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New York State Department of Environmental Conservation

Division of Environmental Remediation

Active Industrial Uniform Site

Site No. 152125

2016 Periodic Review Report

(January 2016 through December 2016)

D&B Engineers and Architects, P.C.

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EXECUTIVE SUMMARY

The Active Industrial Uniform Site (the Site) groundwater extraction and treatment system (GWE&TS) is located in the Village of Lindenhurst, Suffolk County, New York. The GWE&TS was designed to recover and treat a chlorinated solvent groundwater contamination plume emanating from the Site and discharge the treated groundwater to Little Neck Creek in accordance with all applicable discharge standards.

Based on evaluation of the performance, effectiveness and protectiveness of the GWE&TS throughout this reporting period (January 1, 2016 through December 31, 2016), the following conclusions and associated recommendations are briefly summarized:

Operation and Maintenance

- GWE&TS Operation: The GWE&TS was not operating for the vast majority of this reporting period with the exception of a brief period in August 2016; therefore, routine GWE&TS inspection and maintenance services were not completed throughout the majority of this reporting period. It is recommended that operation of the GWE&TS is continued once the system is made operational. It should be noted that D&B performed a system evaluation and provided recommendations to the NYSDEC in March 2017, regarding system repairs and modifications in support of restarting the GWE&TS. The recommendations were implemented by the NYSDEC Remedial System Contractor and ALM Systems, a subcontracted controls integrator under the oversight of D&B, subsequently the GWE&TS was brought back on-line in April 2017. These activities will be summarized in upcoming Site Management Quarterly Reports.

- Facility Maintenance: Ensure snow plowing/removal activities and lawn maintenance activities, as well as proper reporting of such, are completed, as necessary.

- OM&M Logs: D&B recommends that the NYSDEC Remedial Services Contractor record more clear and detailed descriptions of completed field activities and issues encountered, as well as alarm triggers, downtime dates and times and the steps taken to bring the GWE&TS back online on the Site Activities and System Operation Logs, as appropriate. In addition, multiple copies of logs, including some differing information is periodically reviewed. As such, D&B further recommends that the NYSDEC Remedial Services Contractor make an effort to provide one set of logs with all descriptions and dates of activities clearly indicated. These steps will help enable D&B to better understand the current status of the GWE&TS and facilitate a more efficient preparation of the Site Management Quarterly Reports. In addition, it is recommended that the NYSDEC Remedial Systems Contractor adhere to the routine maintenance schedule.

Monitoring Plan

- Monitoring/Extraction Well Sampling: Based on the widely varying VOC concentrations detected in several wells over previous reporting periods, it is recommended that the NYSDEC ensures that the Remedial Services Contractor is utilizing proper and consistent sampling techniques during each groundwater and system sampling event. In addition, ensure that the RW-2 effluent piping is properly purged by the NYSDEC Remedial Services contractor prior to collecting routine groundwater samples from this well, and that consistent sampling techniques are utilized in order to ensure consistent, usable analytical data. Additionally, as extraction well RW-2 has exhibited widely varying concentrations ranging from non-detect to a maximum of 258.83 ug/l (detected on March 21, 2014), since the well has been sampled along with the quarterly monitoring wells in mid-2011. It is recommended that the GWE&TS be restarted with both extraction wells operating and reamin operational to ensure that site-specific contamination is adequately captured and not extending from the Site.

- Off-Site Monitoring Well Network: Due to varying concentrations of total VOC's exhibited in RW-2 it is recommended that the shallow groundwater monitoring well network be expanded to include the installation of additional shallow monitoring wells on Lane Street, Grove Street, Willow Lane and Palm Street.

- Treatment System Sampling: Aqueous-phase influent and effluent samples were collected in August 2016 as the GWE&TS was only operating for a brief amount of time this reporting period. The NYSDEC Remedial Systems Contractor should collect all system samples as soon as the system is again placed into routine operation.
- Routine Maintenance of the Pressure Blower and Transfer Pumps: In order to reduce the likelihood of premature equipment failure and resulting system downtime, D&B recommends that the NYSDEC Remedial Services contractor perform maintenance of the pressure blower and transfer pumps, and all other system components, in accordance with their respective manufacturer's specifications when the system is again placed into routine operation.

Treatment System Operational Issues

- Transfer Pump P-1: D&B recommends that the NYSDEC Remedial Services Contractor verify proper programing of the VFD and PLC control logic to allow for proper operation of Transfer Pump P-1.
- Transfer Pump P-2: D&B recommends that, the NYSDEC Remedial Services Contractor repair or replace Transfer Pump P-2. Additionally, the NYSDEC Remedial Services Contractor should verify proper programing of the VFD and PLC control logic to allow for proper operation of Transfer Pump P-2.
- Influent/Effluent Piping Investigation: Following repair of the GWE&TS, it is recommended that the NYSDEC Remedial Services Contractor test the effluent line.
- Extraction Wells: D&B recommends that the NYSDEC Remedial Services Contractor complete well redevelopment activities at extraction well RW-2 to remove the 7 feet of sediment that has been identified in the well.
- Overall Treatment System: D&B recommends that all system components and controls be inspected and repaired, as necessary, prior to restart of the GWE&TS to ensure safe and efficient operation of the treatment system.

Institutional Controls/Engineering Controls

- IC/EC Operation: ICs in the form of a Declaration of Covenant and Restrictions, which includes land and groundwater use restrictions, are in place at the Site. The Covenant ensures that the current owner and any future property owners are aware of these site-specific restrictions until no longer deemed necessary by the NYSDEC. On-site groundwater restrictions remain in-place and the use of the property has been and will continue to be restricted to operation of the GWE&TS only. No changes have been made to the property during this reporting period. Although the treatment system EC was not operational during the majority of the reporting period, all EC requirements are currently in place and the treatment system will be placed into routine operation once the operational issues identified above are addressed, per NYSDEC direction. As discussed above the GWE&TS was restarted in April 2017. The events associated with restarting of the GWE&TS will be summarized in upcoming Site Management Quarterly Reports.
- IC/EC Compliance Status: These ICs should be included with the property deed as a legal document to ensure that the current property owner and any future property owners are aware of these site-specific restrictions until no longer deemed necessary by the NYSDEC. However, it should be noted that the intent of the ICs are currently being met as groundwater is not used for potable purposes and the use of the property has been and will continue to be restricted to operation of the GWE&TS only. No changes have been made to the property during this reporting period. As previously discussed, the GWE&TS was off-line throughout the majority of this reporting period. It should be noted that site-specific contaminant concentrations in the network of on-site and off-site monitoring wells have generally not increased while the system has been shut down.

Green and Sustainability Recommendations

- Building Heaters: D&B recommends that the building heaters be replaced with new high-efficiency natural gas-powered units.
- Building Lighting: It is recommended that all light bulbs within the building be replaced with high efficiency bulbs, when needed.

- Renewable Energy Feasibility Assessment: D&B recommends evaluating the feasibility of installing alternate energy sources or purchasing renewable energy credits in order to off-set the electricity usage for the GWE&TS from non-renewable energy sources.
- Reduction of Paper Use: Continue transmitting reports electronically as PDF files to the NYSDEC for review and approval.

General Recommendations

- General GWE&TS Operation: The GWE&TS should remain in-place and operating as designed until remedial objectives have been obtained.
- RSO Evaluation: A system repair and upgrade effort is planned to be completed at the Site in the near future. RSO activities will continue once the system repairs are completed. It should be noted that the GWE&TS was restarted in April 2017. The events associated with restarting of the GWE&TS will be summarized in upcoming Site Management Quarterly Reports.
- SMP Revisions: It is recommended to revise the Site SMP to include the revised sampling frequencies and include additional information regarding remaining contamination at the site.
- PRR Reporting Frequency: Based on a review of the guidance documents provided by the NYSDEC, it is recommended that PRRs be completed on an annual basis. The frequency of follow-up PRRs will be determined by the NYSDEC based on future Site conditions and compliance.

