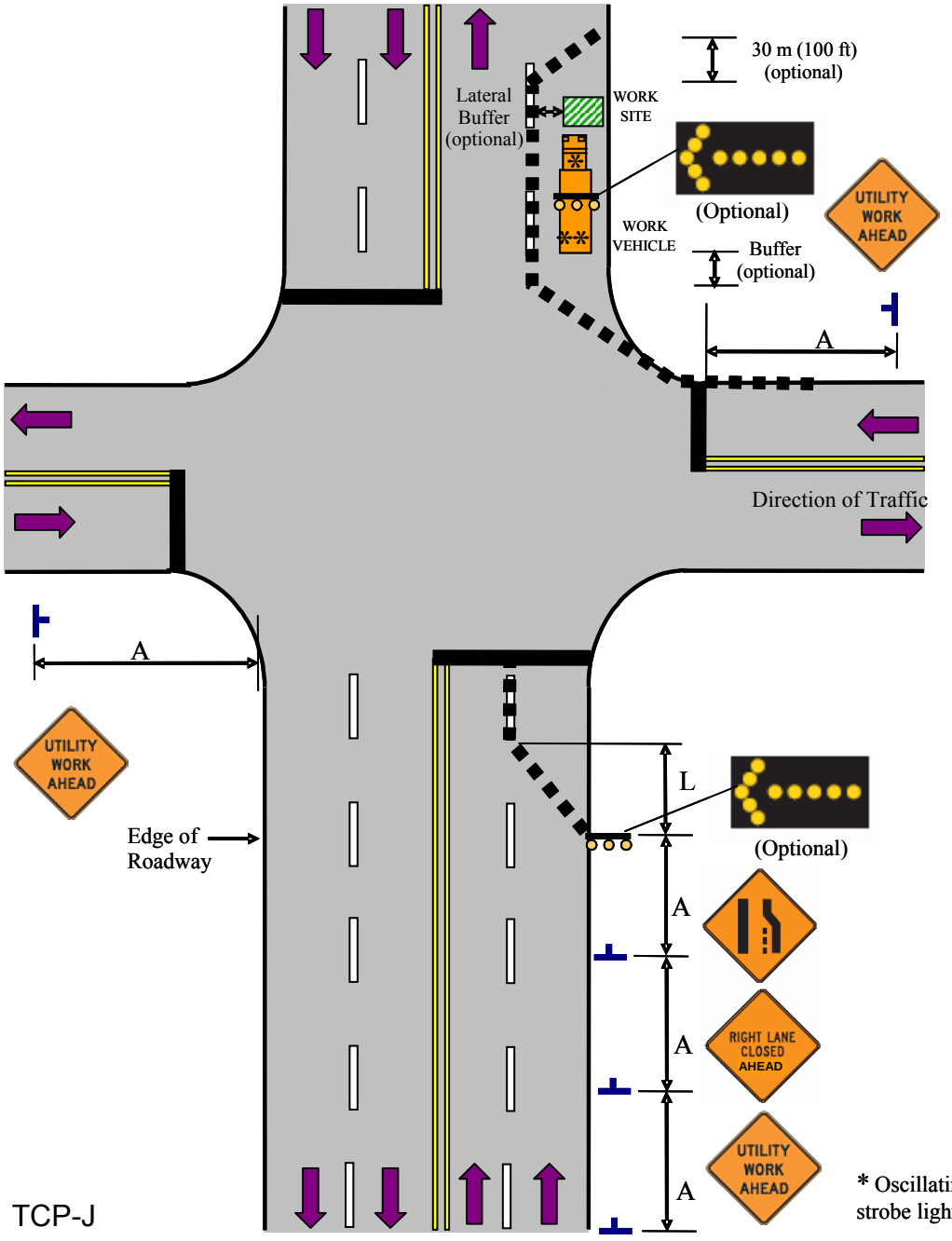


TCP-H

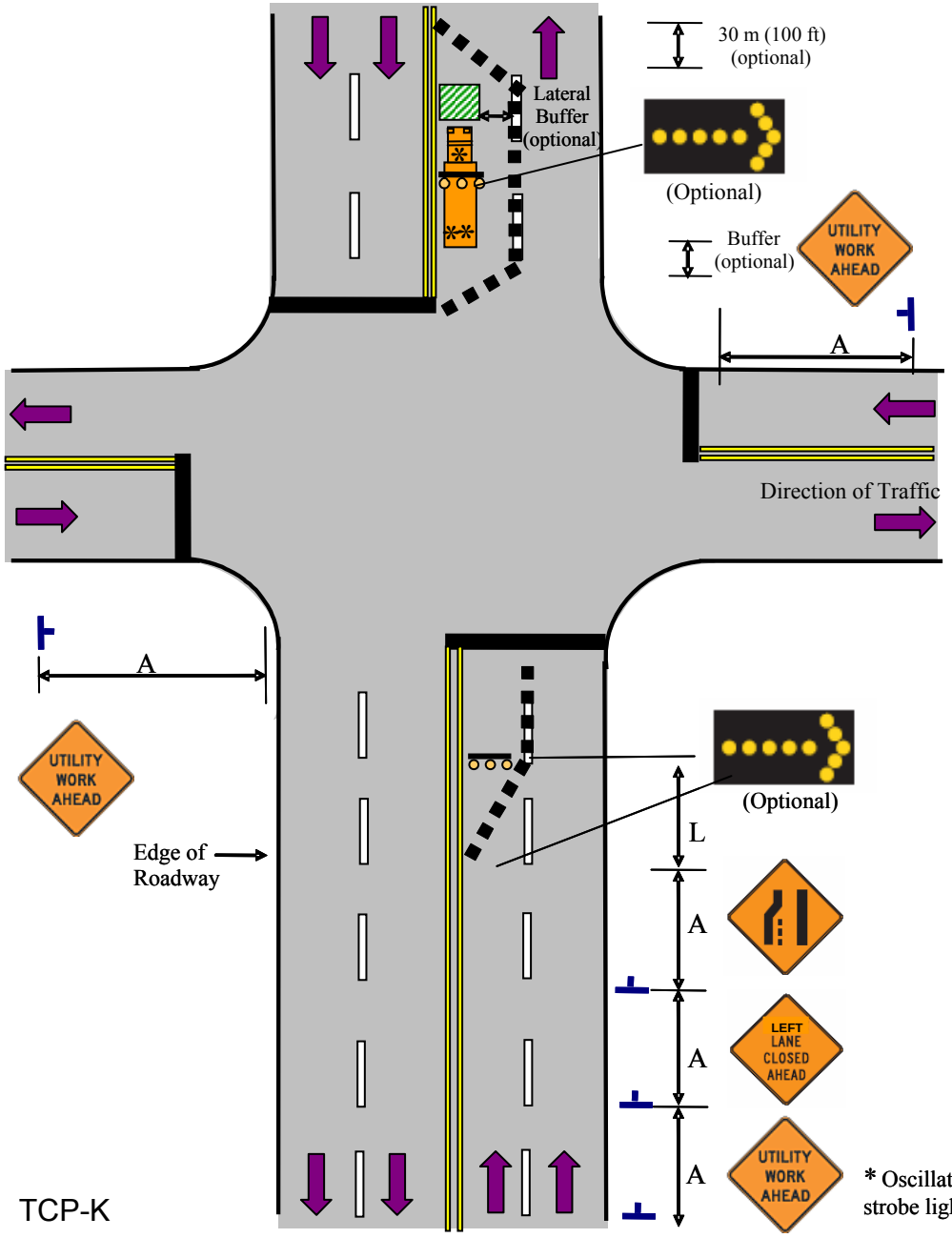
Left Lane Closure on Near Side of Intersection