1.0 INTRODUCTION

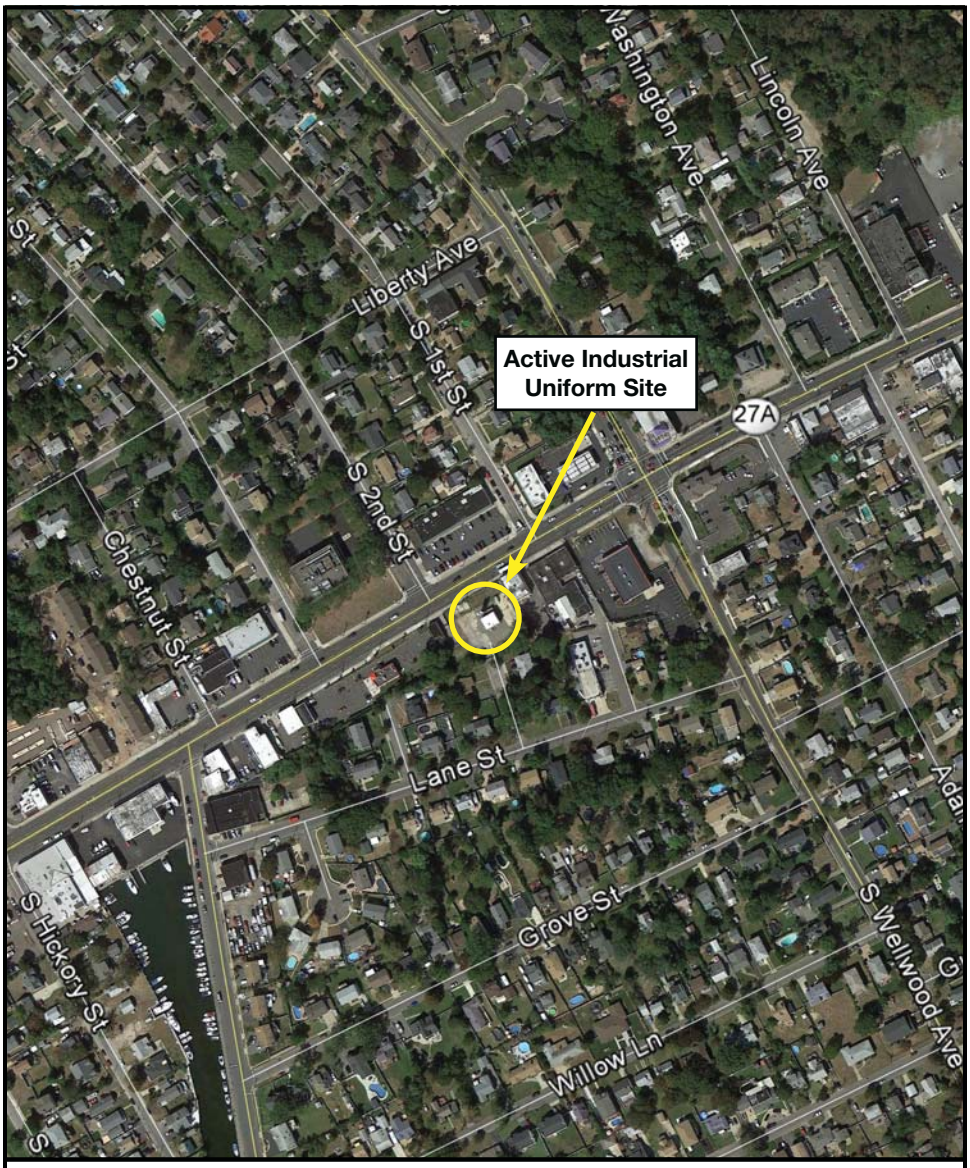
The purpose of this Periodic Review Report (PRR) is to summarize and evaluate the performance of the groundwater extraction and treatment system (GWE&TS) at the Active Industrial Uniform Site (the Site), located at 63 West Montauk Highway in the Village of Lindenhurst, Suffolk County, New York (see Figure 1-1). The information provided in this report covers the period from January 1, 2016 through December 31, 2016; however, portions of this report incorporate pertinent historical background information and monitoring data, as appropriate.

Several clickable hyperlinks are provided in this report (indicated by blue text), which include tables, graphs, figures, etc.

Environmental Assessment and Remediation (EAR), a NYSDEC Remedial Services contractor, completed all operation, maintenance, monitoring and sampling activities throughout this reporting period, while all evaluation, reporting and engineering services were completed by D&B.

It should be noted that the GWE&TS was offline and has not operated throughout the majority of this reporting period, as detailed below.

Figure 1-1
Site Location Map



The GWE&TS was shut down throughout the vast majority of this reporting period. The GWE&TS was restarted in August 2016; however, the system was only operational for a few days until Transfer Pump P-2 failed. Due to ongoing issues associated with various GWE&TS components, the system has not been operating since this time for the following reasons: 1) following the replacement and programming of the VFD at Transfer Pump P-1, Transfer Pumps P-1 and P-2 were cycling rather than maintaining a constant level in the Air Stripper Tower 1 and 2 sumps, respectively; 2) the identification of a leaking union at the Transfer Pump P-1 effluent line, 3) high liquid levels at Air Stripper Tower 2; and, 4) Transfer Pump P-2 was noted to have a cracked impellor. It should be noted that D&B performed a system evaluation and provided recommendations to the NYSDEC in March 2017, regarding system repairs and modifications in support of restarting the GWE&TS. The recommendations were implemented by the

NYSDEC Remedial System Contractor and ALM Systems, a subcontracted controls integrator under the oversight of D&B, subsequently the GWE&TS was brought back on-line in April 2017. These activities will be summarized in upcoming Site Management Quarterly Reports.

The objectives of this PRR include:

- Identify the remedial goals established for the Site.
- Present a description of the GWE&TS components.
- Review Site monitoring and sampling protocols.
- Evaluate the GWE&TS operation and performance.
- Present recommendations regarding the operation of the GWE&TS with respect to system performance, effectiveness and protectiveness, and its ability to achieve the goals established for the Site by the Record of Decision (ROD), dated March 1997.

1.1 Remedial System Optimization

As part of an ongoing Remedial System Optimization (RSO) effort to improve the efficiency, effectiveness and net environmental benefit of the GWE&TS, an on-site source area assessment and temporary well plume re-delineation program was completed at the Site in February and March 2013. As per a recommendation of the associated July 2013 RSO Data Summary Report, a remedial alternatives study was performed for the Site in October 2013. Following review of the remedial alternatives study and several follow-up discussions with the NYSDEC, it was determined that further plume delineation would be required prior to implementing any alternative remedial approach for the Site.

To this end, and based on D&B's recommendations, a membrane interface probe (MIP) investigation, including targeted groundwater sample collection, was completed at the Site on July 7 through 11 and July 14, 2014. It should be noted that the GWE&TS was manually shut down during the MIP Investigation in an effort to achieve static aquifer conditions. The results of the completed MIP investigation and groundwater sampling activities were summarized in the February 2015 MIP Investigation Summary Report. Based on the recommendations presented in the February 2015 MIP Investigation Summary Report, D&B and NYSDEC are currently discussing the merits of implementing a chemical injection Pilot Study Scope of Work to address the identified remaining contamination at and downgradient of the Site.

It should be noted that the GWE&TS was restarted in April 2017. The events associated with restarting of the GWE&TS will be summarized in upcoming Site Management Quarterly Reports. RSO activities will continue in the near future as the GWE&TS has been recently restarted.

1.2 Treatment System Operational Issues

As discussed in recent Site Management Quarterly Reports, several operational issues are currently affecting the GWE&TS, or have affected the GWE&TS in 2016, as further detailed below:

<u>Transfer Pump P-1</u>

On January 21, 2016, the NYSDEC Remedial Services Contractor met with ALM Systems at the site to review and troubleshoot the issues with the GWE&TS's automated controls. ALM Systems noted several wiring and controls issues, including incorrect wiring at the VFD for Transfer Pump P-1 and an inoperable cooling fan in the VFD for Transfer Pump P-1.

Based on recommendations from ALM Systems and as directed by NYSDEC, the NYSDEC Remedial Services Contractor replaced the VFD at Transfer Pump P-1, ensuring it was properly wired on February 4, 2016.

On August 10, 2016 the NYSDEC Remedial Services Contractor was on-site to complete system updates in preparation for the upcoming well redevelopment. On August 23, 2016, ALM Systems and the NYSDEC Remedial Services Contractor were on-site to complete VFD programming activities for Transfer Pump P-1. Following programming at Transfer Pump P-1, the system was successfully restarted with Transfer Pumps P-1 and P-2 operating; however, the pumps were cycling rather

than maintaining a constant level in the sumps. According to the NYSDEC Remedial Services Contractor, Transfer Pump P-2 was not receiving a modulating signal from the PLC. The system was operating upon departure from the site.

On August 29, 2016, the NYSDEC Remedial Services Contractors was on-site to assess the status of the system. The system was noted to be off due to a high liquid level at Air Stripper Tower (AST) 2; however, AST-2 could not be pumped out or restarted at that time. Due to ongoing issues with Transfer Pump P-2, as discussed below, and the identification of a leaking union at the Transfer Pump P-1 effluent line, the GWE&TS has been off since this time.

Transfer Pump P-2

Transfer Pump P-2 was most recently replaced on October 28, 2015. However, it should be noted that the NYSDEC Remedial Services Contractor did not test the pump at that time as they were concerned with possibly rupturing the recently repaired effluent line and due to the reported system control issues.

Following programming at Transfer Pump P-1, the system was successfully restarted on August 23, 2016 with Transfer Pumps P-1 and P-2 operating; however, the pumps were cycling rather than maintaining a constant level in the sumps. According to the NYSDEC Remedial Services Contractor, Transfer Pump P-2 was not receiving a modulating signal from the PLC. The system was operating upon departure from the site. On August 29, 2016, the NYSDEC Remedial Services Contractor was on-site to assess the status of the system. The system was noted to be off due to a high liquid level at Air Stripper Tower 2; however, AST-2 could not be pumped out or restarted at that time.

The NYSDEC Remedial Services Contractor returned to Site on August 30, 2016 to troubleshoot Transfer Pump P-2 and noted a crack in the pump impellor. As such, Transfer Pump P-2 has remained off since this time. Due to ongoing issues associated with various GWE&TS components, the system has not been operating since this time pending additional troubleshooting activities.

Influent and Effluent Piping

The GWE&TS is currently limited to approximately 130 gpm, below its design capacity of approximately 200 gpm due to what was initially believed to be a blockage within the effluent line.

As reported in the previous PRR, D&B prepared an effluent line investigation scope of work, dated January 14, 2015, for the investigation of any restrictions within the effluent piping. In addition, the January 14, 2015 scope of work also included provisions for the investigation of the influent piping for each extraction well to locate any below grade damage which may be allowing sand and gravel to enter the influent piping, as well as provisions for the installation of filter screens within each influent pipe to trap any such debris in an effort to limit damage to the system transfer pumps.