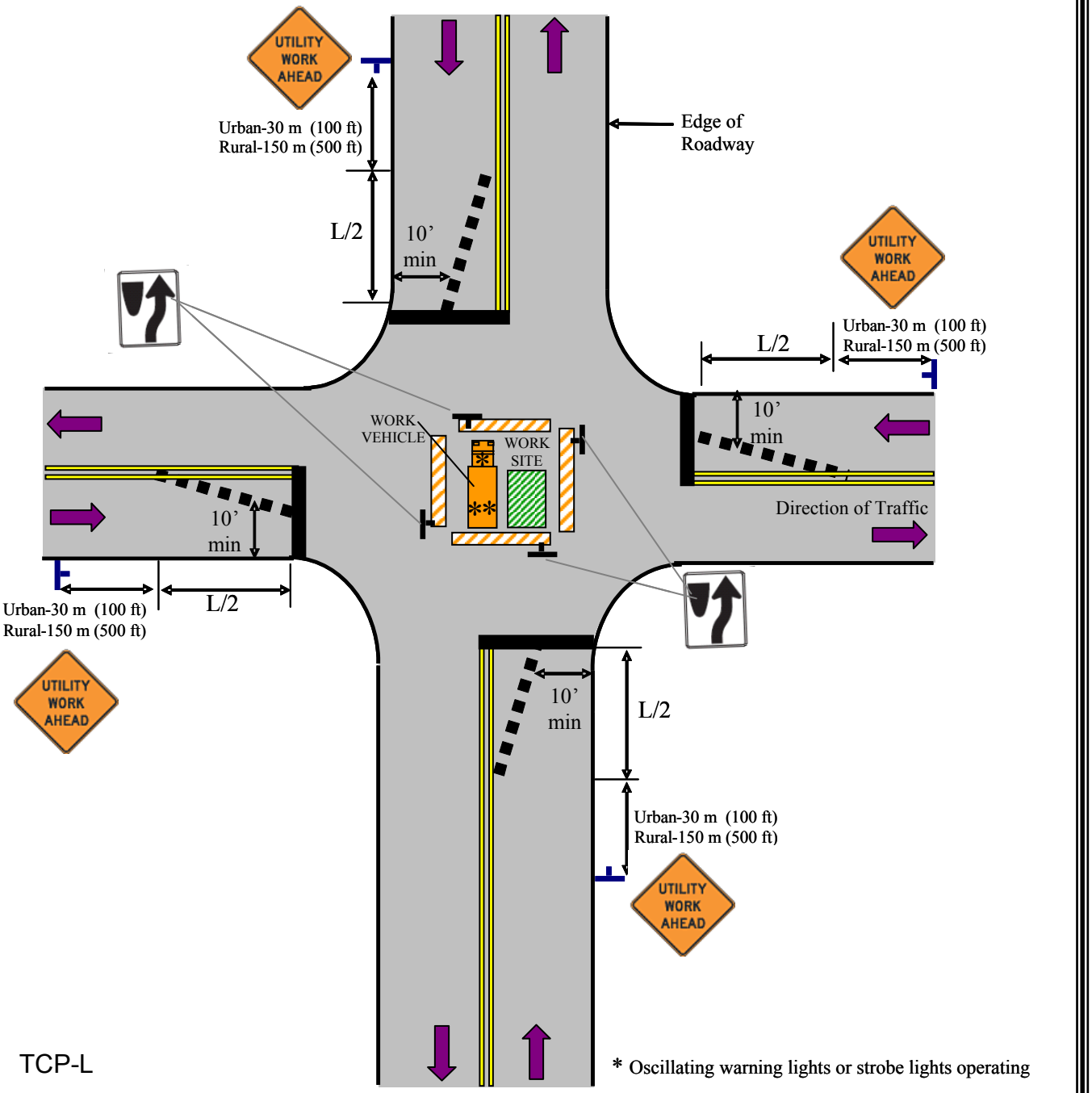
TCP-I



Right Lane Closure on Far Side of Intersection

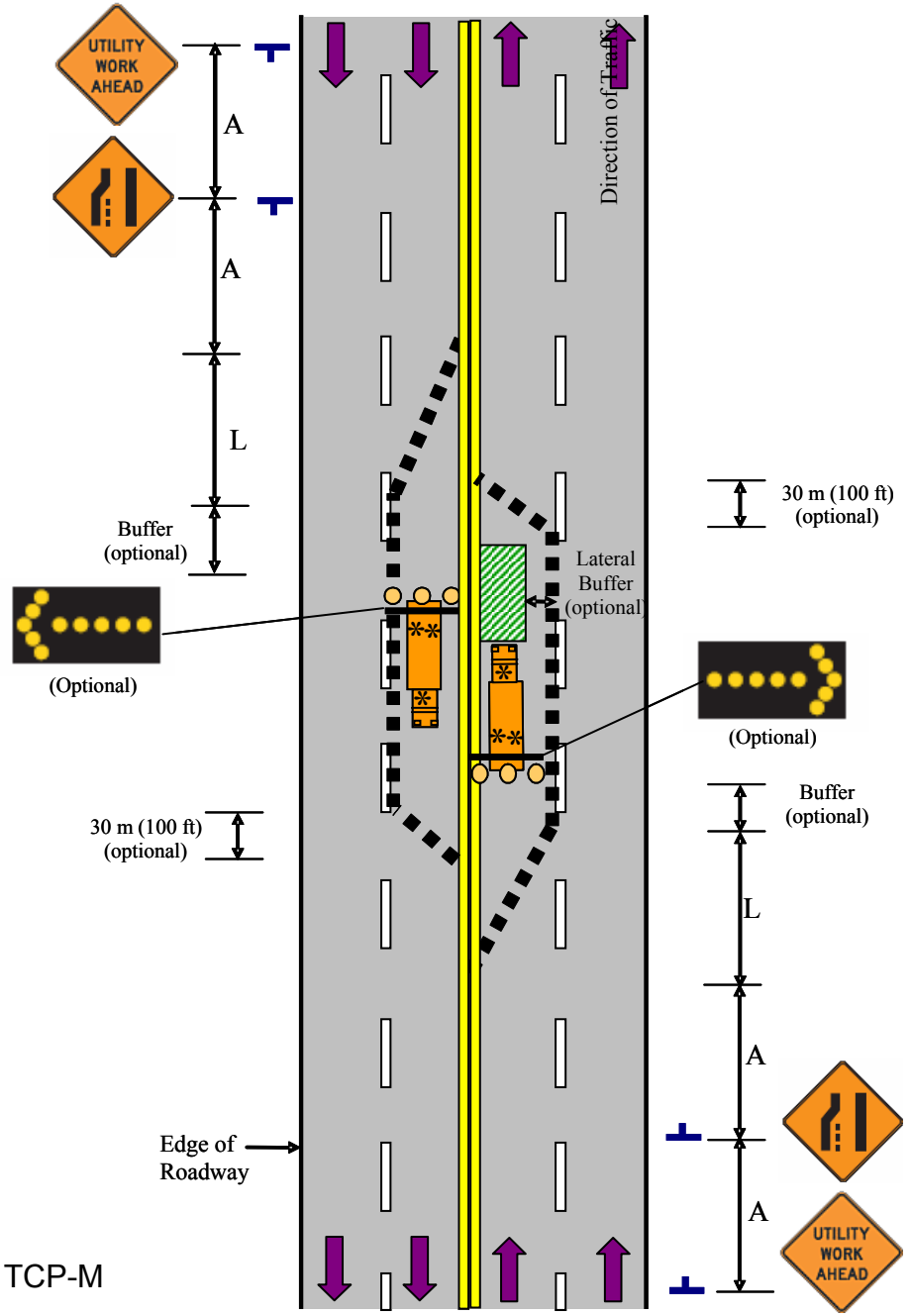


Left Lane Closure on Far Side of Intersection



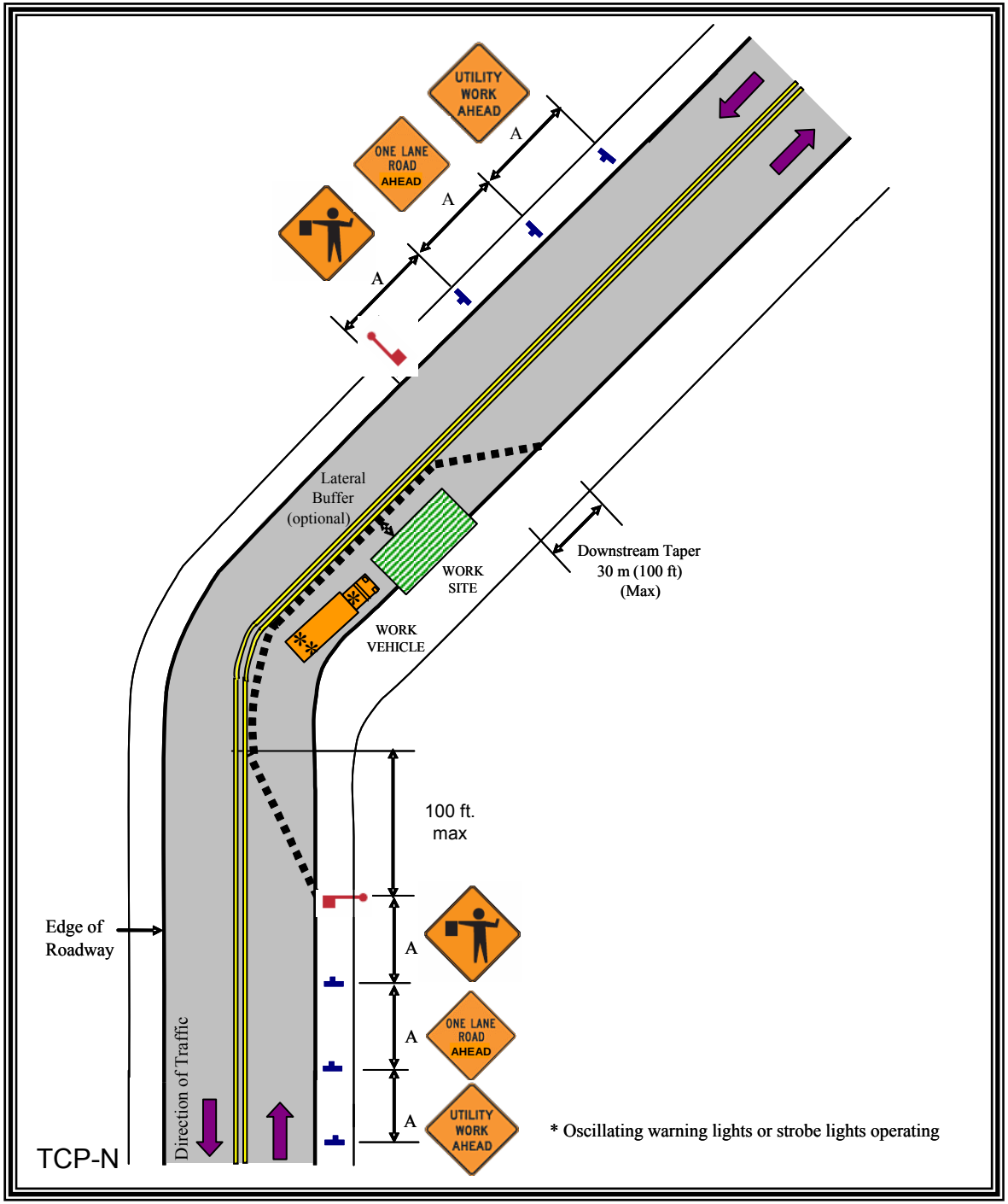
Closure in Center of Intersection

Center Lane Closure on a Multi-Lane Road

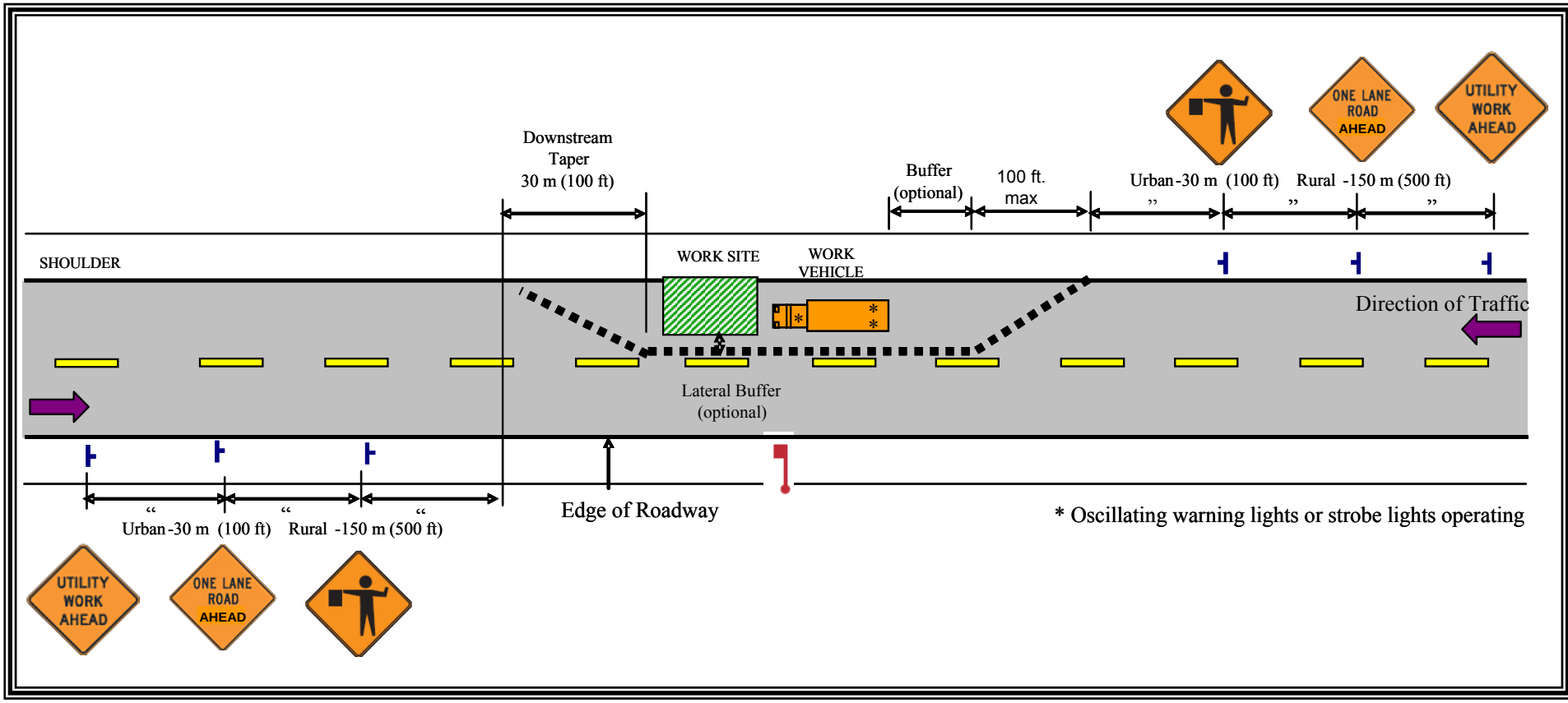


TCP-M

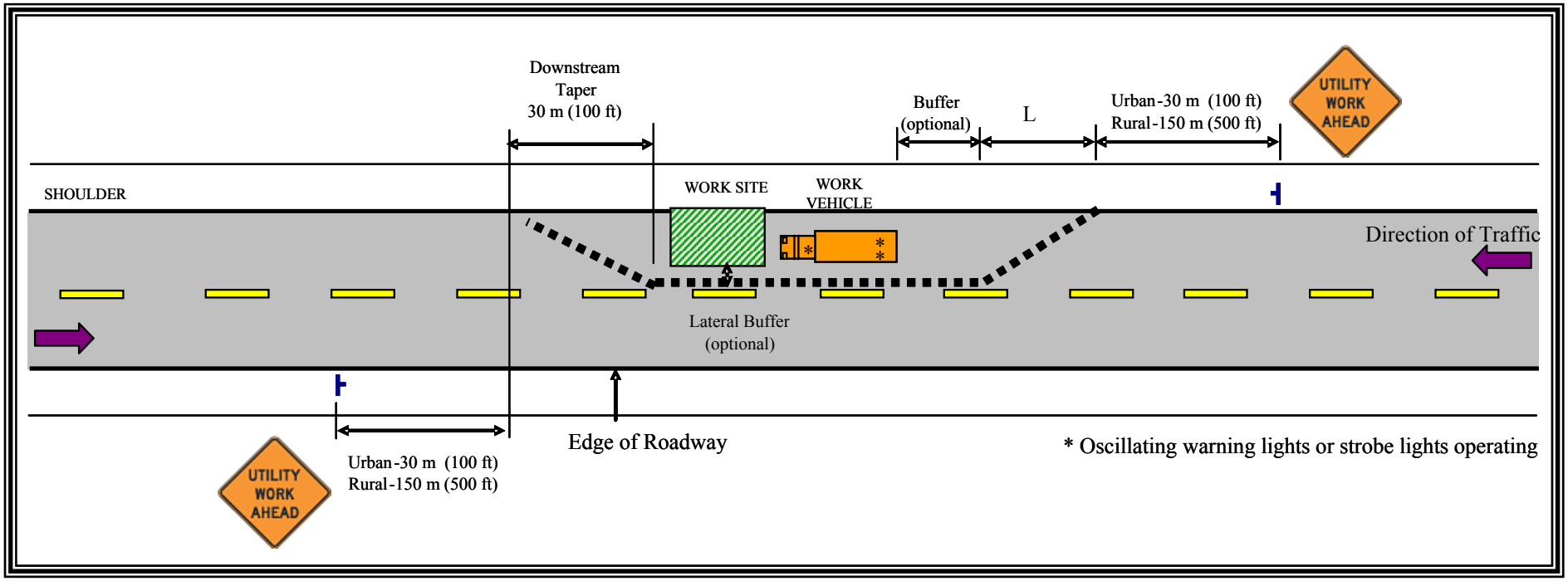
Lane Closure On Two-Lane Road (Restricted Visibility)



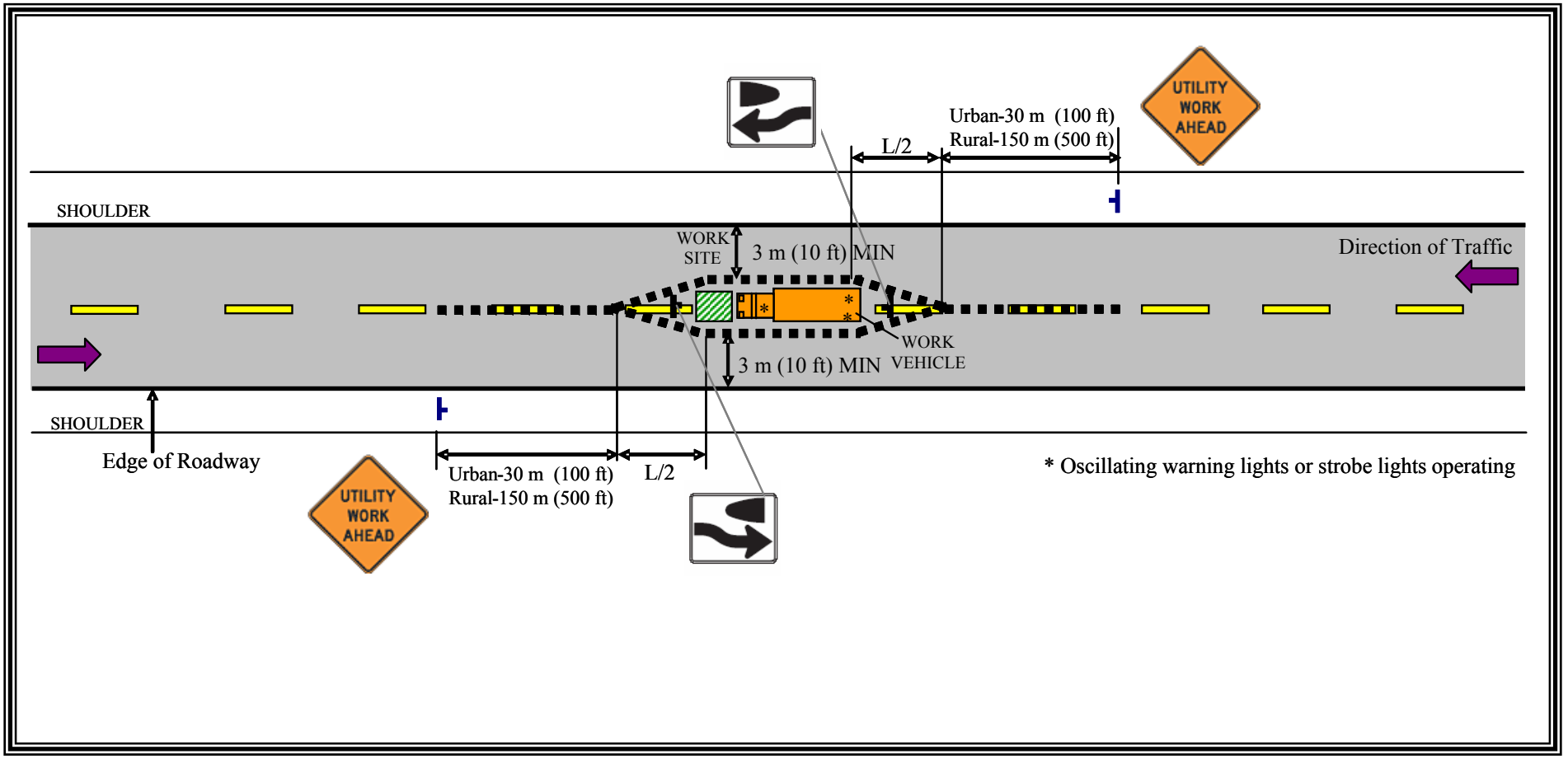
Lane Closure on Two-Lane Road with Unrestricted Visibility
(Low Traffic Volume, Low Speed where Traffic cannot self-regulate without the use of Flaggers)



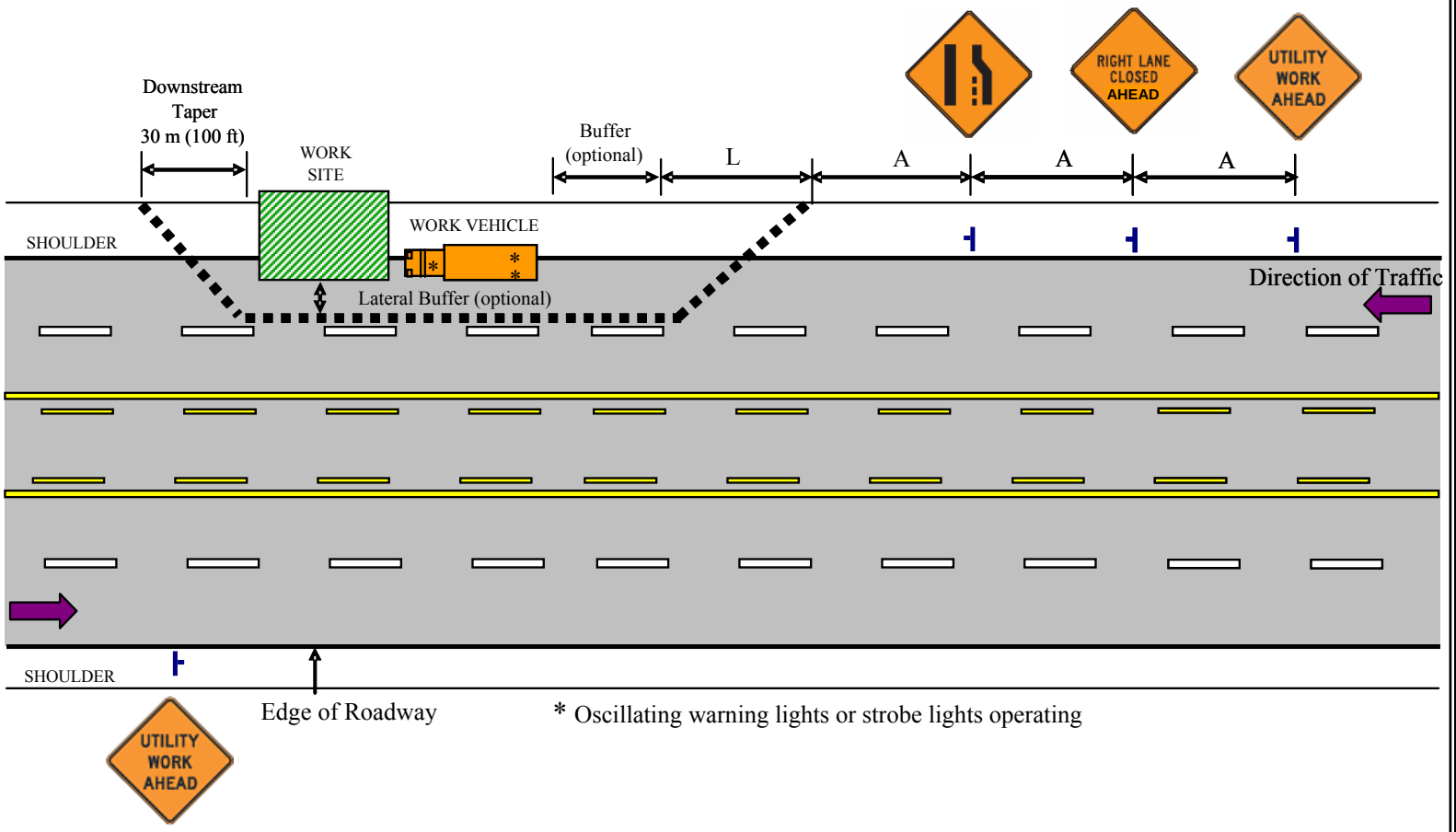
Lane Closure on Two-Lane Road with Unrestricted Visibility
(Low Traffic Volume, Low Speed where Traffic can self-regulate without the use of Flaggers)



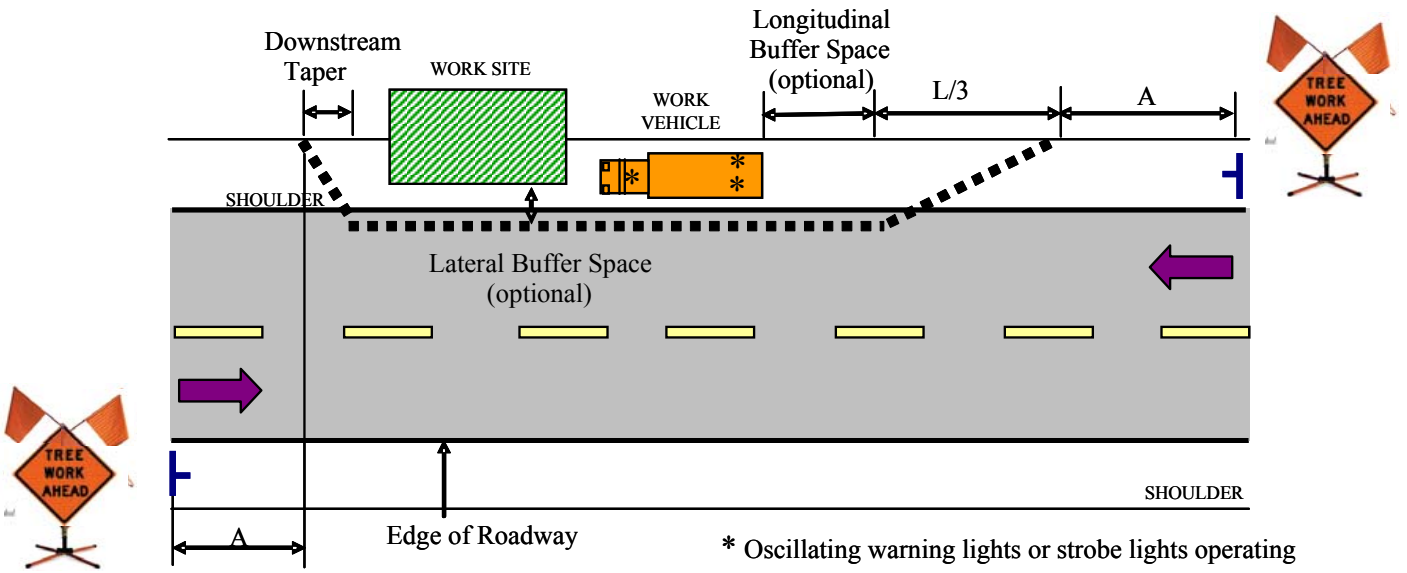
Utility Work in Center of Road
(Low Traffic Volumes)



Outside Lane Closure on Multi-Lane Road

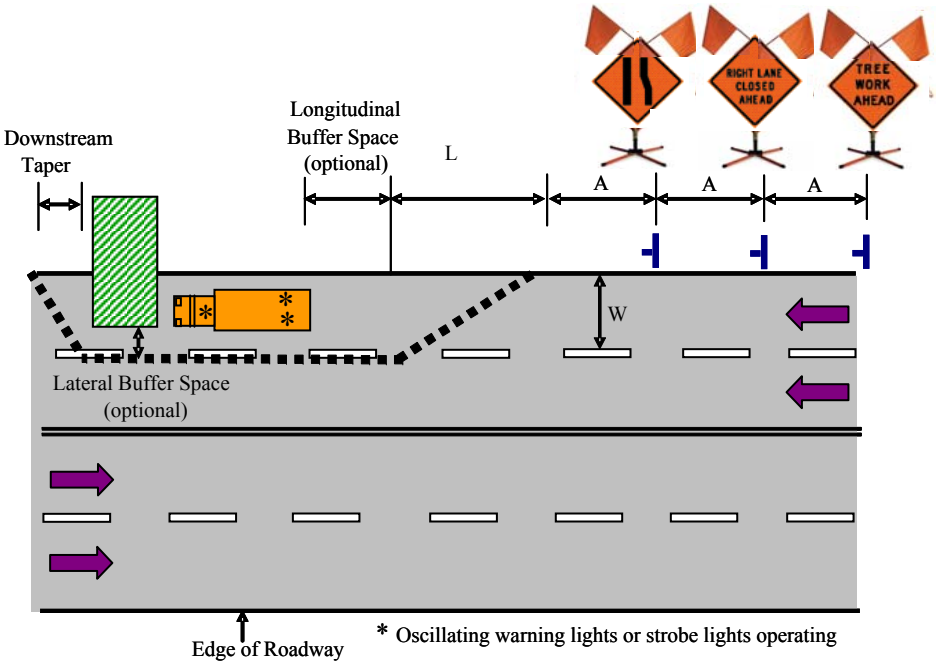


Tree Cutting/Trimming Shoulder Closure on a Two-Lane Road



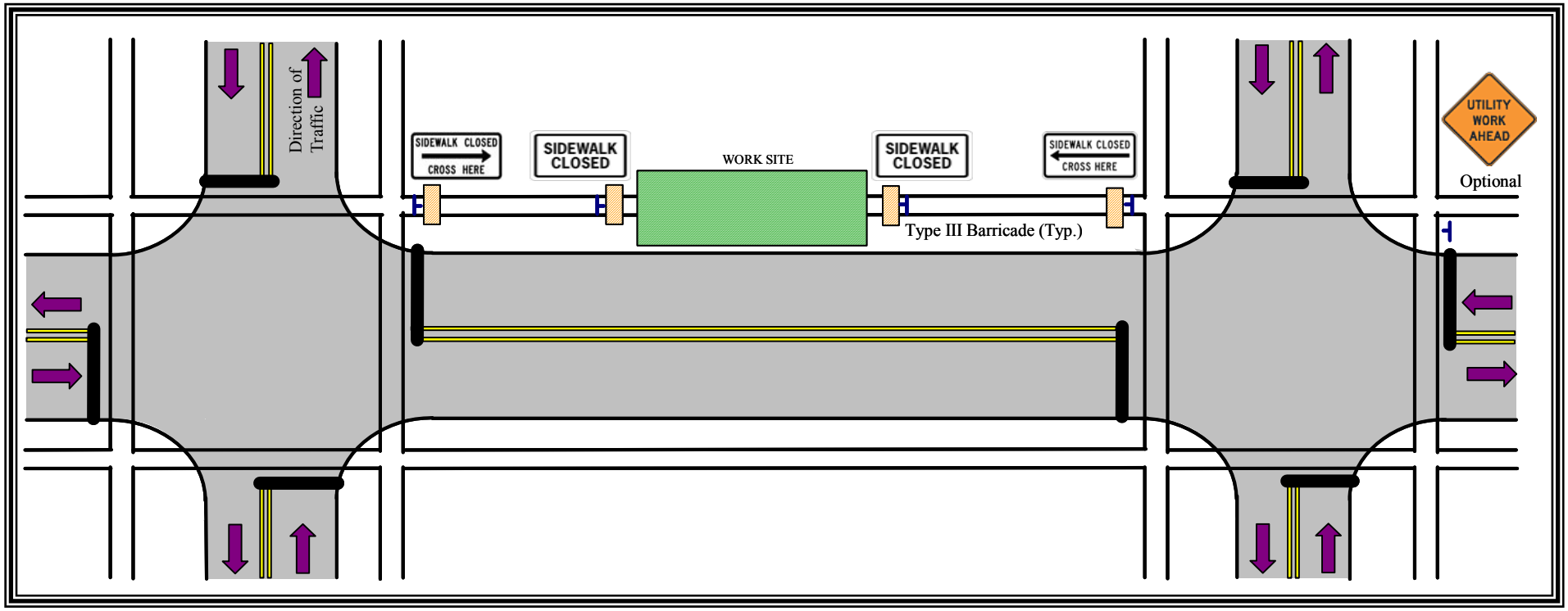
Note: Road Work Ahead, Utility Work Ahead, Worker Symbol sign may be substituted for Tree Work Ahead Sign

Tree Cutting/Trimming Lane Closure on a Multi-Lane Road



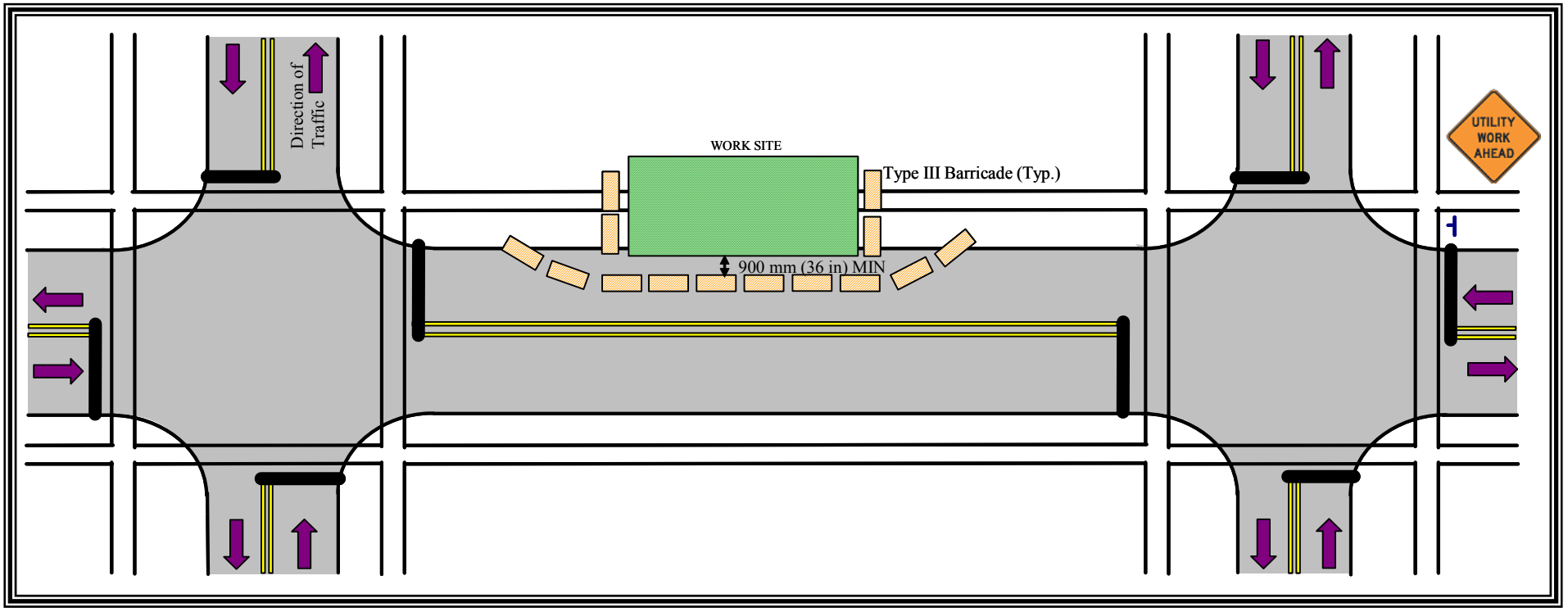
Note: Road Work Ahead, Utility Work Ahead, Worker Symbol sign may be substituted for Tree Work Ahead Sign

Sidewalk Detour for Pedestrians



Note: Sidewalk Closed signs are representative of several wording and direction options available

Sidewalk Diversion for Pedestrians



FOREWORD

National Grid's vision is to be a world-class safety organization, with zero injuries every day. A critical component of achieving this vision is the careful development, implementation and maintenance of safety procedures. This document, **Work Zone Traffic Control**, provides the minimum standards and specifications for work zone traffic control associated with the utility maintenance, repair and construction on or near roadways or on construction sites.

The procedure is designed to promote uniform and consistent application of these basic principals here at National Grid.

By following this guidelines set forth in Work Zone Traffic Control personnel can reduce their risk of injury and comply with applicable laws and regulations.

Questions regarding this procedure should be referred to National Grid's Safety Department.

Record Of Change

Date of Review/ Revision:

Revision	Date	Description
1	06/01/09	Response to audit item

1.0 INTRODUCTION

1.1 Purpose

This procedure will provide the minimum standards and specifications for work zone traffic control associated with the utility maintenance, repair and construction on or near roadways or on construction sites. The procedure is designed to promote uniform and consistent application of these basic principals.

The purpose of traffic control devices and reasons for their use is to help ensure roadway safety by providing for the orderly and predictable movement of all traffic and provide safety to both the public and employees.

1.2 Applicability

Equally as important as the safety of road users traveling through temporary traffic work zones is the safety of workers. This procedure applies to National Grid employees whose work exposes them to the risks of moving roadway traffic or construction equipment or interfere with the orderly flow of traffic. This includes maintenance or construction work performed within the highway boundary or on construction sites, either public or private.

Minimum standards of application are prescribed for typical situations. A number of typical scenarios are illustrated in the Utility Work Zone Traffic Control Field Guide, showing proper application of these standards and principles.

1.3 Reviews and Revisions

This procedure shall be reviewed periodically and revised as required. Revisions of this procedure should be made as a result of regulatory changes, management review, change in safety management guidance, or company policies. The dates of reviews and revisions will appear on the front of the page of the procedure titled “Record of Change”.

The Safety Programs and Regulatory Compliance Group shall have primary responsibility for maintaining this document, soliciting comment from stakeholders, and revising as necessary. The requirements of this procedure or any future revision thereof, shall be effective the date of its issue unless otherwise noted.

1.4 Documentation

Documentation related to this procedure and subsequent reviews and revisions will be maintained in the Safety Department. This procedure will be accessible to field operations both in paper and electronic formats. The paper versions of the procedure will not be document controlled. The official, current version of this procedure and all other procedures prepared under this guidance will be on the National Grid internal intranet website.

1.5 Quality Assurance and Audit

Internal self-assessment and quality assurance activities are performed at several levels. Local management is responsible for complying with this procedure and with associated work

methods that may be developed. The Safety Department shall be responsible for reviewing and revising this procedure based on feedback from these stakeholders.

The use of this procedure is subject to audit and it is anticipated that the Company' Legal Department and/or Internal Audit will periodically review its implementation.

2.0 RESPONSIBILITIES

2.1 Line of Business (LOB)

- Ensure that all employees are trained in Work Zone Traffic Control
- Monitor compliance with this procedure and note conditions where application of this procedure does not provide adequate worker protection.

2.2 Safety Department

- Provide on-going technical assistance to LOB as requested

2.3 Learning and Development

- Develop Work Zone Traffic Control training for LOB's.
- Conduct training for all workers exposed to the risks of moving roadway traffic or construction equipment.
- Conduct refresher training as needed to address needs and changes in regulatory requirements.
- Maintain training records in training database

2.4 Employees

- Adhere to the requirements of this procedure
- Attend all required training
- Request additional information when necessary

3.0 APPLICATION

It is not possible to prescribe detailed standards of the application for all situations that may conceivably arise. Therefore, typical illustrations are presented in the *Utility Work Zone Traffic Control Field Guide* for the most common situations with the understanding that additional protection may be required where special complexities and hazards prevail. Although each situation must be dealt with individually, conformity with the provisions established herein is required. The protection described for each situation shall be based on the **speed and volume of traffic, duration of work, and exposure to hazards**.

These standards are basically applicable to both rural and urban situations. High speed highways and streets require more thorough treatment than the minimum requirements, whereas low speed may be treated satisfactorily with a minimum of devices.

3.1 Standardization

3.1.1 All traffic control devices used on maintenance and construction projects shall conform to the applicable specifications of this manual.

3.1.2 Signs shall be kept in proper position, clean and legible at all times. Damaged, defaced or dirty signs shall be cleaned, repaired or replaced.

3.1.3 Barricades and signs supports shall be neatly constructed and shall not appear makeshift. They shall be repaired, cleaned or replaced as needed to keep up their appearance.

4.0 FUNDAMENTAL PRINCIPLES OF WORKZONE TRAFFIC CONTROL

4.1 Plan for Safety

Workers should plan ahead for the safety of the motorist, pedestrian and worker.

4.2 Keep it Moving

Normal traffic movement should be disrupted as little as possible.

4.3 Communicate

Motorists and pedestrians should be warned, informed and guided in a clear and positive manner while approaching and traveling through the work zone.

4.4 Plan for the Worst

Workers should plan for the possibility of errant vehicles leaving the roadway and impacting the work zone.

4.5 Train

Each person whose actions affect temporary traffic control zone safety should receive training appropriate to the job decisions each is required to make. Only those who are trained in safe traffic control practices and have a basic understanding of the principles and National Grid's procedures should supervise the selection, placement and maintenance of traffic control devices in work zones.

5.0 THE WORK AREA MUST BE PLANNED

Traffic congestion makes it necessary to plan protection for our work areas. Planned protection is necessary to avoid vehicle and pedestrian traffic hazards for the safety of the public and our own employees.