The NYSDEC Remedial Services Contractor did not identify any significant or obvious blockages; however, the entire effluent line exhibited approximately 1/8 to 1/4 inches of residue and scaling throughout its entire inner diameter. This thickness of residue and scaling is not expected to greatly effect system effluent flow potential, though it is currently believed that this scaling may be contributing to system flow limitations.

The NYSDEC Remedial Services Contractor was on-site on April 30, 2015 and attempted to restart the GWE&TS; however, upon restarting the system, the effluent pipe ruptured. Following two effluent pipe repair events, the effluent pipe was ultimately repaired on October 28, 2015. It should be noted that the effluent pipe was not tested following its repair due to the NYSDEC Remedial Services Contractor's concerns regarding possibly rupturing the line again.

Extraction Well Redevelopment

On August 8, 2016, the NYSDEC Remedial Services Contractor performed the following well redevelopment activities at extraction well RW-1; one round of well screen brushing, two rounds of pumping (via air lift) and surging of the well, where approximately 465 gallons were removed from the well per air lift. On August 10, 2016, the NYSDEC Remedial Services Contractor returned to site to redeploy the pump in RW-1 completing all well redevelopment activities. Additionally, on August 9, 2016, well redevelopment activities were attempted at extraction well RW-2. Approximately 13 feet of material was identified in the well. After several attempts approximately 6 feet of the accumulated material was removed; however,

NYSDEC Remedial Services Contractor was unable to successfully complete the slated well redevelopment. On August 16, 2016, the NYSDEC Remedial Services Contractor was on-site to complete boroscoping activities at extraction well RW-2 to identify any structural issues within the well. The inspection did not identify any structural issues with RW-2.

2.0 SITE OVERVIEW

2.1 Site Operations and Description

The Site is a NYSDEC Class 2 Inactive Hazardous Waste Site and is listed on the New York State Registry of Inactive Hazardous Waste Sites (Site No. 152125). Laundering operations began at the Site in 1945 and continued until 1993. Dry cleaning activities were also conducted at the Site for a 17-year period between 1970 and 1987. All on-site buildings associated with these operations were demolished in February 1995.

The Site is approximately 1/2 acre in size. The surrounding properties are primarily commercial, with the exception of a residential area located to the south of the Site on Tompkins Lane. Access to the Site is from Tompkins Lane. A Site location map is provided as Figure 1-1.

The GWE&TS consists of two 8-inch diameter extraction wells, with one located on-site in the southwest portion of the Site (RW-1), and one located off-site, approximately 1,500 feet southwest of the Site (RW-2). As detailed above, RW-2 is not currently operating, as directed by the NYSDEC, due to low historical concentrations of site-specific VOCs and a general decline in total VOC concentrations. Extracted groundwater is conveyed to the GWE&TS building via underground piping, and is pumped to two series-configured packed-tower air strippers. Treated groundwater is then pumped via underground piping to a storm water basin located approximately 1,000 feet west of the Site, which then discharges into Little Neck Creek, in accordance with all applicable discharge standards.

Exhaust gas from each air stripper was initially treated utilizing two granular activated carbon (GAC) vessels connected in series; however, based on low historic contaminant concentrations detected in the air stripper vapor-phase discharge, the vapor-phase discharge piping was reconfigured to bypass the GAC vessels and discharge directly to the atmosphere in June 2011, per the direction of the NYSDEC. The GWE&TS is equipped with instrumentation and controls which allow for automated startup and operation of the GWE&TS, as well as an auto dial alarm notification system.

2.2 Site Impacts and Investigation History

Initial Investigation Activities

An initial investigation of the Site was completed in December 1987 by the property owner, American Linen Supply. Soil and groundwater samples collected at the Site during the initial investigation exhibited elevated concentrations of chlorinated volatile organic compounds (VOCs), including tetrachloroethene (PCE). The sources of the contamination were determined to be three former PCE storage tanks. These tanks were reportedly removed between 1985 and 1987; however, it was not determined if the contamination was the result of leaks, spills or both. Based on the results of the initial investigation, a soil vapor extraction (SVE) system was installed in the southeast portion of the Site, as part of an Interim Remedial Measure (IRM). The SVE system was placed into operation in July 1991. The goal of the IRM was to remove on-site soil contamination and to prevent migration of soil vapor to off-site areas.

Figure 2-1 depicts the locations of former on-site features, including the former Active Industrial Uniform building, former dry wells/cesspools, the former SVE system, the locations of the former PCE tanks, as well as sample locations associated with the initial and pre-design investigations.

A Remedial Investigation (RI) was performed between October 1993 and April 1994. Based on the results of the RI, both shallow and deep groundwater contaminant plumes were identified extending from the Site in southwesterly directions toward Little Neck Creek (approximately 800 feet southwest of the Site). The shallow plume was found to have concentrations of PCE of as high as 20 milligrams per liter (mg/l) migrating south-southwest. The deep plume had a more southerly direction and was believed to be following a confining clay layer reported to be located at approximately 70 feet bgs. Soil

contamination was identified in the on-site dry wells/cesspools with PCE concentrations of as high as 40,000 milligram per kilogram (mg/kg) identified in the southern portion of the Site. Elevated concentrations of PCE were also found in the soil at the former locations of the PCE tanks with concentrations of up to 30,000 mg/kg. Copies of the historical off-site plume maps are provided in ***Appendix A***.

Record of Decision

Based on the findings of the RI, the NYSDEC issued a ROD for the Site in March 1997. In order to eliminate or mitigate threats to human health and the environment, the NYSDEC selected the following remedies:

- Continued operation of the SVE system to remediate shallow source-area soil and expansion of the system to treat contaminated soil in the area of the dry wells/cesspools on the north side of the Site and under portions of the former building.
- Removal of VOCs from the SVE system emissions by activated carbon.
- Installation of an air-sparging (AS) system to remediate shallow on-site groundwater.
- Installation of a GWE&TS to capture and treat shallow off-site groundwater and discharge the treated groundwater to the storm water sewer system.
- Environmental monitoring of groundwater upgradient, on-site and downgradient of the Site and periodic reviews.
- Implementation of a deed restriction, including restrictions on soil excavation and other disturbance of on-site soil, and implementation of a groundwater use restriction for the property.

Pre-Design Investigation

Following the selection of the remedial alternatives outlined in the March 1997 ROD, a Pre-Design Investigation (PDI) was completed in 1998. The purpose of the PDI was to further define on-site soil and groundwater contamination, and off-site groundwater contamination, and to perform groundwater modeling studies to assess various pumping scenarios to best address the contaminant plumes.

The on-site soil and groundwater investigation conducted as part of the PDI targeted the on-site dry wells/cesspools. The locations of the sampling points are depicted on ***Figure 2-1***. Analytical results generated from the PDI identified the on-site cesspools as a significant source of contamination at the Site. Similar to the results of remedial investigation conducted at the Site between October 1993 and April 1994, the greatest concentrations of chlorinated VOCs were identified in soil samples collected from the southern portion of the Site. PCE concentrations of up to 760,000 mg/kg were detected in the 0 to 4 foot bgs sample collected at soil boring GP-22, located in the southeastern portion of the Site. Additionally, elevated concentrations of petroleum hydrocarbons, most notably total xylenes, were identified in the soil on the southern portion of the property. The maximum recorded concentration of total xylenes was 62,000 ug/kg, detected in the 10 to 11-foot bgs sample collected at soil boring GP-21. Soil boring GP-21 was located in the southeastern portion of the Site. The greatest on-site concentrations of total VOCs in groundwater were identified at temporary groundwater sample point GP-1 (26,000 ug/l), located in the western portion of the Site. All on-site groundwater samples were collected from 10 to 16-feet bgs.

Based on the results of the off-site groundwater investigation, the most significant VOC contamination was present between 26 to 40 feet bgs, extending in a southwesterly direction from the Site. The PDI investigation determined Little Neck Creek to be the discharge point for the contaminant plume.

In order to better monitor on-site and off-site groundwater contaminant concentrations, 11 groundwater monitoring wells were installed as part of the PDI, prior to installation of the GWE&TS. Eight groundwater monitoring wells were installed on-site (MW-101 through MW-108) and three groundwater monitoring wells were installed off-site (MW-109, MW-110 and MW 111), downgradient of the Site (see Figures 2-2 and 2-3 provided below). Note that monitoring well MW-110 was paved over and/or destroyed soon after it was installed and has not been sampled as part of the routine groundwater monitoring activities since D&B assumed O&M duties in February 2005.

Based on the results of the pre-design investigation, the GWE&TS design initially outlined in the ROD was modified by moving the off-site recovery well location further downgradient of the Site than was originally proposed and increasing the design extraction flow rates from 60 gallons per minute (gpm) to 100 gpm.

Monitoring and extraction well as-builts are provided in ***Appendix B***.

November 2000 IRM

Additionally, a second IRM was completed in November 2000 based on the results of the PDI, which consisted of the excavation and off-site disposal of approximately 600 cubic yards of unsaturated contaminated soil from the northeastern and southeastern portions of the Site. A total of twelve dry well structures were also removed and disposed of as part of these activities. The approximate lateral extent of the soil excavation, as well as, the locations of nine of the dry wells are provided on Figure 2-2 below.

In a letter dated February 5, 2001, the NYSDEC determined that the November 2000 IRM soil excavation had removed the on-site sources of contamination and, as a result, the planned air sparging system would not be installed. The NYSDEC further concluded that if any residual contamination remained on-site, installation of an on-site extraction well (RW-1) pumping at a rate of 100 gpm, would create a sufficient "capture zone" to capture any contamination that would have otherwise been addressed by the air sparging system. It should be noted that the design documents for the GWE&TS indicated that 80% of the design flow rate (or 80 gpm) would be sufficient for containment of the plume.