The vital nature of our services makes it necessary to provide them with a minimum of interruption. We must gain access, to our facilities and equipment, as repair and maintenance is required, providing a work area that is safe for all concerned.

It is National Grid's goal to maintain good relations with the general public. Employees in the field can create public goodwill by the way they conduct themselves and the way they arrange and maintain the traffic work zone.

You can help to maintain a reputation as a good neighbor by making it your standard work practice to use these principles of work zone traffic control.

5.1 Planning Considerations

5.1.1 Maintain street work areas for only as long as is absolutely necessary to quickly and safely move in, do the job, and move out, minimizing obstructions to traffic and exposure to accidents.

5.1.2 Plan according to the work area and duration of work.

5.1.3 Consider the character of the area around the work zone.

5.1.4 Install and securely anchor approved bridging over excavations where pedestrian and vehicular traffic must be maintained during the job.

5.1.5 Take special care to provide suitable boundary definitions and/or barricades to make pedestrians and drivers of vehicles aware of work area boundaries.

5.1.6 Plan in advance for:

- Speed of traffic
- Volume of traffic
- Any changes in the above which may occur during the work operation
- Duration of work
- Traffic approaches
- Pedestrian traffic
- Work vehicle movements above work zone

5.1.7 Maintain the smallest work area consistent with safe operations being guided by the following limitations:

a. Width of work area. The width of a work area, generally, should not exceed the width of one traffic lane. The job should be worked in steps; or in congested areas with unusual traffic conditions, notify appropriate police agency and/or DOT officials.

b. Length of work area. Whenever possible, place tools, equipment, vehicle, or other suitable barriers between the working point and oncoming traffic. Additional area required for essential equipment may be obtained by increasing the work area in the direction of the flow of traffic.

5.1.8 Day or night, warning lights on vehicles and barricades should be operating before moving out into traffic lanes.

5.1.9 Planned consideration should be given for a flagger when the work area extends into traffic lanes. The flagger shall be equipped with a stop and slow paddle and Class 2 or higher high visibility/reflective outer clothing. Channelization is preferred to flagging operations, when two-way traffic can be maintained.

5.1.10 Determine in advance the need for specific traffic control devices including additional special equipment which may be necessary. Consider who will install, maintain and remove the devices. For proper procedure concerning installation and removal of these devices, refer to Section 7.0.

5.1.11 Plan where work material and equipment will be stored.

5.1.12 Consideration should be given to preparation of an emergency traffic plan for unexpected incidents which cause complete closure of a roadway.

5.1.13 Refer to the Typical Control Plan diagrams (TCP's) in the Utility Work Zone Traffic Control Field Guide and select the setup which most closely meets your requirements, adapting it where necessary to meet local conditions.

5.1.14 For night operations or work areas left with traffic restrictions at night, illumination may be required in addition to flashing and steady lights on warning and guide devices.

6.0 SELECTING THE TYPICAL APPLICATION

Selecting the most appropriate typical application for a temporary traffic control zone requires knowledge and understanding of that zone. Three factors are used to characterize the typical applications: speed and volume (roadway type), duration of work and exposure to hazards.

Work duration is a major factor in determining the number or types of devices used in temporary traffic control zones. The five categories of work duration and their time at a location are as follows:

6.1 Duration of Work

6.1.1 Long-Term Stationary

Work that occupies a location more than three days.

At long-term stationary temporary traffic control zones, there is ample time to install and realize benefits from the full range of traffic control procedures and devices that are available for use. Generally, larger channelizing devices are used, as they have more retro- reflective material and offer better nighttime visibility. The larger devices are also less likely to be displaced or tipped over-an important consideration during those periods when the work crew is not present. Furthermore, as long-term operations extend into nighttime, retro-reflective and/or illuminated devices are required.

6.1.2 Intermediate-Term Stationary

Work that occupies a work location for more than one daylight period up to three days, or nighttime lasting more than one hour.

Typically, the work zone is occupied by excavations, materials, and/or equipment at times when workers are not present. At least one advance warning sign should face each direction of traffic approaching a long duration stationary work area. When such an area uses a portion of the roadway, channelizing devices should be used. For long duration work areas, larger signs and more conspicuous channelizing devices are usually warranted to control traffic. Conditions normally require attention by the person responsible for traffic control during work of long duration. Warning, delineation and channelization devices should be effective under varying conditions of light and weather. Devices should be kept current and flagger signs should be covered or turned from view when the flagger is not on duty.

6.1.3 Short-Term Stationary

Work that occupies a work location for more than 1 hour, within a single daylight period.

Most utility operations are short-term stationary work. The work crew is present to maintain and monitor the temporary traffic control zone. The use of a flagger is an option depending on road speed and volume. Lighting and/or retro-reflective devices should be chosen to accommodate varying seasonal, climatic, and visibility situations.

This would be work of a type that at the conclusion of the work day or emergency period, the area is returned to its original state in regard to traffic restrictions. It includes operations such as overhead utility repair, and work on underground utilities at manholes. At least one advance warning sign shall face each direction of traffic approaching the work area. When such an area occupies a portion of the roadway, channelizing devices should be used. As the size of a work area that occupies a travel lane increase, the number of traffic control devices should be increased. For short duration stationary work areas, portable signs, consistent with the need for advance warning and adequate notice, supplemented with cones and barricades are generally sufficient to control traffic.

6.1.4 Short Duration

Work that occupies a location up to one hour.

During short duration work, there are hazards involved for the crew in setting up and taking down the traffic controls. Also, since the work time is short, the time during which motorists are affected is significantly increased as the traffic control is expanded. Considering these factors, it is generally held that simplified control procedures may be warranted for short duration work. Such shortcomings may be offset by the use of other, more dominant devices such as special lighting units on work vehicles, such as arrow displays and flashing beacon lights.

It includes operations such as tree-trimming, overhead utility repairs and work at underground utilities at manholes lasting more than 15 minutes at one location.

6.1.5 Mobile Work

Work that moves intermittently or continuously.

Mobile operations often involve frequent short stops, each as much as 15 minutes long, for activities such as removal of debris from the roadway, operating a power distribution switch, changing a street light lamp, operating a gas valve, gas leak detection operations, surveying, inspections and other utility operations that are similar to stationary operations. Warning signs, flashing beacon lights, flags, and/or channelizing devices should be used. Each worker shall be highly visible to approaching traffic.

Mobile operations also include work activities in which workers and equipment move along the road without stopping, usually at slow speeds. The advance warning area moves with the work area. Traffic should be directed to pass safely. For some continuously moving operations-where volumes are light and visibility is good, a well marked and well signed vehicle may suffice. If volumes and/or speeds are higher, a shadow or backup vehicle equipped as a sign truck, preferable supplied with a flashing arrow display, should follow the work vehicle. Where feasible, warning signs should be placed along the roadway and moved periodically as the work progresses. In addition, vehicles may be equipped with such devices as flags, flashing vehicle lights, truck-mounted attenuators, and appropriate signs. These devices may be required individually or in various combinations, including all of them, as determined necessary.

Safety should not be compromised by using fewer devices simply because the operation will frequently change its location. Portable devices should be used. Flaggers may be used, but caution must be exercised so they are not exposed to unnecessary hazards. The control devices should be moved periodically to keep them near the work area. If mobile operations are in effect on a high-speed travel lane of a multilane divided highway, flashing arrow displays should be used.

6.2 Location of Work

The choice of traffic control needed for a temporary traffic control zone depends upon where the work is located. As a general rule, the closer the work is to traffic, the more control devices are needed.

6.2.1 Outside of the shoulder edge

Devices may not be needed if work is confined to an area 15 or more feet from the edge of the shoulder. Consideration should be given to roadway characteristics, roadway geometrics, and vehicle speed.

A general warning sign shall used if workers and equipment are within 15 feet or less of an uncurbed roadway or 2 feet or less of a curbed roadway.

6.2.2 On or near the shoulder edge

The shoulder should be signed as if work were on the road itself, since it is part of the driver's recovery area. Advance warning signs are needed. Channelizing devices are used to close

the shoulder, direct traffic, and keep the work space visible to the motorist. Portable barriers may be needed to prevent encroachment of errant vehicles into the work space and to protect workers.

6.2.3 On the median of a divided highway

Work in the median may require traffic control for both directions of traffic, through the use of advance warning signs and channelization devices. If the median is narrow, with a significant chance for vehicle intrusion into long-term work sites and/or crossover accidents, portable barriers should be used.

6.2.4 On the traveled way

Work on the traveled way demands optimum protection for workers and maximum advance warning for drivers. Advance warning must provide a general message that work is taking place, information about specific hazards, and actions the driver must take to drive through the temporary traffic control zone.

6.3 Roadway Type

Roadway type is also a primary factor in the use of temporary traffic control zone traffic control devices.

6.3.1 Rural two lane roadways

Characterized by relatively low volumes and high speeds.

6.3.2 Urban arterial roads

Often have lower speeds, but they may require significant controls because of higher traffic volumes and closer spacing of such design features as intersections.

6.3.3 Other urban streets

Characterized with light traffic volumes will generally require fewer more closely spaced devices.

6.3.4 Rural or urban multilane divided and undivided highways

6.3.5 Intersections

6.3.6 Freeways

Major arterials and freeways need the highest type of traffic control, primarily because of high speeds and often high volumes of traffic.

7.0 SIGNS

7.1 Location of Signs

7.1.1 Signs shall be placed where they convey their messages effectively and placement must therefore be accommodated to highway characteristics. Signs shall be so placed that the driver will have adequate time for response.

7.1.2 As a general rule signs shall be located on the right side of the roadway. Where special emphasis is deemed necessary, dual installations may be made which consist of duplicate signs opposite each other on the left and right sides of the roadway. Within a construction or maintenance zone, however, it is often necessary and/or desirable to place signs on portable supports placed within the roadway itself. It is also permissible to mount appropriate signs on barricades.

7.1.3 All signs should be mounted at approximately right angles to the direction of, and facing, traffic which they are to serve. Signs mounted on barricades, or temporary supports may be at lower heights but the bottom of the sign shall be not less than one foot above the pavement elevation. However, higher mounting heights are desirable.

7.2 Regulatory Signs

Regulatory signs (for example, speed limit reductions) impose legal compulsions or restrictions on motorists. Therefore, their use must be officially authorized by the agency having responsible jurisdiction.

7.3 Warning Signs

Warning signs are the most important type of signs used in connection with the maintenance and construction operations. Motorists, properly alerted to the physical conditions ahead, should be able to adjust the operation of their vehicles to safely negotiate the maintenance, construction or detour zone.

Warning signs are normally placed in advance of the condition for which they are intended. The advance posting distance for these signs will vary with the approach speed of traffic, the type of maintenance or construction activity, the roadway conditions, and the number and type of signs and other devices used.

Visibility of each sign should be examined with respect to grade, alignment, road curvature and other possible obstructions on the approach to the sign.

For maximum mobility and safety on certain types of maintenance operations, a large sign may be effectively mounted on a vehicle stationed in advance of the work or moving along with it. This may be the working vehicle itself, as in the case of gas leak mobile and street light work, or a vehicle provided expressly for this purpose. These mobile sign displays may be mounted on a trailer, may be provided with self-contained electric power units for flashing beacons and lights, or may be mounted on a regular maintenance vehicle.

7.4 Guide Signs

Guide signs are used to direct traffic through and around maintenance and construction operations where temporary route changes are necessitated by highway closures and detours.

8.0 BARRIERS AND CHANNELIZATION

8.1 Function

Barriers and channelizing devices, when properly used, are often essential to properly control and direct the movement of traffic through or around maintenance and construction projects.

- 8.1.1These devices are used to mark a limited channel of traffic or to close off sections of highways.
- The work vehicles themselves may be used to protect the work area, particularly in low speed urban districts.
- Consideration should always be given to the need for lighting devices at night.

8.2 Channelization

A very important element, within the system of traffic control devices commonly used in construction or maintenance areas (where a reduction in pavement width is involved), is the taper that is provided for channelization.

8.3 Barricades

Barricades are used to physically block off all or part of a roadway.

- If barricades extend across a roadway and shoulder as a fence, availability of access for maintenance or construction forces must be considered.
- Roadways should be narrowed gradually. This gradual narrowing may be accomplished by means of the barricades themselves or by placing cones, drums, or vertical panels in advance of the barricades. An alternate method is to install the barricades at intervals with each successive barricade extending further into the roadway. At night, consideration should be given to the use of delineators or steady-burning lighting devices to indicate the path to be followed and/or of obstructions within the roadway.
- Barricades may also be used to confine traffic to certain lanes or paths of travel for certain distances. These may be placed longitudinally or transversely to the path of travel. Cones, drums, or vertical panels may be used longitudinally or diagonally.

8.4 Auxiliary Devices

When used to require a change in direction or reduction in the number of lanes available, the change should be made gradually.

8.4.1 Cones

a. Cones shall be predominantly orange in color and may be supplemented with warning flags.

b. Cones should be kept clean and bright for maximum target value.

c. For night time use, they shall be reflectorized or equipped with lighting devices for maximum visibility.

8.4.2 Drums

Drums are less portable than cones but provide greater emphasis. They may be used to surround a work area. Drums shall not be placed in the roadway without advance warning signs.

8.4.3 Warning Lights

Warning lights are used to illuminate and emphasize the existence of obstructions and hazards at night. They may be used as necessary as a supplement to reflectorized signs, barricades and other channelizing devices. Warning lights used in series to supplement channelizing devices should be steady-burning, except that the first two lights in series may flash.

Warning lights consist of steady-burning lights, flashing lights and flashing arrow boards.

a. Steady burning lights include all single-unit, steady-burning, low-intensity lamps which emit yellow light.

b. Flashing yellow lights. They are used for advance warning or for marking a severe or unexpected obstruction or hazard in or near the roadway.

c. Flashing arrow boards. A portable unit, consisting of flashing indications arranged to form an arrow symbol, may be used with standard warning devices on highway obstructing maintenance and construction projects.

   1. A unit may be trailer mounted or it may be mounted on a vehicle and arranged so that it can be displayed or turned from view as necessary.

   2. When these units are used on a moving vehicle, controls and pilot lights should be located so that the message display can be monitored and changed from within the driving compartment of the vehicle.

8.4.4 Work Zone Enhancement Devices

Includes; telescoping bars, portable crowd control barriers, such as Color-cade barriers and other protective devices are used to provide additional measures for keeping pedestrians,

bicyclists, etc. from entering into the work area. Traffic control devices must meet the criteria for NCHRP Report 350 standards. However, common devices such as telescoping bars between cones and Color-cade barriers that are typically used within the work zone are not intended for vehicle protection but to prevent pedestrian incursion into the work zone.

9.0 INSTALLATION AND REMOVAL OF DEVICES

9.1 Protection

Installation and removal of devices, in itself, constitutes highway work that should be protected by means appropriate to the situation, such as hazard vehicle lights and vehicle emergency flashers. Establishing a work area within an intersection, or at a freeway interchange, may warrant greater protection.

9.2 Order of Work

1 Device installation normally proceeds from the beginning of the work zone to the far end. On a two-way road, the less affected direction should be set up before the more affected one. The work vehicle used should move in the same direction as traffic in the roadway half being set up.

2 On a one-way roadway, device removal is normally started at the downstream end with removal of the last work area protection device. Channelizing devices are then removed, from downstream to upstream, with those in advance of the workers continuing to provide protection, until the roadway is cleared. Removal of advance warning signs on the shoulder is normally accomplished with a work vehicle traveling in the direction of traffic flow.

10.0 EMPLOYEES EXPOSED TO VEHICULAR TRAFFIC

10.1 Clothing Requirements

a. High visibility safety apparel is required to maximize employee protection when exposed to the risks of moving roadway traffic or construction equipment.

b. Employees must wear high-visibility safety apparel meeting the requirements of ISEA "American National Standard for High-Visibility Safety Apparel" or equivalent revisions, and labeled as ANSI 107-2004 standard performance for Class 2 or 3 exposure.

c. High-visibility safety apparel is defined as company approved:

   1. Safety vests
   2. Rain gear (jacket or jacket and pants ensemble), or
   3. Garments worn over the outer layer of clothing

d. Flaggers - safety apparel meeting ANSI 107-2004 standard performance Class 3 risk exposure should be considered for:

   - Flagging at night
   - Flagging in inclement weather and similar lowlight conditions
   - Flagging in high speed/volume traffic areas
   - When determined by the competent person in charge

e. Any exception for not wearing high-visibility safety apparel must be valid and must be documented on the job brief by the individual exposed to the risks of moving roadway traffic or construction equipment and by the responsible person in charge.

11.0 FLAGGERS

11.1 Application

Consideration should always be given to the need for flaggers to control traffic on a maintenance or construction project where traffic is permitted to travel through or adjacent to the work area. However, the decision to use or not to use a flagger in a particular situation rests with the person in charge of the operation.