Figure 2-2

On-Site Monitoring Wells and Extraction Well Locations and Pertinent Historical Features

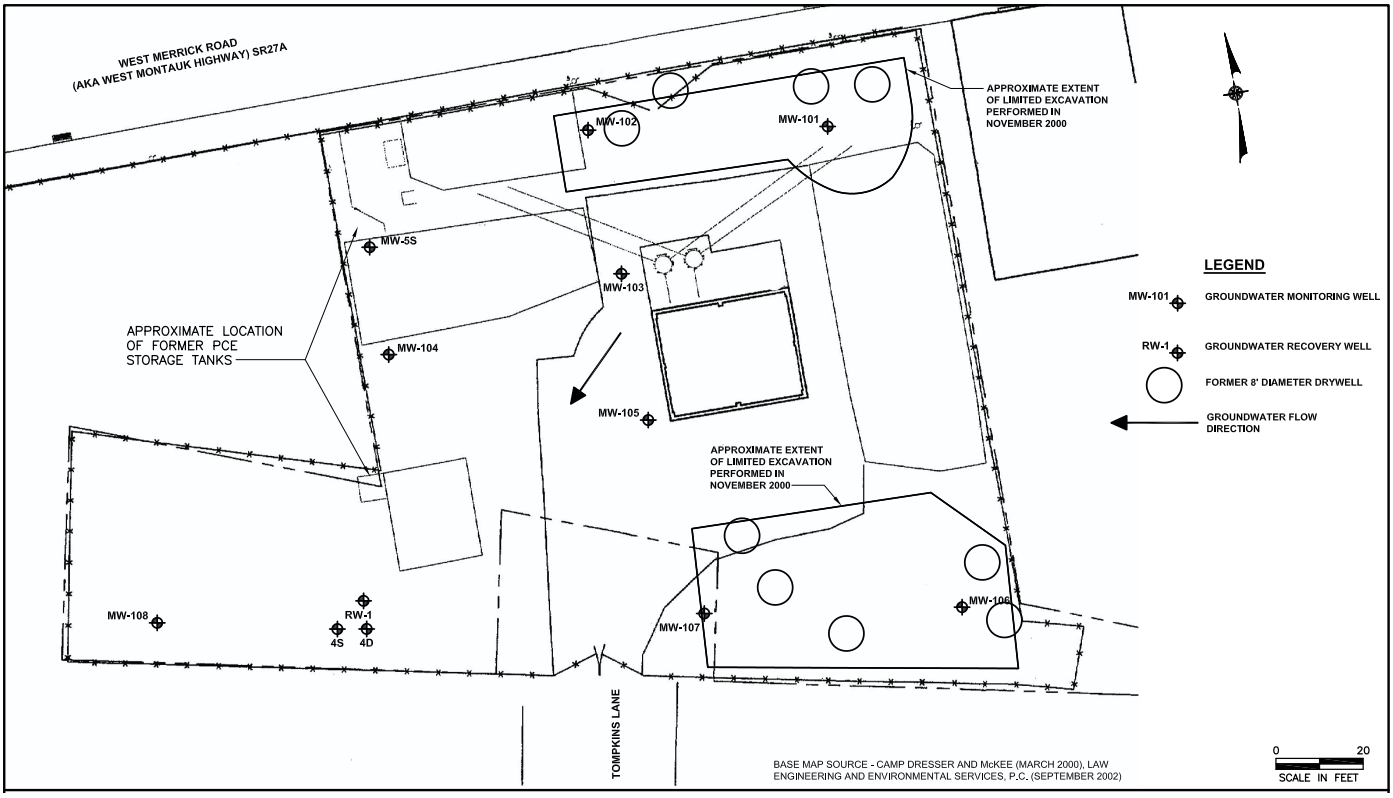


Figure 2-3

Off-Site Monitoring Wells and Extraction Well Location Map

GWE&TS Construction

The construction of the GWE&TS began in June 2001 and was completed in December 2001. It is D&B's understanding that the former SVE system was shut down and dismantled during the GWE&TS construction process. The on-site GWE&TS was placed into routine operation on December 27, 2001 and was operated by others until D&B assumed site management duties in February 2005.

3.0 OPERATION AND MAINTENANCE (O&M) PLAN COMPLIANCE

3.1 O&M Plan Requirements and Compliance Status

The O&M scope of services for the GWE&TS consists of general facility maintenance activities, routine GWE&TS maintenance activities, non-routine GWE&TS maintenance activities and system alarm/shutdown response activities, in accordance with the requirements of the site-specific Operations and Maintenance Manual (OMM), dated April 2002 and September 2012 Site Management Plan (SMP), revised January 2014. Site Activities Logs and Maintenance reports, which typically include details of shut downs and non-routine maintenance activities are typically prepared by the NYSDEC Remedial Services Contractor. However, as the GWE&TS was only operating for a brief amount of time throughout this reporting period, the NYSDEC Remedial Services Contractor completed only one System Monitoring Log and Site Activities Logs summarizing non-routine maintenance events that occurred throughout this reporting period. Copies of the Site Activities Logs are provided in ***Appendix C***.

Presented below is a summary of the O&M activities performed throughout this reporting period.

General Facility Maintenance Activities

General facility maintenance work items are those tasks which involve the maintenance and upkeep of the GWE&TS, as well as grounds keeping of the GWE&TS property. General facility maintenance activities completed during this reporting period include:

- Snow-plowing to maintain access to the Site and GWE&TS. Although several winter storm events occurred during the winter months of this reporting period, snow plowing/removal activities were not reported to have been completed by the NYSDEC Remedial Services Contractor.
- Although not reported in the NYSDEC Remedial Services Contractor O&M Logs during this reporting period, landscape maintenance activities are routinely completed throughout the spring and summer months at the GWE&TS property, as necessary.
- Periodic inspection of the extraction and monitoring wells to ensure the wells are secure and accessible.
- Periodic verification of posted safety information to ensure all information is current and accurate.
- Periodic maintenance of ground cover to prevent soil erosion and surface runoff.
- Periodic inspection of the vehicle driveway for potholes and other damage.
- Lubrication of gate locks on an as-needed basis.

Routine GWE&TS Inspection and Maintenance Activities

A summary of the routine GWE&TS inspection and maintenance services and their typical frequencies of completion, based on the current SMP are provided on Table 3-1. However, as the GWE&TS was not operating throughout the vast majority of this reporting period, routine GWE&TS inspection and maintenance services were only conducted in August of this reporting period.

Table 3-1: Routine Inspection and Maintenance Services Summary

Routine Inspection/Maintenance Item	Frequency				
	Bi-Weekly	Monthly	Bi-Monthly	Quarterly	As-Needed
Extraction Well Inspection Items					
Flow Rate (gpm)	✓				
Total Flow (gal)	✓				
Pump Pressure (psi)	✓				
Drawdown	✓				
Controls Inspection	✓				
Air Stripper Tower Inspection Items					
Stripper Inlet Pressure (psi)	✓				
Transfer Pump (P-1) Outlet Pressure (psi)	✓				
Sump Level (inches)	✓				
Discharge Speed (%)	✓				

Table 3-1: Routine Inspection and Maintenance Services Summary (cont.)

Routine Inspection/Maintenance Item	Frequency				
	Bi-Weekly	Monthly	Bi-Monthly	Quarterly	As-Needed
Air Stripper Blower Inspection Items					
Moisture Knockout Influent Vacuum (inches H_2O)	✓				
Blower Influent Vacuum (inches H_2O)	✓				
Blower Effluent Pressure (inches H_2O)	✓				
Blower Effluent Velocity (feet/minute)	✓				
Blower Effluent Temperature (^oF)	✓				
Blower Effluent Flow Rate (ft^3/minute)	✓				
Treated Water Discharge Inspection Items					
Flow Rate (gpm)	✓				
Total Flow (gal)	✓				
Routine Maintenance Items					
Pressure Blower Maintenance			✓		
Particulate Filter Maintenance		✓			
Transfer Pump Maintenance				✓	
Air Stripper Maintenance					✓
GAC Removal and Replacement					✓
Air Stripper Packing Removal and Replacement					✓

Also, note that the effluent particulate filter has been taken out of service for the past several years, per NYSDEC direction, as particulate levels in aqueous-phase effluent did not warrant use of the filter. As such, this routine maintenance item was not completed during this or the previous several reporting periods.

Non-Routine GWE&TS Maintenance Activities

Non-routine GWE&TS maintenance activities are those maintenance activities which involve out-of-scope maintenance and upkeep of the GWE&TS, as well as out-of-scope maintenance in response to system alarm and/or shut-down events.

Non-routine maintenance activities completed throughout 2016 are summarized below:

January 1, 2016 through March 31, 2016 (Quarter 45)

Non-routine system maintenance activities were not completed during this reporting period.

April 1, 2016 through June 30, 2016 (Quarter 46)

Non-routine system maintenance activities were not completed during this reporting period.

July 1, 2016 through September 30, 2016 (Quarter 47)

- On August 8, 2016, the NYSDEC Remedial Services Contractor was on-site to complete well redevelopment of extraction well RW-1. While on-site the NYSDEC Remedial Services Contractor completed one round of screen brushing, two rounds of pumping (via air lift) and surging, where approximately 465 gallons were removed from the well per air lift.