1 STOP/SLOW Paddles. Paddles are the preferred tool to use when performing flagging duties.

2 Flags. A 24" x 24" Red Flag may be used for flagging in emergencies when STOP/SLOW paddles are not available. Red Flags are also acceptable when flagging at four-way intersections.

11.2 Flagger Stations

11.2.1 Flagger stations should be located far enough from the work site so that vehicles will have sufficient distance to slow down before entering the project but not so far that vehicles will tend to speed up into the work site.

11.2.2 Normally the flagger will be positioned adjacent to the traffic lanes being controlled either on the shoulder or in the barricaded lane. At a spot obstruction the flagger should stand on the shoulder opposite the barricaded section.

11.2.3 The flagger should stand alone, never permitting a group of workers to congregate around him or her. The flagger should be stationed sufficiently in advance of the work area to warn workers of approaching danger, such as out-of-control vehicles.

11.2.4A flagger warning sign shall be used facing each direction of traffic. These advance warning signs are optional for very brief periods or emergency traffic control.

11.2.5 Flagger Stations at night time shall be illuminated, except in emergency situations.

11.3 One-Lane Control

Where traffic in both directions must, for a limited distance, use a single lane, provisions should be made for alternate one-way movement to pass traffic, through the constricted section. However, where the one-lane section is of any significant length, there should be some means of coordinating movements (for example, walkie-talkies, hand signals, etc.) at each end so that vehicles are not simultaneously moving in opposite directions in the section and so that delays are not excessive at either end. Control points at each end of the route should be chosen so as to permit easy passing of opposing lines of vehicles.

12.0 VEHICLES IN THE WORK AREA

1 All vehicles in the work area shall activate their vehicle hazard warning flashers in addition to their beacon/flashing lights for the duration of the work.

2 As vehicles approach the work area they should activate their vehicle hazard warning lights along with the beacon/flashing to indicate to traffic that they are slowing down and preparing to enter the work zone.

3 Drivers of vehicles with portable beacon lights shall not attempt to activate or affix the lights to the vehicle while driving.

4 Beacon/Flashing lights are intended as hazard warning lights. These lights are not considered “Emergency Response Lights” and should not be used as such. It is, however permissible to use the Beacon/Flashing light while performing patrol or shadow vehicle activities when the vehicle speed is below the normal speed limit creating a potential traffic hazard.

5 All vehicle lights shall be approved for use by Fleet and only used in accordance with manufacturers’ instructions, local, state and federal law.

13.0 REFERENCES

13.1 49 CFR, Manual of Uniform Traffic Control Devices. 2003, rev 1 & rev2

13.2 NYCRR, Title 17, Volume (b), Chapter V, Uniform Traffic Control Devices.

13.3 29 CFR 1926.201 - Signaling,

13.4 29 CFR 1926.202- Barricades,

13.5 29 CFR 1926.203- Definitions,

13.6 29 CFR 1910.269, Electrical Power Generation, Transmission and Distribution.

13.7 Utility Work Zone Traffic Control, Wayne State University, August 2008

13.8 ANSI 107-2004

APPENDIX G

HASP ANNUAL CHECKLIST

Glen Cove Former MGP Site HASP Annual Checklist	
Have all National Grid procedure revisions been incorporated into HASP?	
Are there any new procedures to be incorporated into the HASP?	
Is all contact information in the HASP current and correct?	
Has the scope of work changed? If so, are changes reflected in HASP?	
Is the O2 injection system present and operational?	
Does the Activity Hazard Analysis need to be revised?	
Have any attributes of LIPA property and associated procedures and regulations changed?	
Has GEI obtained the most recent as-built drawings of the transmission/distribution line layout from National Grid?	

APPENDIX H

EMERGENCY EVACUATION PLAN AND MAP

Emergency Evacuation Plan

In the event of severe weather, a chemical emergency, a fire, or other hazard which warrants evacuation of the personnel onsite or working within the Glen Cove community; the following procedures will be strictly adhered to:

1. **IF THE EMERGENCY IS SITE-WIDE (such as severe inclement weather), SOUND THE ALARM** All staff vehicles are equipped with an air horn. The emergency signal blast with the air horn should be a single blast lasting approximately **30 seconds**. If another horn blast happens to occur at the same time or during your blast, do not discontinue yours. Complete your emergency signal. Be aware that other emergency blasts may occur in the event of an emergency.

   IF THE EMERGENCY IS LOCALIZED (such as a fire in the trailer or an accident in the work zone) you do not need to sound the alarm with the air horn. You must yell **FIRE, FIRE, FIRE,** (or other emergency) repeatedly. Make sure that at least one other employee has heard and understood the alarm.

2. **NOTIFY/CALL 911 EMERGENCY OPERATOR.** The employee first observing the fire or other hazard will relocate outside of the immediate area of the hazard,

   DIAL 911 and
   Report the emergency situation indicating that
   THERE IS A FIRE OR OTHER TYPE OF AN EMERGENCY AT:

   [Name and location of emergency]
   The National Grid/LIPA Glen Cove Site
   Give Address

3. **EVACUATE!** Select the closest, safest route to exit the site or building and proceed in an orderly and expeditious manner to a prearranged meeting area outside. While in route to the exit, assist in the notification of other employees by re-sounding the alarm to evacuate**. FIRE, EVACUATE!!! FIRE, EVACUATE, FIRE, EVACUATE!!!** While in route from the building(s) or site, take the time to notify the other employees and occupants in the area of the emergency and the necessity for evacuation. For a site-wide evacuation, follow the designated path on the Emergency Evacuation Map.

4. **ASSEMBLE:** After you have heard the GEI air horn emergency signal or after you have been clearly notified by other personnel that you must vacate and/or evacuate your area, you must immediately relocate to the **DESIGNATED GEI ASSEMBLY AREA (on Emergency Evacuation Map)** if the emergency is site-wide. The DESIGNATED ASSEMBLY AREA for site-wide emergencies is the top of entrance road just outside the site entrance on Grove Street. If the emergency is localized, relocate to an area outside your work zone that is a **safe distance from the emergency**. Secure your work area if necessary, and if possible**.** As you exit the building or job site, select the closest and safest route and proceed in an orderly manner to the **DESIGNATED ASSEMBLY AREA** where a head count will be taken to ensure that everyone has safely evacuated**. The first person to arrive will conduct the headcount. Use the sign-in sheet (if possible) to help determine who is present onsite, but also be sure to determine from other employees who is onsite at well (include sub-contractors). Sub-contractor crew chiefs must inform GEI of employee presence.** Be especially cautious as you cross traffic lanes for arriving emergency vehicles and other moving private vehicles.

5. Remain in the assembly area until released to return to work or instructed otherwise.

6. Random safety drills regarding the material in this emergency evacuation plan will be conducted to determine the efficacy of the plan and necessary changes.

- Notify the GEI Project Manager, GEI Corporate Health and Safety Officer, and the National Grid Project Manager of the emergency and actions taken by site personnel.

Appendix E

Community Air Monitoring Plan (electronic only)

GEI Consultants

Geotechnical
Environmental and
Water Resources
Engineering

Community Air Monitoring Plan

Glen Cove Former Manufactured Gas Plant

City of Glen Cove
Nassau County, New York
AOC Index No. D1-0001-98-11
Site No. 1-30-089P

Submitted to:
National Grid
175 East Old Country Road
Hicksville, NY 11801

Submitted by:
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400 Unicorn Park Drive
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781-721-4000

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March 2014
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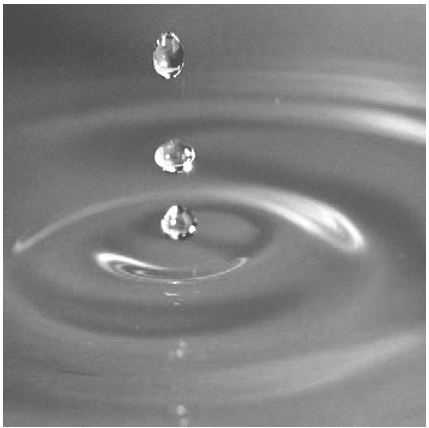

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Abbreviations and Acronyms

CAMP	Community Air Monitoring Plan
CM	Construction Manager
DUSR	Data Usability Summary Report
GEI	GEI Consultants, Inc., P.C.
MGP	Manufactured Gas Plant
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PM-10	Particulate Matter Less than 10 Micrometers in Size
TVOC	Total Volatile Organic Compounds
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound
MEASUREMENTS	
$\mu g/m^3$	micrograms per meter cubed
ppm	parts per million

Executive Summary

This Community Air Monitoring Plan (CAMP) Work Plan has been developed to provide procedures for measuring, documenting, and responding to potential airborne contaminants during intrusive activities below the clean soil cover associated with the Glen Cove Former Manufactured Gas Plant (Site) property. The procedures in this CAMP focus on air monitoring techniques and contingency measures designed to mitigate potential airborne contaminants. This CAMP Work Plan is based on the CAMP guidelines established by the New York State Department of Health (NYSDOH) in the New York State Department of Environmental Conservation (NYSDEC) *DER-10 Technical Guidance for Site Investigation and Remediation* (DER-10) (NYSDEC, 2010).

The CAMP provides Air Monitoring Procedures, Alert Levels, Response Levels, Action Levels, and Contingency Measures if Action Levels are approached. Alert Levels are National Grid internal established concentration levels for volatile organic compounds only and are not established by the NYSDOH or NYSDEC. Alert Levels are set below the levels established by the NYSDOH so that actions can be taken prior to exceeding a NYSDOH threshold. An Alert Level serves as a screening tool to trigger contingent measures if necessary, to assist in minimizing off-site transport of contaminants during remedial activities. A Response Level is a contaminant concentration level that triggers a temporary work stoppage, continued monitoring, and potential contingent measures. An Action Level is a contaminant concentration that triggers work stoppage and implementation of contingent measures to mitigate potential airborne contaminants prior to resuming work activities. Response Levels and Action Levels are NYSDOH threshold levels established in the May 2010 NYSDOH Generic CAMP presented in Appendix 1A of DER-10. Exceedances of either Response Levels or Actions Levels will be reported to NYSDEC and NYSDOH.

During times of potential related ground intrusive activities below the clean soil cover, perimeter air monitoring will be conducted using a combination of fixed-station, moveable tripod-mounted, and “walk-around” air monitoring equipment (as appropriate). Monitoring will be performed for total volatile organic compounds and dust along the Site perimeter 24 hours a day when fixed stations are used or during working hours if the movable tripod-mounted units are used. The Contingency Plan defines Alert Levels, Response Levels, Action Levels, and specific contingency measures to be implemented. The response actions, potentially including work stoppage and work area controls by various methods, are intended to prevent or significantly reduce the migration of airborne contaminants from the Site.

GEI Consultants, Inc., P.C. (GEI) will implement the CAMP and will report any exceedance of Response Levels and Action Levels to the Contractor, the Construction Manager, National Grid, NYSDOH, and NYSDEC. As specified in the DER-10, all 15-minute readings will be recorded and be available for State (NYSDEC and NYSDOH) personnel to review. The contractor conducting intrusive activities below the clean soil cover will be responsible for enacting contingency measures to respond to Alert Levels, if necessary, and to the exceedances of Alert and Action Levels as they may occur. GEI will provide data summary reports to the Contractor, the Construction Manager, National Grid, and NYSDEC each week during ground intrusive activity below the clean soil cover.

1. Introduction

The New York State Department of Health (NYSDOH) Generic Community Air Monitoring Plan (CAMP), as presented in New York State Department of Environmental Conservation's (NYSDEC) document *DER-10 Technical Guidance for Site Investigation and Remediation* (DER-10), recommends that real-time monitoring for total volatile organic compounds (TVOC) and particulates (i.e., dust) be conducted at the downwind perimeter of each designated work area during ground intrusive activities at contaminated sites. As such, this work plan describes the proposed air monitoring means and methods that will be implemented during intrusive activities below the clean soil cover at the Glen Cove Former Manufactured Gas Plant (MGP) Site (Site). A site location map is shown in Figure 1.

The purpose of the CAMP is to provide early detection in the field of potential short-term emissions and will be conducted in accordance with the generic NYSDOH CAMP.

The objectives of the CAMP are as follows:

- Provide an early warning system to alert the Contractor, the Construction Manager (CM), National Grid, and NYSDEC that concentrations of TVOC or dust in ambient air are approaching Action Levels due to Site activities.
- Provide potential contingency measures to be enacted by the contractor conducting intrusive activities below the clean soil cover and related contractors that are designed to reduce the off-site migration of contaminants if established Action Levels are approached or exceeded.
- Determine whether construction controls are effective in reducing ambient air concentrations to below Action Levels and make appropriate and necessary adjustments.
- Develop a permanent record that includes a database of perimeter air monitoring results, equipment maintenance, calibration records, and other pertinent information.

1.1 Roles and Responsibilities

GEI Consultants, Inc., P.C. (GEI) will implement the monitoring and reporting components of this CAMP under contract with National Grid. The contractor performing intrusive activities below the clean soil cover is responsible for the selection and

implementation of appropriate contingency measures that will mitigate the off-site migration of contaminants in response to Action Levels being approached or exceeded. The remainder of this section specifies the roles and responsibilities of each entity relative to the CAMP. A communication flowchart is shown in Figure 2 with each entity and lines of communication for the CAMP.

1.1.1 GEI Consultants, Inc., P.C.

The scope of GEI's activities will be limited to CAMP monitoring and reporting used for the CAMP. GEI is responsible for the Health and Safety of their employees. GEI's CAMP roles and responsibilities are as follows:

- GEI will monitor and record total volatile organic compounds (TVOC) and dust at various locations around the Site as described in the following sections of this CAMP.
- On a daily basis, GEI will communicate to the following entities whether TVOC or dust exceeded Response Levels or Action Levels specified in Section 2.1, and suggest corrective actions required to address the situation. GEI will convey the CAMP results to the entities listed below and inform them if the Alert or Response Levels have been exceeded. GEI will direct contractors at the Site to take action if warranted.

    - **Contractor – TBD**

    - **New York State Department of Environmental Conservation**
      R. Scott Deyette
      Chief, Inspection Unit
      New York State Department of Environmental Conservation
      MGP Remedial Section, Division of Environmental Remediation
      Bureau of Western Remedial Action, 11th Floor
      625 Broadway
      Albany, New York 12233-7017
      518-461-3721

    - **National Grid**
      Theodore Leissing –Manager – Long Island Area
      Office: (516) 545-2563
      175 East Old Country Road
      Hicksville, NY 11801

    - **Construction Manager - TBD**

- GEI will provide, maintain, and operate the equipment used to implement the CAMP.

    - GEI will provide data summary reports to the Contractor, CM, National Grid, and NYSDEC each week during intrusive activity. The reports will identify Response Level and Action Level exceedances and will include data summary reports for all TVOC and dust data collected.

1.1.2 Contractor

The Contractor is the lead contractor responsible for site activities pertaining to the intrusive activities below the clean soil cover. The Contractor will be responsible for taking contingent actions in conjunction with National Grid in response to Response Level and Action Level exceedances. The Contractor will be responsible for taking contingent actions for Alert Levels, if required by GEI, CM, and/or National Grid. The Contractor is responsible for the Health and Safety of their employees.

1.1.3 National Grid

National Grid has the responsibility to provide mitigation services related to the release of MGP-related vapors in excess of CAMP Response Level and Action Levels. National Grid is also ultimately responsible for the remediation of the Site under an approved work plan with NYSDEC.

1.1.4 New York State Department of Environmental Protection

NYSDEC is responsible for the environmental regulatory enforcement for all activities conducted at the site including compliance with this CAMP, stormwater runoff mitigation (erosion and sediment control), and all environmental and remediation regulations, policies, and guidance applicable to the Site. NYSDEC may provide on-site oversight personnel for the work being conducted.

1.1.5 Construction Manager

The CM is National Grid's representative on site and is responsible for day-to-day operations on the Site. The CM will be responsible for directing the Contractor to take contingent actions in conjunction with National Grid in response to Alert Level (TVOC only), Response Level, and/or Action Level exceedances. The CM is responsible for the Health and Safety of CM employees and subcontractors.

2. Sampling and Analytical Procedures

This section of the CAMP presents a detailed description of the air monitoring, air sampling, and analytical procedures, including data management that will be used during ground intrusive site activities. The intent of the real-time monitoring program is to provide early detection in the field of short-term emissions and off-site migration of site-related TVOC and dust.

Real-time monitoring methods will be utilized to measure ambient air concentrations during the project. Monitoring for TVOC and respirable particulate matter (particulate matter less than 10 micrometers in size [PM-10]) will occur at a minimum of two locations and wind direction will be monitored in real-time if an automated monitoring system is utilized. Supplemental monitoring for TVOC and PM-10 will occur along the perimeter of the project site on an as-needed basis. In the event of a possible exceedance of a Response Level or Action Level for TVOC or PM-10, GEI will compare upwind (background) concentrations to downwind concentrations within 60 minutes of the possible exceedance to determine if site activity is causing the Response Level or Action Level exceedance. The air monitoring procedures and equipment are detailed below.

2.1 Alert Level, Response Level, and Action Levels

Alert Levels are not established by the NYSDOH or NYSDEC. An Alert Level is a National Grid internally established concentration levels for TVOC only. An Alert Level is set below the levels established by the NYSDOH so that action can be taken prior to exceeding a NYSDOH threshold. An Alert Level serves as a preemptive screening tool for TVOC to trigger contingent measures if necessary, to assist in minimizing off-site transport of contaminants during remedial ground intrusive activities.

Response Levels are NYSDOH thresholds levels established in the May 2010 NYSDOH Generic CAMP presented in Appendix 1A of DER-10. A Response Level is a contaminant concentration that triggers a temporary work stoppage, continued monitoring, reporting, and/or potential contingent measures. A Response Level serves as a preemptive tool for PM-10 to trigger contingent measures if necessary, to assist in minimizing off-site transport of contaminants during remedial ground intrusive activities.

Action Levels are NYSDOH threshold levels established in the May 2010 NYSDOH Generic CAMP presented in Appendix 1A of DER-10. An Action Level is a contaminant concentration that triggers work stoppage, continued monitoring, reporting, and

implementation of contingent measures to mitigate potential airborne contaminants prior to resuming ground intrusive activities.

For example, if high concentrations of dust are detected on the Site, contingent measures such as spraying water on dry soils may be required to reduce the concentrations and keep them below the Response Level.

The following target parameters and corresponding Alert Levels, Response Levels, and Action Levels were developed in accordance with the NYSDOH Generic CAMP.

Target Parameter	**Alert Level**
TVOC (15-minute average concentration)	3.7 ppm greater than background*
Target Parameter	**Response Level**
Respirable Particulate Matter (PM-10)	100 $\mu g/m^3$ greater than background*
Target Parameters	**Action Level (**)**
TVOC (15-minute average concentration)	5.0 ppm greater than background*
TVOC (1-minute average concentration)	25 ppm
Respirable Particulate Matter (PM-10)	150 $\mu g/m^3$ greater than background*

ppm - parts per million
$\mu g/m^3$ - micrograms per meter cubed
TVOC – total Volatile Organic Compounds
* Background is defined as the current upwind fifteen-minute average concentration.
** Action Level Exceedance Requires Work Stoppage and Mitigation of the condition causing the Exceedance

2.2 Air Monitoring Procedures

During times of intrusive activities below the clean soil cover, perimeter air monitoring will be conducted using a combination of fixed-station, moveable tripod-mounted, and/or hand-held air monitoring equipment. Monitoring will be performed for TVOC and PM-10 along the Site perimeter 24 hours a day when fixed station equipment is used or during working hours if movable tripod-mounted or hand-held air monitoring equipment is used.

Monitoring for TVOC and PM-10 will occur at a minimum of two locations using real-time monitoring equipment. Readings will be checked manually on a predetermined periodic basis if tripod-mounted equipment is used. Readings will be recorded once per minute and transmitted to a centralized data logger system if fixed-station equipment is used. Supplemental hand-held perimeter monitoring for TVOC and PM-10 will occur along the perimeter of the project site on an as-needed basis. Each approach is detailed below.

It is anticipated that tripod-mounted equipment will be used for minimally intrusive work such as installation of soil borings or monitoring wells and during shallow intrusive work during substation facility upgrades. It is anticipated that fixed station equipment will only be used in the event of significant excavation work below the clean soil cover at the Site. Supplemental hand-held equipment will be used on an as-needed basis. This may include monitoring directed by National Grid or NYSDEC, or to supplement fixed monitoring station data in response to visible dust.

2.2.1 Fixed-Station Monitoring Procedures

Real-time fixed-station monitoring equipment will be positioned at a minimum of two locations upwind and downwind of the designated work area. The real-time fixed air monitoring stations will be positioned between the work zone and the largest number of potential off-site receptors. Therefore, the placement of the fixed air monitoring stations is based on the need to document all potential off-site migration on the perimeter, but also recognizes the potential off-site receptors and the location of the proposed construction activities. Figure 3 displays a typical arrangement of fixed air monitoring stations around the site. Real-time monitors will continuously gather data 24 hours a day 7 days a week.

The air monitoring stations will be supplemented with a meteorological station and a system of transmitting the real-time data to a central data storage location accessible by the project team in the project trailer or similar work area.

Each real-time fixed-station air monitoring station contains the following:

1. Station enclosure
2. A photoionization detector
3. A particulate aerosol monitor equipped with a PM-10 impactor
4. A data telemetry device

Air monitoring equipment will be housed in a protective weather-tight enclosure. Each monitoring station will continuously measure and record TVOC and PM-10 at a rate of one sample per minute and record 15-minute averages. Figure 4A shows an example of a fixed air monitoring station.

In addition to the air monitoring stations, a meteorological monitoring station will be established on site to continuously monitor and record temperature, relative humidity, wind speed, and wind direction. Fifteen-minute averages for each meteorological parameter will be transmitted to the central data storage location to determine upwind and downwind stations for assessing Alert, Response, and Action Levels.

All TVOC, PM-10, and meteorological data will be stored in data loggers located within each monitoring/meteorological station. Stored analytical data along with system performance data from each station will be sent in real-time, via telemetry, to the Site central computer system for monitoring and analysis. In the event of severe weather or power loss at the site, data recording and/or recovery may be affected.

2.2.2 Tripod Mounted Monitoring Procedures

Tripod-mounted monitoring equipment will be positioned along the Site perimeter to monitor the air based on a particular day's ground intrusive activities. At a minimum, one tripod-mounted station will be positioned upwind and one tripod-mounted station will be positioned downwind of the designated work area. Real-time monitors will continuously gather data during periods of ground intrusive activity during working hours. The equipment will be manually read on a predetermined periodic basis during the work activities.

The readings will be collected at a minimum of 15-minute intervals during periods of intrusive activities. Wind direction will be determined by using a wind sock or flagging placed on a pole at the Site.

Each tripod-mounted air monitoring station would include the following:

1. Station enclosure and Tripod
2. A photoionization detector
3. A particulate aerosol monitor equipped with a PM-10 impactor

Air monitoring equipment will be housed in a protective weather-tight enclosure. Each monitoring station will continuously measure and record TVOC and PM-10 at a rate of one sample per minute and record 15-minute averages. Figure 4B shows an example of a typical tripod-mounted air monitoring station.

All TVOC and PM-10 will be stored in data loggers located within each monitoring station. Data from each piece of equipment will be downloaded daily and stored on a central storage location. The location of each station, the work zone, and the wind direction will be recorded daily.

2.2.3 Supplemental Hand-held Monitoring

Supplemental hand-held monitoring equipment will be recorded downwind of the designated work area on an as-needed basis. Specific site conditions that may trigger supplemental hand-held monitoring include:

- Visible dust
- Detection of TVOC and/or PM-10 at an air monitoring station at concentrations exceeding an Alert Level, Response Level, and Action Levels
- Direction by the construction manager, National Grid, or NYSDEC

Fifteen-minute average TVOC and PM-10 readings will be recorded at a downwind location between the work area and the nearest receptors.

When a triggering condition is observed during ground intrusive activity, the supplemental downwind perimeter monitoring will occur until the conditions that triggered the monitoring have subsided. TVOC concentrations will be monitored and recorded using a photoionization detector. PM-10 will be measured and recorded using a particulate aerosol monitor equipped with a PM-10 impactor.

At each monitoring point, the 15-minute average value of TVOC and PM-10, sample time, and sample location will be collected and recorded. Additional temporary monitoring points may be established due to changing site or meteorological conditions.

2.2.4 Equipment Calibration

Equipment calibration will be performed according to manufacturer's instructions. Each photoionization detector will be calibrated once daily using an isobutylene gas mixture. Particulate monitors will be purged and zeroed daily. Other hand-held portable equipment will be calibrated before each use, or a minimum of once per week when not in use.

2.3 Volatile Organic Compound (VOC) Analytical Sampling

During significant excavation below the clean soil cover when fixed station monitoring is employed, verification VOC samples will be collected once per week at two air-monitoring stations (one upwind and one downwind). A duplicate sample will be collected once every twenty samples. The samples will be collected to demonstrate that the real-time monitoring stations are effective in measuring the concentration of the VOC target compounds. VOC samples will be collected using 6-liter Summa® canisters (or equivalent vacuum canisters) and analyzed using United States Environmental Protection Agency (USEPA) Method TO-15 modified to include naphthalene. An accredited laboratory will perform the analytical testing on the canisters and will provide Category B deliverables as required by the New York Analytical Services Protocol. The results will be validated according to USEPA National Functional Guidelines and New York State Requirements, and a Data Usability Summary Report (DUSR) will be

produced. The results will be submitted electronically to the NYSDEC's Environmental Information Management System.

2.4 Pre-Construction Baseline Sampling

For significant excavation below the clean soil cover, pre-construction monitoring will be completed to establish baseline ambient air concentrations prior to the start of excavation activities. Baseline conditions will be developed for TVOC and PM-10 in ambient air using real-time fixed station sampling methods. Monitoring methods will follow those described in subsection 2.2.1. TVOC and PM-10 data will be recorded 24 hours per day for a minimum of three days. In addition, air samples will be collected for time-weighted average VOC analysis.

2.5 Data Management Procedures

This section of the Plan discusses the data management procedures that will be used during the remedy. Data may be generated from a variety of sources, including real-time fixed station analytical monitoring, supplemental walk-around monitoring, tripod-mounted monitoring stations, and meteorological monitoring.

These data must be reduced, evaluated, verified, and presented to related parties in a timely manner to facilitate decision-making. The data management process for each source of data is discussed below.

Analytical data generated at each fixed-station are sent to the central computer system via radio telemetry or will be manually downloaded daily. The monitoring data will also be downloaded to the project database for data evaluation. The following daily charts, tables, or figures will be prepared:

- Instantaneous and averaged TVOC concentrations compared to the TVOC Action Level
- Instantaneous and averaged PM-10 concentrations compared to the PM-10 Action Level
- Supplemental Hand-Held PM-10 concentrations compared to the Action Level (if any)
- Supplemental Hand-Held TVOC concentrations compared to the TVOC Action Level (if any)
- Air monitoring station locations

The following weekly charts, tables, or figures will be prepared:

- Maximum 15-minute average concentrations of TVOC and PM-10

- Upwind and downwind comparison of Response Level and Action Levels reached during the week if the daily maximum 15-minute average concentrations of TVOC and PM-10 exceeded a Response Level or Action Levels
- Summary of site activities
- Air monitoring station locations

GEI will review all real-time data in a timely manner following collection and prepare a final summary report for National Grid.

3. Response Plan

The purpose of this section is to identify the procedures to be followed in response to elevated levels of target compounds measured during intrusive activities below the clean soil cover. Response actions will be enacted by the Contractor, CM, and National Grid. GEI will report any occurrences where a Response Level or Action Level is exceeded, which would require response measures to be enacted. The NYSDEC will be notified of any occurrence where a Response Level and/or Action Level (NYSDOH threshold) is exceeded. If there is a verified exceedance, GEI will inform the CM, National Grid, and NYSDEC within 60 minutes of the exceedance via e-mail at a minimum. In general, a tiered approach to site conditions with corresponding response actions will be implemented during the air monitoring program. The four tiers of site conditions are defined as follows.

- **Site Condition 1.** Normal or ambient air-conditions where TVOC and PM-10 are less than the Alert and Response Levels.
- **Preliminary Site Condition 2.** Concentration of TVOC only is equal to or greater than the Alert Level, but less than the Action Level.
- **Site Condition 2.** Concentration of PM-10 is equal to or greater than Response Level, but less than the Action Level.
- **Site Condition 3.** Concentration of TVOC or PM-10 is equal to or greater than the Action Level.

The response plan will rely on real-time data generated from the fixed-station equipment and tripod-mounted equipment, and meteorological equipment. These data sources will be evaluated together in order to make appropriate decisions concerning site conditions and potential control measures.

An explanation of the notification system, specific conditions, and response actions for TVOC and PM-10 is presented below.

TVOC and PM-10 concentrations in air will be measured and recorded by station monitors. PM-10 may be temporarily suspended during periods of rain. Figure 5 presents the TVOC decision diagram that will be used to determine the appropriate site condition based on contaminant concentrations. Figure 6 presents the PM-10 decision diagram.

Specific TVOC target concentrations for Site Condition 1, Preliminary Site Condition 2, Site Condition 2, and Site Condition 3 are summarized in Table 1.

3.1 Site Condition 1

Site Condition 1 represents normal site conditions and will be in effect when the TVOC concentration is less than the Alert Level of 3.7 ppm and PM-10 is less than the Response Level of 100 $\mu g/m^3$. Under a Site Condition 1, each photoionization detector and particulate monitor located at the monitoring stations will collect and analyze TVOC and PM-10 at a frequency of one sample per minute.

3.2 Preliminary Site Condition 2

Preliminary Site Condition 2 will be in effect if the TVOC concentration is greater than or equal to the Alert Level of 3.7 ppm but less than the Action Level of 5.0 ppm.

At this time, the upwind and downwind concentrations will be compared to determine if the Preliminary Site Condition 2 is due to site activities. If downwind TVOC concentrations are greater than upwind concentrations, then it will be assumed that the Preliminary Site Condition 2 is due to site activities.

If the above condition is true, then a Preliminary Site Condition 2 will be verified. Under a verified Preliminary Site Condition 2, GEI will inform the CM, if applicable, National Grid and the Contractor. The contractor will implement mitigation control measures to abate the emissions and reduce levels back below the Alert Level. Possible Preliminary Site Condition 2 response actions are listed in Table 2. The site will remain in Preliminary Site Condition 2 as long as the TVOC concentration is between 3.7 ppm (Alert Level) and 5.0 ppm (Action Level), based on 15-minute averages.

The site will return to Site Condition 1 if the 15-minute average concentration of TVOC is less than the Alert Level of 3.7 ppm.

3.3 Site Condition 2

Site Condition 2 will be in effect if the average 15-minute PM-10 concentration at a station is greater than 100 $\mu g/m^3$ and related to site activities.

The upwind and downwind PM-10 concentrations will be compared to determine if the elevated PM-10 concentrations are due to site activities. If downwind PM-10 concentrations are 100 $\mu g/m^3$ greater than upwind concentrations (Response Level), then it will be assumed that the Site Condition 2 is due to site activities.

Under Site Condition 2, GEI will inform the CM, if applicable, and National Grid. GEI or the CM, if applicable, will notify the Contractor, NYSDEC, and NYSDOH. The Site Condition 2 will remain in effect as long as the average PM-10 concentration is greater than or equal to 100 $\mu g/m^3$ above upwind conditions (Response Level), and less than or equal to 150 $\mu g/m^3$(Action Level). Under a verified Site Condition 2, dust suppression techniques must be implemented by the Contractor. At this point, routine monitoring continues and 15-minute averages continue to be evaluated. Work may continue with dust suppression techniques if downwind PM-10 levels do not exceed 150 $\mu g/m^3$ above the upwind level (Action Level) and if no visible dust is migrating off site from the work area.

A contingency meeting/conference call attended by GEI, the Contractor, CM, National Grid, and NYSDEC will be held within 60 minutes of the verified Site Condition 2 if the condition is not mitigated by dust suppression techniques. Possible response actions for dust control are listed in Table 2.

3.4 Site Condition 3

Site Condition 3 will be in effect if the TVOC concentrations increase to greater than the Action Level of 25.0 ppm or the average 15-minute PM-10 concentration exceeds 150 $\mu g/m^3$ above the current average upwind concentration (Action Level). Site Condition 3 will remain in effect if one of the following conditions is true.

- The TVOC concentration is greater than 25 ppm (Action Level).
- The average 15-minute PM-10 concentration exceeds 150 $\mu g/m^3$ above the current average upwind concentration (Action Level)

Under Site Condition 3, GEI will inform the CM, if applicable, and National Grid. GEI or the CM, if applicable, will notify the Contractor, NYSDEC, and NYSDOH. All construction activities will be halted. The contractor will implement mitigation control measures to abate the emissions and reduce levels back below the Action Levels. Possible Site Condition 3 corrective measures/actions are listed in Table 2. After appropriate corrective measures/actions are taken, work activities may resume if the following conditions are met:

- TVOC concentration at the Site perimeter is no more than 5.0 ppm above background for the 15-minute average; and
- Dust suppression measures and other controls are successful in reducing the downwind PM-10 concentration to within 150 $\mu g/m^3$ of the upwind level and in preventing visible dust migration.

3.5 Visible Dust

In addition to measured PM-10 levels, the CAMP requires monitoring of visible dust conditions. If visible airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques if downwind PM-10 levels do not exceed the Action Level concentration of 150 $\mu g/m^3$ above the upwind level and if no visible dust is migrating from the work area.