- On August 9, 2016, the NYSDEC Remedial Services Contractor was on-site to complete well redevelopment activities at extraction well RW-2. Approximately 13 feet of material was identified in the well. After several attempts approximately 6 feet of the accumulated material was removed; however, NYSDEC Remedial Services Contractor was unable to successfully complete the slated well redevelopment.
- On August 10, 2016, the NYSDEC Remedial Services Contractor re-wired the submersible pump and re-deployed the pump into extraction well RW-1, completing all redevelopment activities.
- On August 16, 2016, the NYSDEC Remedial Services Contractor scoped extraction well RW-2 utilizing a camera to assess for potential structural issues within the extraction well.
- On August 23, 2016, the NYSDEC Remedial Services Contractor was on-site with ALM Systems to complete VFD programming for Transfer Pump P-1. Following the reprogramming at Transfer Pump P-1, the system was successfully restarted with both Transfer Pumps operating. However, the pumps were cycling rather than maintaining a constant level in the sumps. According to the NYSDEC Remedial Services Contractor, Transfer Pump P-2 was not receiving a modulating signal from the PLC.
- On August 24, 2016, the NYSDEC Remedial Services Contractor was on-site to collect system influent and effluent samples. While on-site, the NYSDEC Remedial Services Contractor noted that there was a leaking 4-inch union at Transfer Pump P-1 effluent pipe.
- On August 26, 2016, the NYSDEC Remedial Services Contractor was on-site to repair the leaking 4-inch PVC union at the Transfer Pump P-1 effluent pipe. The NYSDEC Remedial Services Contractor reconnected the pump and restarted the GWE&TS system upon departure from the site.
- On August 29, 2016, the NYSDEC Remedial Services Contractor arrived on-site for a system check; however, the GWE&TS was observed to be off. According to the NYSDEC Remedial Services Contractor, the GWE&TS shut-down due to a “high-level” condition in AST 2. The date and time that the system shut-down was not provided on the NYSDEC Remedial Service Contractors operational logs. The NYSDEC Remedial Services Contractor attempted to pump out the AST-2 sump and restart the system but was not successful at this time.
- On August 30, 2016, the NYSDEC Remedial Services Contractor arrived on-site to troubleshoot malfunctioning issues at Transfer Pump P-2. Upon inspection of Transfer Pump P-2 the motor was found to be working sufficiently; however, the impeller shaft inside the pump end was cracked.

October 1, 2016 through December 31, 2016 (Quarter 48)

Non-routine system maintenance activities were not completed during this reporting period.

GWE&TS Alarms

The GWE&TS is equipped with an autodialer alarm notification system, which is programmed to call technicians in the event of an alarm condition. The following is a list of the current alarms for the system:

- Alarm #1 – Temperature Alarm
- Alarm #2 – Sound Level Alarm
- Alarm #3 – General Alarm
- Alarm #4 – High Pressure Stripper
- Alarm #5 – High Level Stripper
- Alarm #6 – High Pressure Transfer Pump
- Alarm #7 – Low Flow Stripper
- Alarm #8 – Low Flow Extraction Well

As the GWE&TS was operating for only a brief amount of time throughout this reporting period, only one alarm condition occurred during this reporting period. On August 29, 2016, the GWE&TS was found to be shut down due to a “high liquid level” condition at Air Stripper Tower 2. The NYSDEC Remedial Services Contractor attempted to restart the system; however, due to equipment malfunctions the system could not be restarted.

3.2 Evaluation of O&M Activities

General Facility Evaluation

Although the GWE&TS was not operational for the vast majority of this reporting period, general facility maintenance activities were completed as needed and as specified in the Site Management Plan (SMP) for the Site. Overall, the scope of services for general facility maintenance activities is considered satisfactory.

GWE&TS Inspection and Operation Evaluation

A summary of the minimum operating requirements for the major GWE&TS components is provided below:

- Extraction wells: The design flow rate for extraction wells RW-1 and RW-2 is 100 gpm. However, based on information presented in the Active Industrial Final Design documents, dated March 2000, containment of the chlorinated plume could be achieved with the on-site extraction well pumping at a minimum of 80% of the design flow rate of 100 gpm (80 gpm).
- Packed-tower air strippers: The design of the packed-tower air strippers is based on the removal of influent contaminant concentrations at the design combined flow rate of 200 gpm and a maximum PCE concentration of 5,900 ug/l, to concentration levels below the specified site-specific effluent limits. As described in Section 1.0, a revised SPDES permit equivalency was issued for the Site by the NYSDEC Division of Water/Bureau of Water Permits on February 12, 2013. Both the original and revised permit equivalencies are provided in ***Appendix D***.
- Vacuum blower: The design flow rate for the vacuum blower is a maximum of 1,350 cubic feet per minute (cfm).

However, as the GWE&TS was off-line throughout the vast majority of this reporting period, as a result the above-listed components were in operation for a brief time in August 2016.

A summary of the GWE&TS operating conditions, including average influent pumping rates, flow volumes and total VOC concentrations; total effluent flow volumes and total VOC concentrations; and total VOC removals and efficiencies are provided on Table 3-2. However, as the GWE&TS was not in operation for the majority of this reporting period, and as shown below, these values are not applicable with the exception of Quarter 47 (July 2016 through September 2016).

Table 3-2: Treatment System Performance Summary

Parameter	Quarter 45 (January 1, 2016 through March 31, 2016)	Quarter 46 (April 1, 2016 through June 30, 2016)	Quarter 47 (July 1, 2016 through September 30, 2016)	Quarter 48 (October 1, 2016 through December 31, 2016)	Quarterly Average
Influent[1]					
RW-1 Average Pumping Rate (gpm)	NA	NA	61.0	NA	NA
RW-1 Total Flow Volume (gal)	0	0	348,548	0	0
Maximum Total Influent VOC Concentration (ug/l)	NA	NA	58.15	NA	NA
Effluent[1]					
Effluent Total Flow Volume (gal)	0	0	192,800	0	0
Maximum Total Effluent VOC Concentration (ug/l)	NA	NA	0.15	NA	NA
VOC Removal Summary[2]					
Total VOC Removal (lbs)	NA	NA	0.17	NA	NA
Average Total VOC Removal Rate (lbs/hr)	NA	NA	1.77E-03	NA	NA
Average Total VOC Removal Efficiency	NA	NA	99.74	NA	NA

Notes:
NA: Not applicable.

1. As the GWE&TS was not operating throughout the vast majority of this reporting period, total influent and effluent flow rates and volumes are not available with the exception of Quarter 47 (July 1, 2016 to September 30, 2016).
2. As the GWE&TS was not operating throughout the vast majority of this reporting period, VOC removal quantities, rates and system efficiency are only available of Quarter 47 (July 1, 2016 to September 30, 2016). However, the VOC removal efficiency has ranged from approximately 77.66% to 100% since D&B assumed O&M duties in February 2005 to the end of this reporting period (December 31, 2016). The GWE&TS flow values were estimated based on recent effluent flow volume data from Quarter 47 (July 1, 2016 to September 30, 2016) time period. As the GWE&TS was not operating throughout the vast majority of this reporting period, only one aqueous-phase effluent sample was collected throughout this reporting period.

GWE&TS Downtime Evaluation

As previously discussed, the GWE&TS was shut down throughout the vast majority of this reporting period. As such, the GWE&TS experienced a total of 361 days (approximately 8,665 hours) of downtime throughout this reporting period, as compared to approximately 365 days (approximately 8,760 hours) of downtime reported during the previous reporting period.

The GWE&TS was shut down throughout the vast majority of this reporting period. The GWE&TS was restarted in August 2016; however, the system was only operational for a few days until Transfer Pump P-2 failed. Due to ongoing issues associated with various GWE&TS components, the system has not been operating since this time for the following reasons: 1) following the replacement and programming of the VFD at Transfer Pump P-1, Transfer Pump P-1 and P-2 were cycling rather than maintaining a constant level in the Air Stripper Tower 1 and 2 sumps, respectively; 2) the identification of a leaking union at the Transfer Pump P-1 effluent line, 3) high liquid levels at Air Stripper Tower 2; and, 4) Transfer Pump P-2 was noted to have a cracked impellor. It should be noted that D&B performed a system evaluation and provided recommendations to the NYSDEC in March 2017, regarding system repairs and modifications in support of restarting the GWE&TS. The recommendations were implemented by the NYSDEC Remedial System Contractor and ALM Systems, a subcontracted controls integrator under the oversight of D&B, subsequently the GWE&TS was brought back on-line in April 2017. These activities will be summarized in upcoming Site Management Quarterly Reports.

Groundwater Monitoring Well Condition Summary

All groundwater monitoring wells and extraction wells RW-1 and RW-2 were found to be accessible during the groundwater monitoring sampling events completed during this reporting period with the exception of Quarter 46 (April 2016 through June 2016) due to budgetary restrictions. It should be noted that the NYSDEC Remedial Services Contractor inadvertently did not complete monitoring well field inspection logs as part of the routine groundwater sampling event during Quarter 45 (January 2017 through March 2017). Monitoring well inspection forms are provided in ***Appendix E***.

All groundwater monitoring wells were located as indicated on the Site map; however, it should be noted that the NYSDEC Remedial Services Contractor observed that well locks were not present at monitoring wells MW-4 and RW-2 and the lock at monitoring well MW-106 was not functioning during the Quarter 48 reporting period (October through December 2016).

All monitoring well concrete well pads, protective casings, surface seals, PVC well risers, well plugs and locks were observed to be present and in good condition, with the exception of monitoring well MW-106, which was reported to have a non-functional lock during the Quarter 48 reporting period (October through December 2016), and monitoring well MW-4D and RW-2, which were reported to not have locks during the Quarter 48 reporting period (October through December 2016).