4. Reporting

GEI will prepare and submit weekly reports to the Contractor, CM, National Grid, and NYSDEC summarizing the CAMP monitoring data. Each report will consist of a letter-style report and charts/tables summarizing the following:

- Maximum 15-minute average concentrations of TVOC, and PM-10
- Upwind and downwind comparison of Response Levels and Action Level reached during the weekly period
- Summary of site activities
- Air monitoring station locations
- Meteorological conditions

Following the completion of all work, a report will be developed summarizing the intrusive activities. As part of the report, the CAMP activities will be documented.

References

New York State Department of Environmental Conservation. 2010. DER-10 / Technical Guidance for Site Investigation and Remediation. Division of Environmental Remediation. May 3, 2010. Appendix 1A. pp. 204-206.

Tables

Table 1
Target Concentrations for Site Conditions
Community Air Monitoring Plan
Glen Cove Former MGP Site
Glen Cove, New York

Target Parameter	National Grid requirement[1]	DER-10 generic CAMP requirements[2]	
	Alert Level	Response Level	Action Level
TVOC (15-minute Average Concentration)	3.7 ppm	NA	5.0 ppm
TVOC (1-minute Measured Concentration)	NA	NA	25 ppm
PM-10 (15-minute Average Concentration)	NA	100 µg/m^3	150 µg/m^3

Site Condition	TVOC	PM-10	Notification Required
Site Condition 1	Less than Alert Level (<3.7 ppm)	Less than Response Level (<100 µg/m^3)	NA
Preliminary Site Condition 2	Greater than or equal to Alert Level less than Action Level (≥3.7 ppm and <5 ppm)	NA	National Grid, Construction manager (if applicable), Contractor
Site Condition 2	NA	Greater than or equal to Response Level and less than Action Level (≥100 µg/m^3 and <150 µg/m^3)	National Grid, Construction manager (if applicable), Contractor, NYSDEC, and NYSDOH
Site Condition 3	Greater than or equal to Action Level (≥5 ppm or ≥25 ppm)	Greater than or equal to Action Level (≥150 µg/m^3)	

Notes:

[1] Alert Levels are not established by the NYSDOH or NYSDEC and are National Grid internally established concentration levels for total volatile organic compounds. Alert Levels are set below the levels established by the NYSDOH so that actions can be taken prior to exceeding a NYSDOH threshold. An Alert Level serves as a preemptive tool to trigger contingent measures, if necessary, to assist in minimizing off-site transport of contaminants during remedial activities.

[2] Response Levels and Action Levels are defined in Appendix 1A of the New York State Department of Environmental Conservation *DER-10 / Technical Guidance for Site Investigation and Remediation* (NYSDEC, 2010).

µg/m^3 - micrograms per cubic meter

ppm - parts per million by volume

TVOC - total volatile organic compounds

PM-10 - particulate matter (i.e. dust) less than 10 microns in diameter

NA - not applicable

Table 2
Site Conditions and Response Actions
Community Air Monitoring Plan
Glen Cove Former MGP Site
Glen Cove, New York

Site Condition	Control Measure
Site Condition 1	Normal site activities - No control measures required
Site Condition 2	Establish trend of data and determine if evaluation/wait period is warranted Temporarily stop work Temporarily relocate work to an area with potentially lower emission levels Apply water to area of activity or haul roads to minimize dust levels Reschedule work activities Cover all or part of the excavation area Apply VOC emission suppressant foam over open excavation areas Slow the pace of construction activities Change construction process or equipment that minimize air emissions Install a perimeter barrier fence Apply water on haul roads* Wet equipment and excavation faces* Spray water on buckets during excavation and dumping* Haul materials in properly tarped or watertight containers* Restrict vehicle speeds to 10 mph* Cover excavated areas and material after excavation ceases* Reduce the excavation size and/or number of excavations*
Site Condition 3	Halt work Encapsulate construction area and treat air exhaust Perform work during cold weather Cease construction activities Re-evaluate air monitoring work plan

Notes:

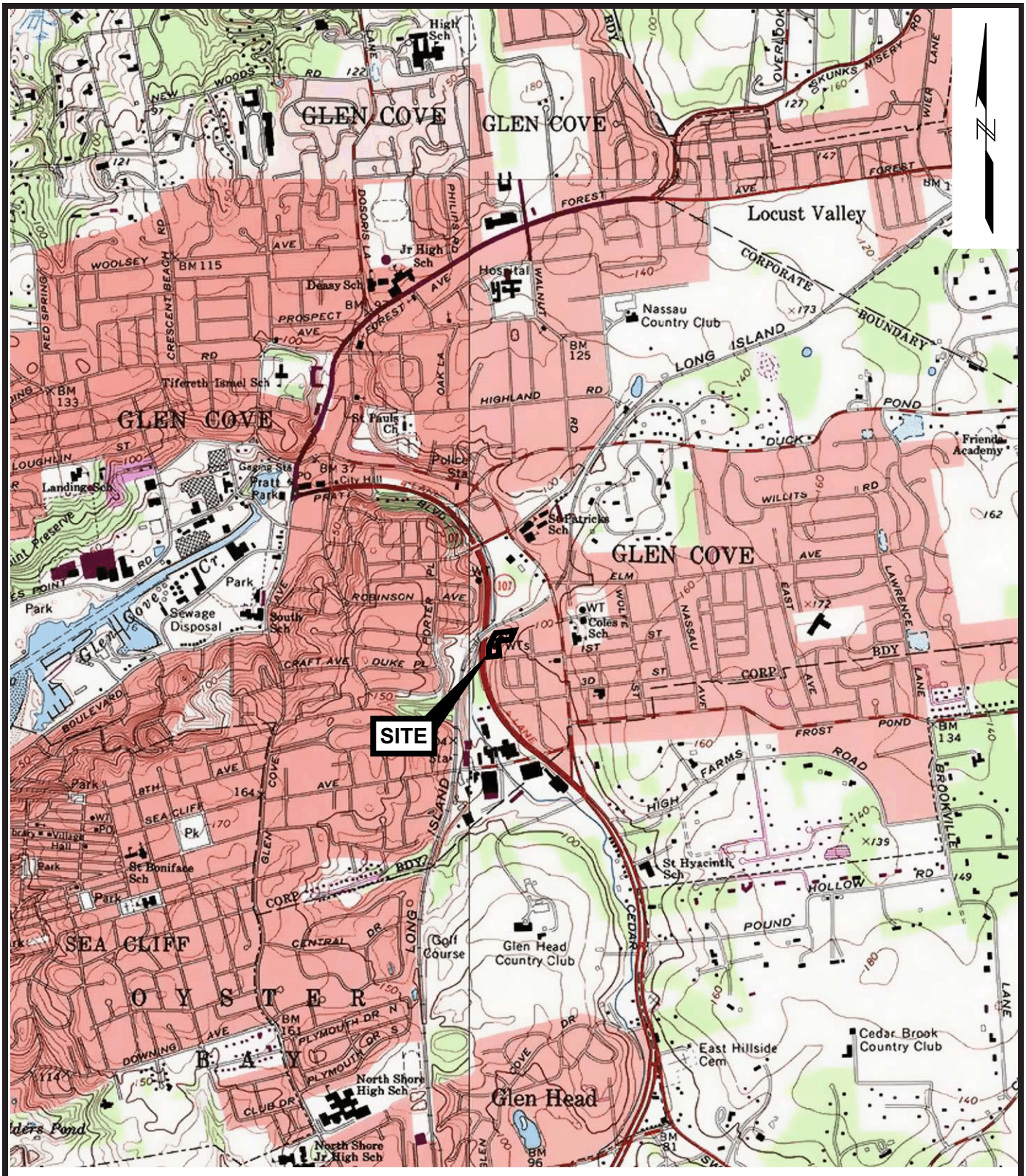
The control measures specified under each site condition can be implemented in any order that is most appropriate under the existing site conditions.

* Control measures suggested in the New York State Department of Environmental Conservation *DER-10 / Technical Guidance for Site Investigation and Remediation* (NYSDEC, 2010)

VOC - volatile organic compound

mph - miles per hour

Figures



SOURCE: MAP CREATED WITH TOPO!™ ©2000 WILDFLOWER PRODUCTIONS (www.topo.com)

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SCALE, FEET

COMMUNITY AIR MONITORING PLAN
GLEN COVE FORMER MGP SITE
GLEN COVE, NEW YORK

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SITE LOCATION MAP

Project 093270 | March 2014 | Figure 1

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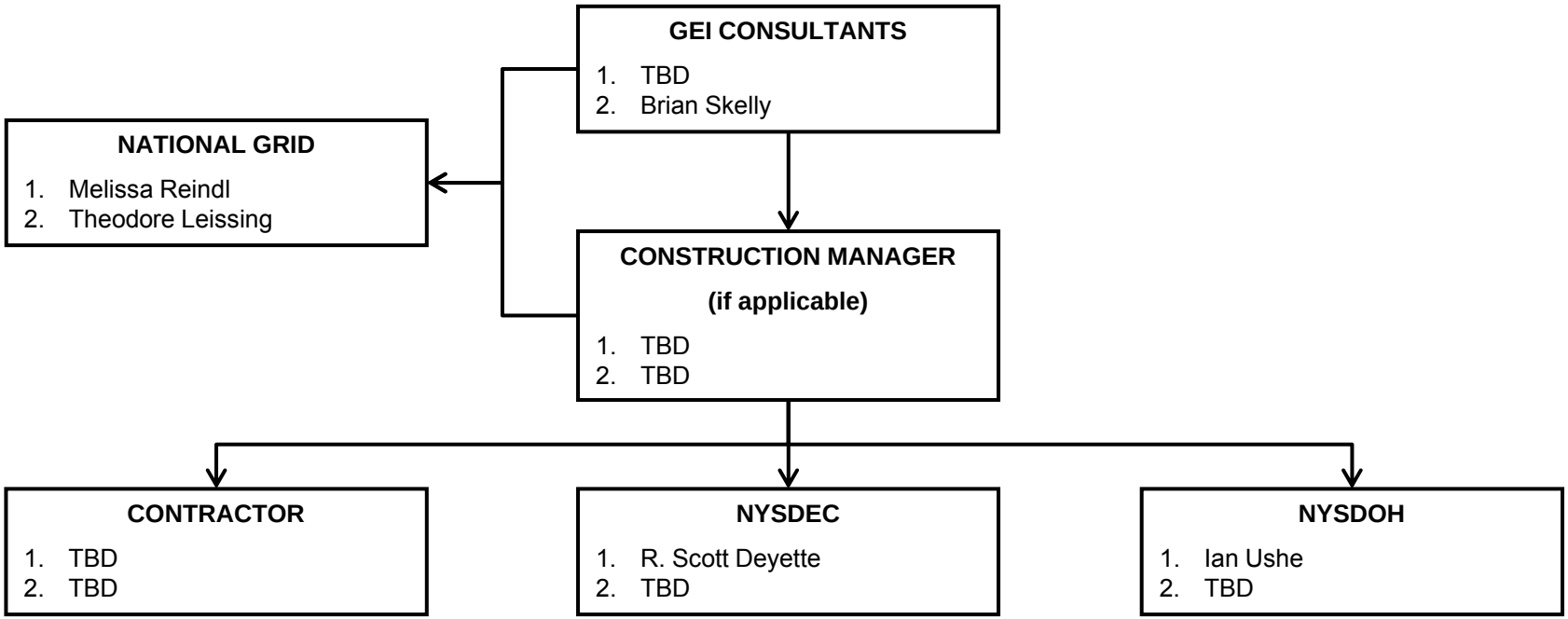

If the primary contact is unavailable, contact alternatives in the order shown

All applicable parties will be notified within 60 minutes of an exceedance of a Response Level or Action Level at the site perimeter.

NOTE:
TBD = To Be Determined

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COMMUNICATION FLOWCHART

Project 093270 | March 2014 | Figure 2

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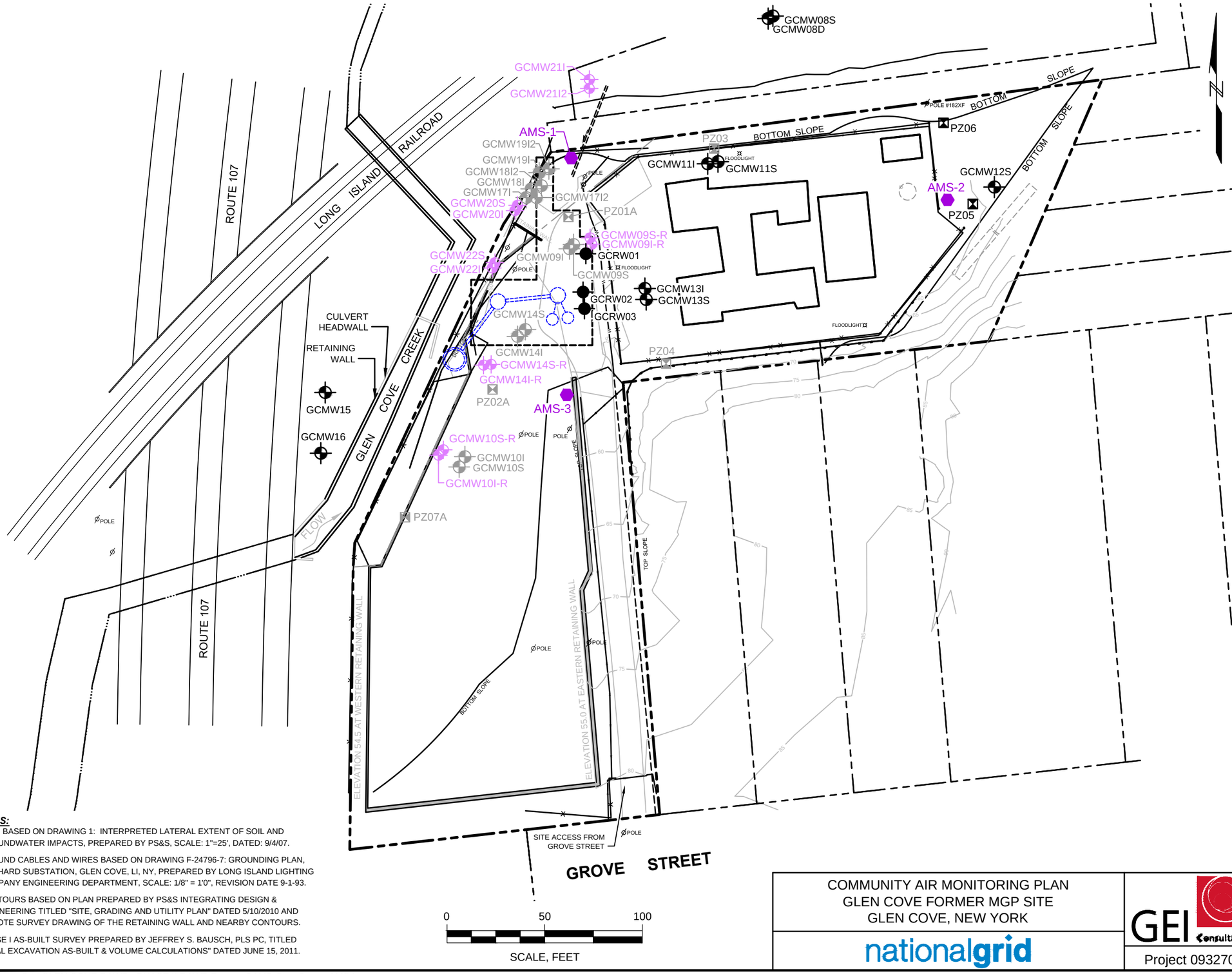

LEGEND:

- PROPERTY BOUNDARY
- EXISTING STRUCTURE
- SURFACE ELEVATION CONTOUR (5' INTERVAL)
- EASEMENT BOUNDARY
- CREEK
- FENCE
- UTILITY POLE
- FLOODLIGHT
- RETAINING WALL H PILES
- RETAINING WALL
- DRAINAGE STRUCTURES
- PHASE I EXCAVATION LIMIT
- AMS-1 — TYPICAL AIR MONITORING STATION
- GCMW22S — PROPOSED MONITORING WELL
- GCMW09S — EXISTING MONITORING WELL
- GCRW01 — EXISTING RECOVERY WELL
- PZ01A — EXISTING PIEZOMETER
- ABANDONED/DESTROYED WELL OR PIEZOMETER

NOTE:

LOCATIONS OF AIR MONITORING STATIONS ARE EXAMPLES ONLY. ACTUAL LOCATIONS AND NUMBER OF STATIONS WILL BE BASED ON THE LOCATION OF INTRUSIVE WORK PERFORMED.