4.0 MONITORING PLAN COMPLIANCE

4.1 Monitoring Requirements and Compliance Status

The monitoring scope of services for the GWE&TS consists of system monitoring activities and groundwater monitoring well network monitoring activities completed in accordance with the requirements of the SMP, unless otherwise noted. Presented below is a summary of each monitoring activity performed throughout this reporting period, as well as associated performance standards, a performance evaluation and associated compliance status, as appropriate. As previously discussed, the GWE&TS was not operating throughout this reporting period and, as such, many of the below-listed activities were accordingly not completed during this reporting period.

GWE&TS Monitoring Activities

GWE&TS monitoring activities typically performed include the sampling of the various system processes to monitor overall VOC removal efficiencies, while at the same time, ensuring that all GWE&TS discharges are below applicable standards and/or discharge limits. As the GWE&TS was operating for only a brief time throughout this reporting period, thus monitoring activities were only completed in August 2016. A summary of the routine GWE&TS monitoring analytes and their typical frequencies of completion are provided below on Table 4-1.

Groundwater Monitoring Activities

Groundwater monitoring activities performed throughout this monitoring period included the sampling of ten on-site groundwater monitoring wells (MW-101 through MW-108, MW-4D and MW-5S) and three off-site groundwater monitoring wells (MW-109, MW-111 and MW-2S), as well as extraction wells RW-1 and RW-2 for VOCs by Method 8260.

As detailed above, extraction well RW-2 was shut down in April 2010 based on low contaminant concentrations, and is currently being monitored on a quarterly basis with the monitoring wells.

Groundwater monitoring activities consist of the collection and analysis of samples from each of these fourteen wells on a quarterly/semiannual basis, as per the frequencies summarized on Table 4-1. Groundwater monitoring well locations are provided in Figures 2-2 and 2-3.

Data Analysis

All groundwater and GWE&TS aqueous-phase influent and effluent samples collected during this reporting period were submitted to Test America Laboratories, Inc. (TAL) for analysis. TAL is a New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP)-certified laboratory. As previously discussed, only one aqueous-phase

influent and effluent sample was collected this reporting period. Vapor-phase effluent samples were not collected during this reporting period, as the GWE&TS was not operating for the vast majority of this reporting period.

Table 4-1: Treatment System and Groundwater Sampling Summary

Sampling Location	Sampling Frequency			Analytical Parameters					
	Monthly	Quarterly	Semi-Annual	VOC (EPA Method 8260B)	VOC (EPA Method 8260B)	VOC (EPA Method TO-15)	TAL Metals (EPA Method 6010B)	pH (EPA Method 9040)(1)	TDS (EPA Method 160.1 or SM 2540C)
Extraction Well RW-1 (2)	✓			✓			✓		
Extraction Well RW-2(3)(4)	✓			✓			✓		
Combined Influent (5)	✓			✓			✓		
Air Stripper Aqueous-phase Effluent	✓			✓			✓	✓	✓
Air Stripper Vapor-phase Effluent(6)			✓			✓			
Groundwater Monitoring Wells MW-103 through MW-107, MW-2S, MW-4D, MW-5S and RW-2		✓			✓				
Groundwater Monitoring Wells MW-101, MW-102, MW-108, MW-109 and MW-111			✓		✓				

Notes:
1. Field analysis.
2. As the GWE&TS was not operating throughout the vast majority of the reporting period, one aqueous-phase influent sample was collected from RW-1 for VOC analysis only, as per NYSDEC direction.
3. As extraction well RW-2 is not currently operating, this well is sampled on a quarterly basis with the monitoring wells.
4. As the GWE&TS was not operating throughout the majority of this reporting period, the groundwater sample collected from extraction well RW-2 was only submitted for VOC analysis.
5. Combined influent analysis is not collected when only one extraction well is operating.
6. In addition to the laboratory analysis, total VOC concentrations in vapor-phase are monitored on a monthly basis utilizing a PID.

As discussed above, system samples were generally not able to be collected per the above sampling frequencies as the GWE&TS was off-line throughout the majority of this reporting period.

All data packages were reviewed for completeness and compliance with NYSDEC Analytical Services Protocol (ASP) Quality Assurance/Quality Control (QA/QC) requirements. Any QA/QC issues arising with the sample results were qualified in the Active Industrial quarterly monitoring reports. Copies of all tabulated analytical data generated throughout this reporting period are provided in ***Appendix F***. Copies of all Data Validation Checklists are provided in ***Appendix G***.

4.2 GWE&TS Performance Standards and Compliance Status

As the GWE&TS was not operating throughout the vast majority of this reporting period, only one round of aqueous-phase system influent and effluent samples were collected by the NYSDEC Remedial Services Contractor; and vapor-phase effluent samples were not collected this reporting period.

Aqueous-Phase Discharge Standards and Compliance Status

The treated groundwater discharged from the GWE&TS is pumped via underground piping to Little Neck Creek. This discharge is authorized by the NYSDEC under a SPDES permit equivalency, which provides for site-specific VOCs, metals, pH and wet chemistry parameter discharge limits. As described in Section 1.0, a revised SPDES permit equivalency was

issued for the Site by the NYSDEC Division of Water/Bureau of Water Permits on February 12, 2013. The original and revised permit equivalencies are provided in ***Appendix D*** .

Based on the analytical data, all analytes in the treated groundwater discharged from the GWE&TS were in compliance with all SPDES equivalency requirements throughout this reporting period. It should be noted that only one aqueous-phase effluent sample was collected in August 2016 and the sample was only analyzed for VOCs.

Vapor-Phase Discharge Standards and Compliance Status

The GWE&TS vapor-phase discharge is authorized by the NYSDEC under an air discharge permit equivalency, which provides for site-specific discharge parameters. A copy of the air discharge permit equivalency document and a summary of site-specific vapor-phase discharge limits, as included in the site-specific OMM, are provided in ***Appendix H***. In addition, a site-specific total VOC effluent limit of 0.5 lbs/hr was developed in consultation with the NYSDEC and is utilized as a means to monitor total vapor-phase VOCs discharged by the GWE&TS.

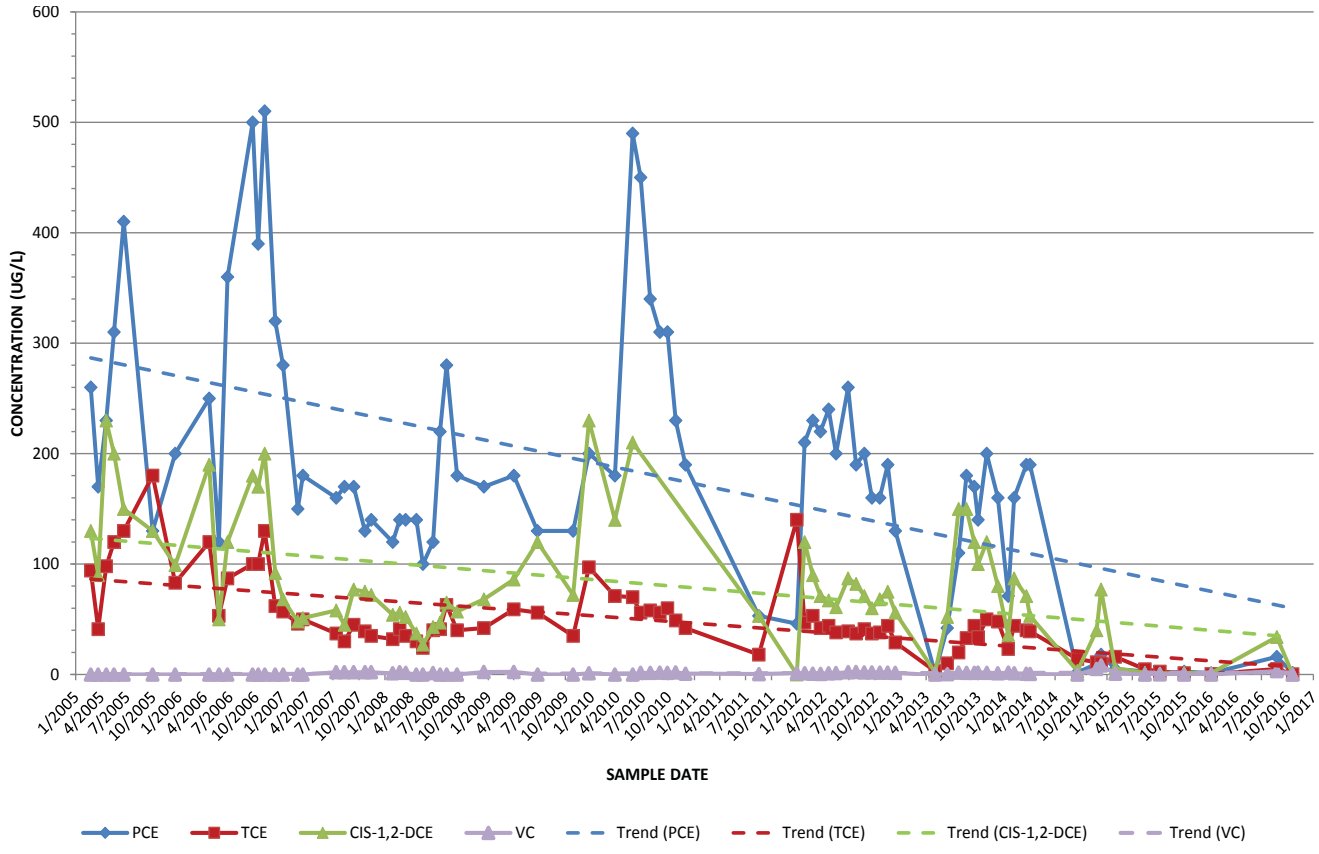
4.3 GWE&TS Performance Evaluation

As the GWE&TS was not operating throughout the vast majority of this reporting period, the performance of the system cannot be evaluated. However, a graph depicting the concentrations of PCE, TCE, cis-1,2-DCE and VC in extraction well RW-1 since D&B assumed O&M duties in February 2005 through the end of this reporting period, is provided as Figure 4-1. As shown on Figure 4-1, PCE was the predominant site-specific VOC detected in RW-1 influent groundwater since February 2005.

All site-specific VOC contaminants of concern have exhibited generally decreasing trends since D&B assumed Site management duties in February 2005, as depicted in Figure 4-1 below.

Figure 4-1

Historical Results of RW-1 Influent Analysis – Site Specific VOCs



Vapor Phase Treatment Performance

As the GWE&TS was not operating throughout the vast majority of this reporting period, semi-annual vapor-phase samples were not collected for laboratory analysis.

4.4 Groundwater Monitoring Well Network Evaluation

On-Site Monitoring Well Network (MW-101 through MW-108, MW-4D and MW-5S)

A summary of the site-specific VOCs (PCE, TCE, cis-1,2-DCE and VC) detected throughout this reporting period in each of the ten on-site groundwater monitoring wells that exhibited detections, are provided below. The Class GA Standard for PCE, TCE and cis-1,2-DCE is 5 ug/l and the Class GA Standard for VC is 2 ug/l. Note that contaminant concentrations detected in exceedance of the Class GA Standards are presented on graphs provided in hyperlinks below.

- MW-101 (screened at 5 to 15 feet below grade): Concentrations of site-specific VOCs have been detected at concentrations well below their respective Class GA Standards throughout this reporting period, similar to the previous reporting period.
- MW-102 (screened at 5 to 15 feet below grade): Concentrations of site-specific VOCs have been detected at concentrations well below their respective Class GA Standards throughout this reporting period, similar to the previous reporting period.
- MW-103 (screened at 5 to 15 feet below grade): Concentrations of site-specific VOCs have been detected at concentrations below their respective Class GA Standards throughout this reporting period, similar to the previous reporting period with the exception of PCE. PCE was detected at a concentration of 8.0 ug/l on July 6, 2016 exceeding its respective Class GA Standards of 5.0 ug/l.
- ***MW-104*** (screened at 5 to 15 feet below grade): Site-specific VOCs have been generally consistently detected at concentrations in exceedance of the Class GA Standards in MW-104. Note that the site-specific contaminants within monitoring well MW-104 have steadily decreased since D&B assumed O&M duties in February 2005. PCE was detected in exceedance of the respective Class GA Standards, as follows:
  - PCE was detected at concentrations ranging from 21 ug/l to 47 ug/l, with the maximum concentration detected on July 6, 2016. PCE has generally exhibited a slightly decreasing trend, as compared to the previous reporting period.
- ***MW-105*** (screened at 5 to 15 feet below grade): Concentrations of site-specific VOCs have generally been detected at concentrations below their respective Class GA Standards during recent previous reporting periods. However, two site-specific contaminants were detected at concentrations exceeding the Class GA Standards during this reporting period: cis-1,2-DCE and VC, as follows:
  - Cis-1,2-DCE was detected at concentrations ranging from 27 ug/l to 120 ug/l, with the maximum concentration detected on October 19, 2016. Overall, cis-1,2-DCE has been generally detected at widely varying concentrations, varying from non-detect to 1,000 ug/l detected in June 2011.
  - VC was detected at concentrations ranging from 0.89 ug/l to 9.0 ug/l, with the maximum concentration detected on October 19, 2016. Overall, VC has exhibited an increasing trend throughout this reporting period; however, VC concentrations have decreased over recent reporting periods and since February 2005.
- ***MW-106*** (screened at 5 to 15 feet below grade): Site-specific VOCs have generally been detected at concentrations in exceedance of the Class GA Standards throughout this reporting period and since D&B assumed O&M duties in February 2005. PCE, TCE, cis-1,2-DCE and VC have been detected in exceedance of their respective Class GA Standards, as follows:
  - PCE was detected at concentrations ranging from 3.0 ug/l to 13 ug/l, with the maximum concentration detected on January 5, 2016. Overall, PCE concentrations have exhibited a decreasing trend since February 2005.
  - TCE was detected at concentrations ranging from 1.8 ug/l to 11 ug/l, with the maximum concentration detected on January 5, 2016. Overall, TCE concentrations have exhibited a decreasing trend since the previous reporting period, and an overall decreasing trend since February 2005.

  - Cis-1,2-DCE was detected at concentrations ranging from 23 ug/l to 34 ug/l, with the maximum concentration detected on October 19, 2016. Overall, cis-1,2-DCE concentrations have exhibited a stable trend throughout this reporting period and an overall decreasing trend since February 2005.
  - VC was detected at concentrations ranging from 2.0 ug/l to 6.0 ug/l, with the maximum concentration detected on October 19, 2016. Overall, VC concentrations have exhibited an increasing trend throughout this reporting period, and a generally decreasing trend since February 2005.
- MW-107 (screened at 5 to 15 feet below grade): Concentrations of site-specific VOCs have been detected at concentrations below their respective Class GA Standards throughout this reporting period, similar to the previous reporting period.
- ***MW-108*** (screened at 5 to 15 feet below grade): Site-specific VOCs have generally been detected at concentrations below the Class GA Standards throughout this reporting period, with the exception of PCE. PCE was detected at a concentration of 5.6 ug/l on July 6, 2016. Overall, PCE concentrations have exhibited a stable trend throughout this reporting period and since February 2005.
- ***MW-4D*** (screened at 60 to 70 feet below grade): Site-specific VOCs have been detected at concentrations in exceedance of their Class GA Standard since this well was added to the routine groundwater monitoring list in June 2012. PCE, TCE and cis-1,2-DCE exceedances detected during this reporting period are as follows:
  - PCE was detected at concentrations ranging from 170 ug/l to 400 ug/l, with the maximum concentration detected on January 5, 2016. Overall, PCE concentrations have exhibited a stable trend throughout this reporting period and a decreasing trend since June 2012.
  - TCE was detected at concentrations ranging from 24 ug/l to 46 ug/l, with the maximum concentration detected on October 19, 2016. Overall, TCE concentrations have exhibited a stable trend throughout this reporting period and since June 2012.
  - Cis-1,2-DCE was detected at concentrations ranging from 2.8 ug/l to 5.4 ug/l, with the maximum concentration detected on October 19, 2016. Overall, cis-1,2-DCE concentrations have exhibited a stable trend throughout this reporting period and a decreasing trend since June 2012.
- MW-5S (screened at 14 to 24 feet below grade): MW-5S has been sampled as part of D&B's work assignment since June 2010. Site-specific VOCs have been detected at concentrations below their respective Class GA Standards throughout this reporting period and have exhibited generally stable trends since June 2010.

In general, site-specific VOCs have shown a decreasing trend in the majority of on-site monitoring wells since the previous reporting period and since D&B assumed site management duties in February 2005. Consistent with the previous reporting period, monitoring well MW-4D exhibited elevated concentrations of PCE and TCE; however, concentrations of site-specific VOCs in monitoring well MW-4D have significantly decreased, as compared to the previous reporting periods. It should also be noted that site-specific VOC concentrations in MW-4D have been detected at widely varying concentrations since 2012.

Monitoring well MW-4D is screened at a depth of approximately 60 to 70 feet below grade, approximately 30 feet deeper than on-site extraction well RW-1 and the site-wide monitoring well network. It should be noted that the Gardiners Clay is located below the Site at a depth of approximately 70 feet below grade and is likely acting as a lower "confining unit" for the groundwater plume. Based on the relatively dense nature of chlorinated solvents, the groundwater plume may be "pooling" or migrating along the top of the Gardiners Clay.

The results from the MIP Investigation Program completed in June and July 2014 indicate that "deep" chlorinated VOC contamination exists at, and downgradient of the Site, immediately above the upper surface of the Gardiners Clay unit. Based on review of the halogen-specific detector (XSD) results from the investigation, the most significant XSD responses (indicative of the presence of halogen-specific compounds, including chlorinated VOCs) were observed at depths corresponding to the top of the Gardiners Clay unit at MIP locations located downgradient of the Site. A more detailed discussion of the investigation is provided in the February 2015 MIP Investigation Summary Report.

Off-Site Monitoring Well Network (MW-109, MW-111, MW-2S and RW-2)

A summary of the site-specific VOCs (PCE, cis-1,2-DCE, TCE and VC) detected during this reporting period in each off-site groundwater monitoring well located downgradient of the GWE&TS and extraction well RW-2 are provided below. Contaminant concentrations detected in exceedance of the Class GA Standards are presented on graphs provided in the hyperlinks below.