SOURCES:

1. PLAN BASED ON DRAWING 1: INTERPRETED LATERAL EXTENT OF SOIL AND GROUNDWATER IMPACTS, PREPARED BY PS&S, SCALE: 1"=25', DATED: 9/4/07.
2. GROUND CABLES AND WIRES BASED ON DRAWING F-24796-7: GROUNDING PLAN, ORCHARD SUBSTATION, GLEN COVE, LI, NY, PREPARED BY LONG ISLAND LIGHTING COMPANY ENGINEERING DEPARTMENT, SCALE: 1/8" = 1'0", REVISION DATE 9-1-93.
3. CONTOURS BASED ON PLAN PREPARED BY PS&S INTEGRATING DESIGN & ENGINEERING TITLED "SITE, GRADING AND UTILITY PLAN" DATED 5/10/2010 AND REMOTE SURVEY DRAWING OF THE RETAINING WALL AND NEARBY CONTOURS.
4. PHASE I AS-BUILT SURVEY PREPARED BY JEFFREY S. BAUSCH, PLS PC, TITLED "FINAL EXCAVATION AS-BUILT & VOLUME CALCULATIONS" DATED JUNE 15, 2011.

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GLEN COVE, NEW YORK

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TYPICAL AIR MONITORING STATION LOCATION PLAN

Project 093270 | March 2014 | Figure 3

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1. Solar Panel
2. Particulate aerosol monitor sample tubing with in-line condenser
3. Particulate aerosol monitor sample inlet with PM-10 impactor
4. Station enclosure
5. Particulate Aerosol Monitor
6. Photoionization detector (PID)
7. PID sample inlet
8. PID sample inlet tubing
9. Data communications device

NOTE:
Figure depicts an AirLogics™, LLC Light air monitoring station as an example and may not be representative of the actual system or components that will be employed at the site

COMMUNITY AIR MONITORING PLAN
GLEN COVE FORMER MGP SITE
GLEN COVE, NEW YORK

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EXAMPLE FIXED STATION INTERNAL COMPONENTS

Project 093270 | March 2014 | Figure 4A

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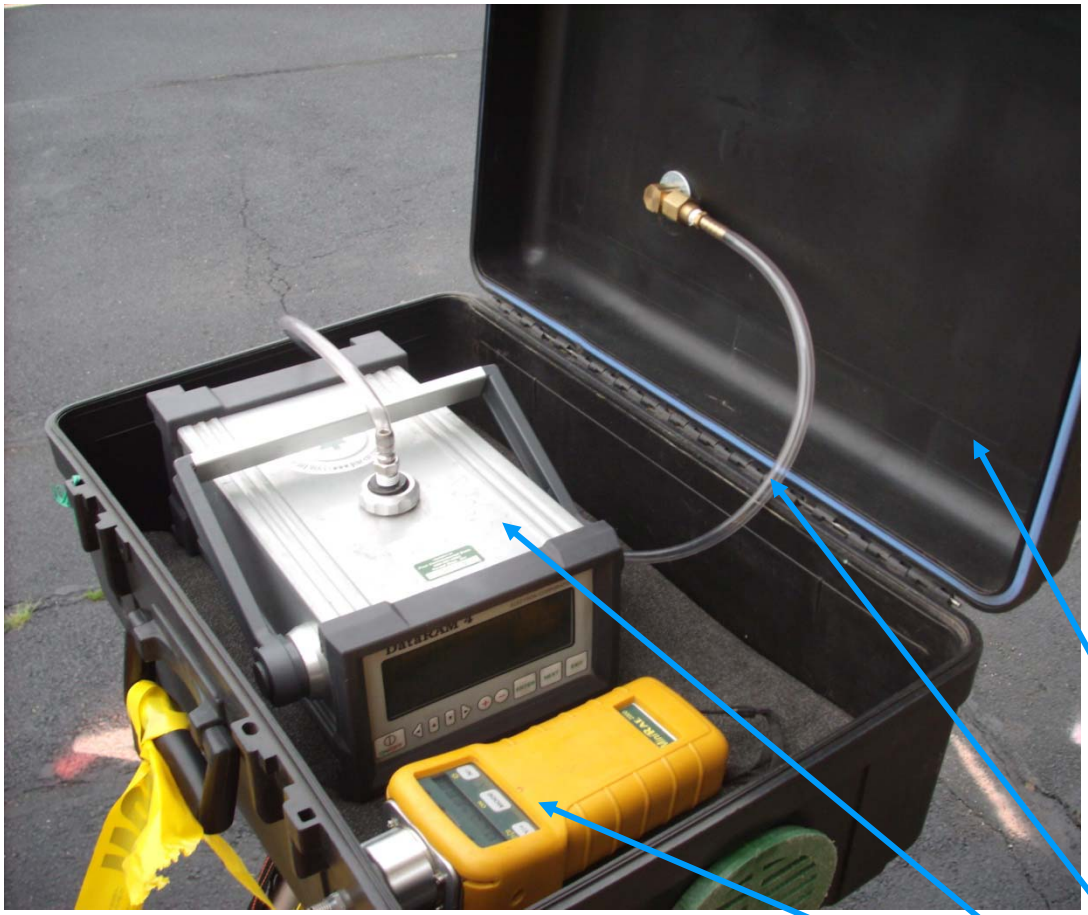

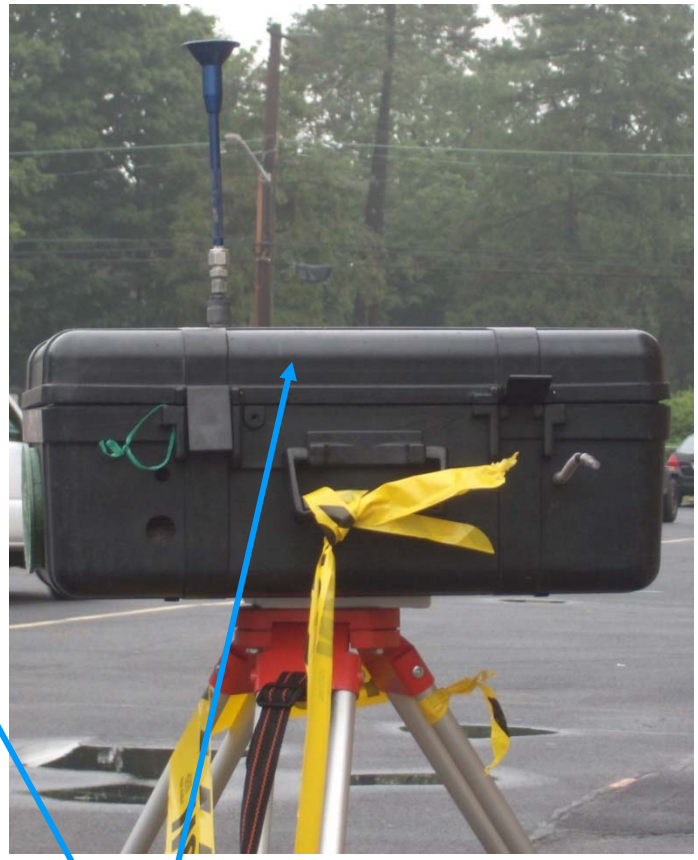

1. Photoionization detector (PID)
2. Particulate aerosol monitor
3. Particulate aerosol monitor sample tubing
4. Station enclosure

(1) (2) (3) (4)

NOTE:
Figure depicts a Pine Environmental air monitoring station as an example and may not be representative of the actual system or components that will be employed at the site

COMMUNITY AIR MONITORING PLAN
GLEN COVE FORMER MGP SITE
GLEN COVE, NEW YORK

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EXAMPLE TRIPOD MOUNTED STATION INTERNAL COMPONENTS

March 2014 Figure 4B

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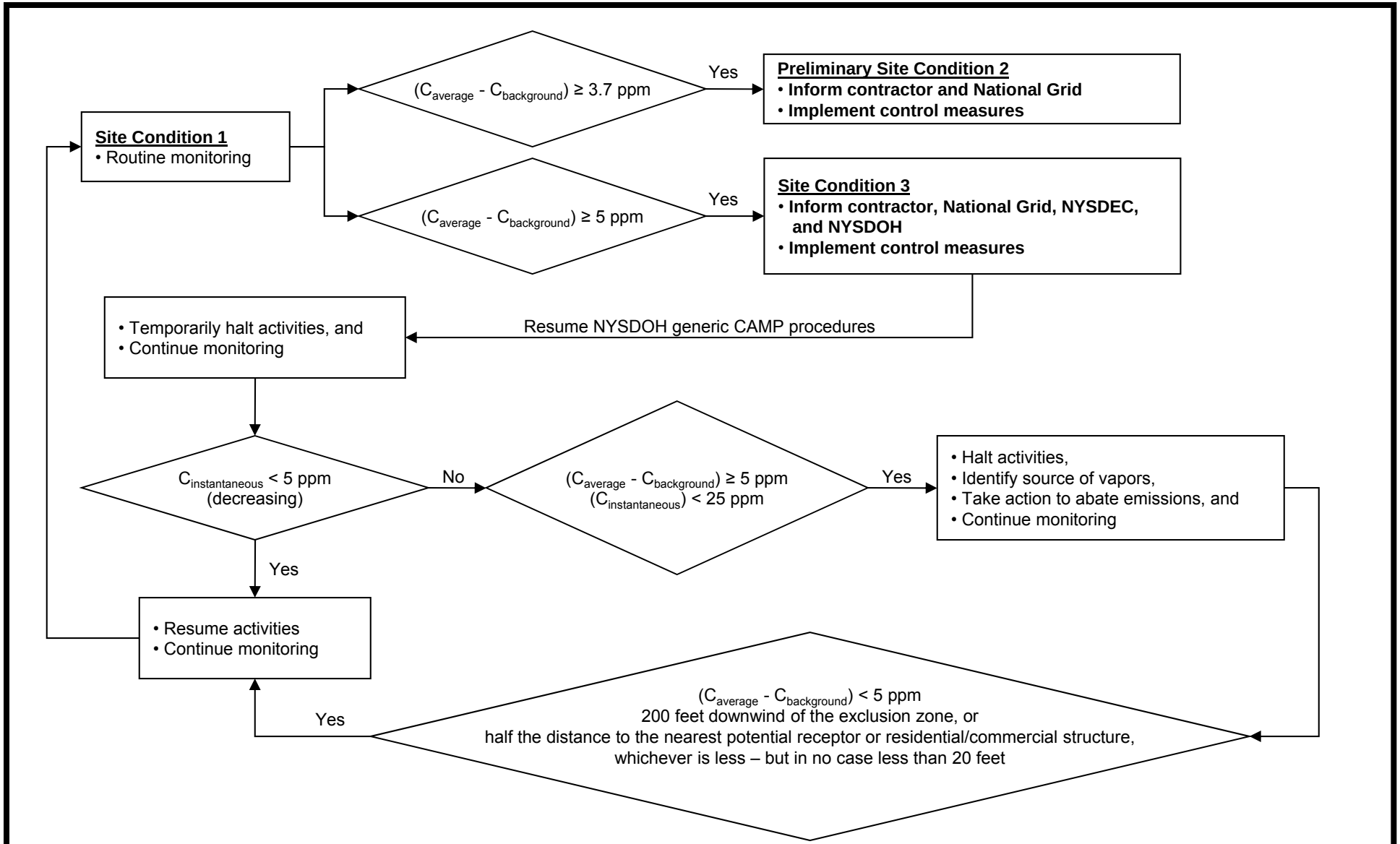

NOTES:

1. TVOC – Total Volatile Organic Compound
2. ppm – parts per million
3. $C_{average}$ = 15-minute average concentration
4. $C_{background}$ = 15-minute average concentration upwind
5. $C_{instantaneous}$ = 1-minute measured concentration

COMMUNITY AIR MONITORING PLAN
GLEN COVE FORMER MGP SITE
GLEN COVE, NEW YORK

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TVOC DECISION DIAGRAM

Project 093270 | March 2014 | Figure 5

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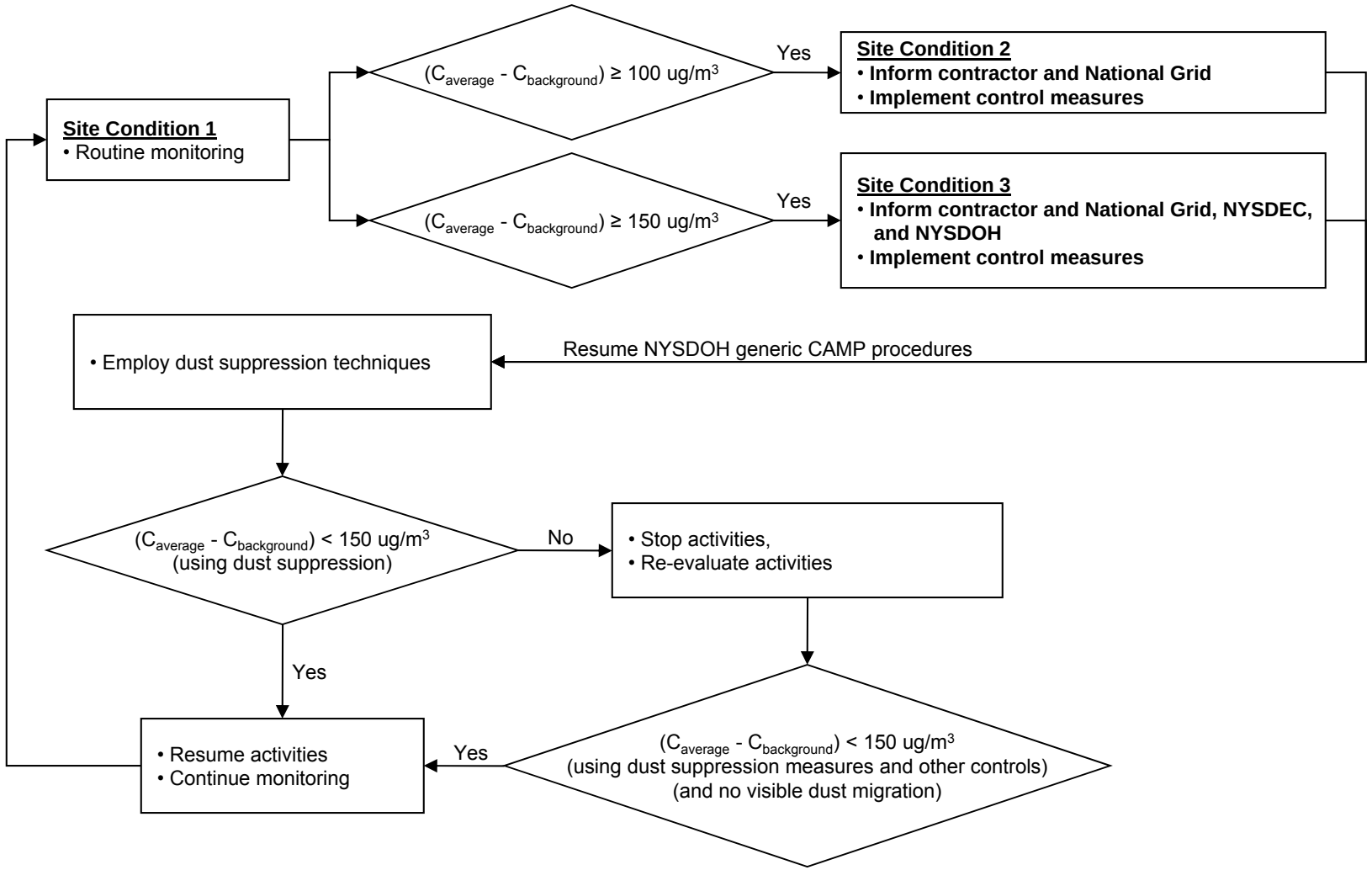

NOTES:

1. PM-10 – particulate matter
2. µg/m^3 – micrograms per cubic meter
3. $C_{average}$ = 15-minute average concentration
4. $C_{background}$ = 15-minute average concentration upwind

COMMUNITY AIR MONITORING PLAN
GLEN COVE FORMER MGP SITE
GLEN COVE, NEW YORK

nationalgrid

GEI Consultants

PARTICULATE MATTER DECISION DIAGRAM

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Appendix 1

NYSDOH Generic CAMP from DER-10 Appendix 1A

Appendix 1A
New York State Department of Health
Generic Community Air Monitoring Plan

Overview

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical- specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for VOCs and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate DEC/NYSDOH staff.

Continuous monitoring will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. A periodic monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or

overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions, particularly if wind direction changes. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

1. If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

2. If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

4. All 15-minute readings must be recorded and be available for State (DEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter ($\mu g/m^3$) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 $\mu g/m^3$ above the upwind level and provided that no visible dust is migrating from the work area.

2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 $\mu g/m^3$ above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 $\mu g/m^3$ of the upwind level and in preventing visible dust migration.

3. All readings must be recorded and be available for State (DEC and NYSDOH) and County Health personnel to review.

December 2009