- MW-109 (screened at 25 to 35 feet below grade): Monitoring well MW-109 is located approximately 1,800 feet south of the Site. Site-specific VOCs have been detected at concentrations below their respective Class GA Groundwater Standards from June 2006 through the end of this reporting period.
- MW-111 (screened at 25 to 35 feet below grade): Monitoring well MW-111 is located approximately 580 feet southwest of the Site. Site-specific VOCs have been detected at concentrations below their respective Class GA Standards since start-up of the GWE&TS and through the end this reporting period.
- ***MW-2S*** (screened at 12 to 22 feet below grade): Monitoring well MW-2S is located approximately 220 feet south of the Site. Site-specific VOCs (primarily including PCE and cis-1,2-DCE) have consistently been detected at concentrations in exceedance of their respective Class GA Standards from when this well was added to the routine groundwater monitoring list (September 2008) through the end of this reporting period. PCE, TCE, cis-1,2-DCE and VC exceedances during this reporting period are as follows:
  - PCE was detected at concentrations ranging from 8.8 ug/l to 10 ug/l, with the maximum concentration detected on January 5, 2016. Overall, PCE has exhibited a decreasing trend since September 2011.
  - Cis-1,2-DCE was detected at concentrations ranging from 18 ug/l to 29 ug/l, with the maximum concentration detected on January 5, 2016. Overall, cis-1,2-DCE concentrations have fluctuated greatly over the past several years.
- ***RW-2*** (screened at 12 to 37 feet below grade): Extraction well RW-2 is located approximately 1,500 feet southwest of the Site. As detailed above, RW-2 is now monitored on a quarterly basis with the site-wide monitoring wells due to generally low contaminant concentrations; though, site-specific VOCs have varied widely over the last several years. It should be noted that site-specific VOC concentrations were observed to be erratic during previous reporting periods; however, concentrations of all site-specific VOCs have decreased in RW-2, and have remained generally stable throughout this reporting period. It is possible that the erratic concentrations previously detected in RW-2 are related to improper or inconsistent sampling techniques, as this well is purged (prior to sampling) from the treatment system building utilizing the existing extraction pump within the well.
  - PCE was detected at concentrations ranging from non-detect to 24 ug/l, exceeding the Class GA Standard for PCE of 5 ug/l during one of the three sampling events completed during this reporting period, with the maximum concentration detected on January 5, 2016. Overall, PCE concentrations have exhibited a stabilized trend throughout this reporting period and since several elevated PCE concentrations were detected in this well in 2012 and 2013.
  - TCE was detected at concentrations ranging from 0.49 ug/l to 6.7 ug/l, exceeding the Class GA Standard for PCE of 5 ug/l during two of the three sampling events completed during this reporting period, with the maximum concentration detected on January 5, 2016. Overall, TCE concentrations have exhibited a stable trend since September 2011.
  - Cis-1,2-DCE was detected at concentrations ranging from 0.53 ug/l to 7.7 ug/l, with the maximum concentration detected on January 5, 2016. Overall, cis-1,2-DCE concentrations have exhibited a stable trend since September 2011.

In general, site-specific VOCs have either decreased or remained consistent in the majority of groundwater monitoring wells since the previous reporting period and since D&B assumed site management duties in February 2005.

5.0 INSTITUTIONAL CONTROL/ENGINEERING CONTROL (IC/EC) CERTIFICATION PLAN

The intent of this section is to provide a description of the Institutional and Engineering Controls (IC/ECs) in place for the Site, as well as the mechanisms used to monitor and enforce these controls.

Institutional Controls

By definition, an IC is any non-physical means for enforcing restriction on the use of real property that limits human health and environmental exposure, restricts the use of groundwater, provides notice to potential owners, operators, or member of the public, or prevents action that would interfere with the effectiveness and/or integrity of operation, maintenance and monitoring activities at or pertaining to a remedial site.

ICs in the form of a groundwater use restriction and land-use restriction are mandatory controls required for the Site as per the site-specific ROD dated March 1997. A copy of the Declaration of Covenant and Restrictions for the Active Industrial Uniform property was obtained from the NYSDEC, which is provided in ***Appendix I***. The Covenant certifies that ICs, including land and groundwater use restrictions, are in place at the Site and ensures that the current owner and any future property owners are aware of these site-specific restrictions until no longer deemed necessary by the NYSDEC. In addition, a copy of the deed for the Active Industrial Uniform property was obtained from the Suffolk County Clerk's Office and a freedom of information request was submitted to the Village of Lindenhurst. A copy of this documentation is provided in ***Appendix J***. Property owner certifications are provided in ***Appendix K***. On-site groundwater restrictions will remain in-place and the use of the property has been and will continue to be restricted to operation of the GWE&TS only. No changes have been made to the property during this reporting period.

Engineering Controls

By definition, an EC is any physical barrier or method employed to actively or passively contain, stabilize or monitor contamination, restrict the movement of contamination to ensure long-term effectiveness of a remedial program or eliminate potential exposure pathways to contamination. The GWE&TS and associated monitoring well network, fencing and security signage are the ECs currently in-place at the Site. The Site fencing and security signage are currently in-place and functioning properly. It should be noted, however, that the IC/EC Certification form provided by the NYSDEC now includes the GWE&TS and associated monitoring well network ECs as D&B recommended in previously completed PRRs.

As previously discussed, the GWE&TS was shut down throughout the vast majority of this reporting period. The GWE&TS was restarted in August 2016; however, the system was only operational for a few days until Transfer Pump P-2 failed. Due to ongoing issues associated with various GWE&TS components, the system has not been operating since this time for the following reasons: 1) following the replacement and programming of the VFD at Transfer Pump P-1, Transfer Pump P-1 and P-2 were cycling rather than maintaining a constant level in Air Stripper Towers 1 and 2 sumps, respectively; 2) the identification of a leaking union at the Transfer Pump P-1 effluent line, 3) high liquid levels at Air Stripper Tower 2; and, 4) Transfer Pump P-2 was noted to have a cracked impellor. It should be noted that D&B performed a system evaluation and provided recommendations to the NYSDEC in March 2017, regarding system repairs and modifications in support of restarting the GWE&TS. The recommendations were implemented by the NYSDEC Remedial System Contractor and ALM Systems, a subcontracted controls integrator under the oversight of D&B, subsequently the GWE&TS was brought back on-line in April 2017. These activities will be summarized in upcoming Site Management Quarterly Reports.

It should also be noted that site-specific contaminant concentrations in the network of on-site and off-site monitoring wells has not increased while the system has been off-line. A copy of the completed IC/EC Certification form, as provided by the NYSDEC, is included as ***Appendix L***.

6.0 GREEN REMEDIATION PLAN

In accordance with the NYSDEC's DER-31 Green Remediation policy, the following section provides a qualitative assessment of the overall environmental impacts or "footprint" associated with the operation of the GWE&TS. In addition, recommendations are provided in order to minimize the environmental impacts of the remedy.

6.1 Qualitative Overview of Environmental Impacts

Electric Usage

The GWE&TS currently obtains 100% of its electricity from the local electric utility, PSEG Long Island (PSEG). Based on publicly available information, PSEG currently supplies electricity from a variety of fuel sources, including fossil fuels (46%),

nuclear (11%), refuse burning (4%) and renewables (3%). The remaining 35% of its electric is supplied from other outside electric utilities. Electricity usage associated with the GWE&TS while operating is mainly attributed to operation of the submersible pump within extraction well RW-1, the pressure blower and the effluent transfer pump. Minor electricity usage can also be attributed to building and Site lighting, building HVAC and system controls, as well as the electric heaters utilized in the winter months. However, as the GWE&TS was not operating for the majority of this reporting period, the majority of electric usage during this reporting period is associated with the GWE&TS building, Site lighting, building HVAC and system controls, as well as the electric heaters utilized in the winter months.

Based on a review of the electric utility bill summary for this reporting period provided by the NYSDEC, the GWE&TS used a total of approximately 13,240 kilowatt-hours (KWH) of electricity, at an average of 36 KWH/day. It should be noted that the average electricity usage during the previous reporting period (January 2015 through December 2015) was 113 KWH/day. This decrease in electric usage is due to the system being shut down throughout the majority of this reporting period, as well as a milder winter.

Fossil Fuel Usage

The GWE&TS was designed to use fossil fuels (e.g., natural gas) for the operation of the building heaters. However, note that the building heaters are currently not functioning. In addition, fossil fuels are indirectly used during the completion of maintenance and monitoring activities associated with the overall operation of the GWE&TS.

Fossil fuel use results from completion of the following Site-related activities:

- Operation of the natural gas building heaters (currently not operational).
- Transportation to and from the Site for monitoring, sampling and system alarm response/non-routine maintenance.
- Operation of a portable generator to power a submersible pump for groundwater monitoring well sampling activities.
- Off-site transportation and shipment of samples collected for laboratory analysis.
- Disposal of waste generated at the Site.

Water Usage

The GWE&TS does not directly use water for operation. However, as the GWE&TS building is connected to the Suffolk County Public Water Supply, a nominal amount of water was utilized during the completion of maintenance and monitoring activities associated with the GWE&TS and groundwater monitoring well network.

Air Emissions

Vapor-phase discharge from the packed-tower air strippers is released directly to the atmosphere. As previously discussed, vapor-phase effluent samples were not collected during this reporting period as the GWE&TS was not operating for the majority of this reporting period. However, contaminant concentrations within vapor-phase discharge are typically well below the site-specific discharge limits. While the GWE&TS is in operation, the vapor-phase discharge is monitored on a routine basis to prevent or limit any vapor-phase contaminant concentration exceedance events.

Monitoring and maintenance activities associated with the GWE&TS also result in indirect emissions to the air through the off-site generation of electricity utilized to power the GWE&TS and the combustion of fossil fuels, as discussed above.

Consumption of Materials and Generation of Waste

Monitoring, maintenance and reporting activities associated with the GWE&TS result in material consumption and the generation of waste. A summary of the current material consumption and waste generation activities for the GWE&TS are summarized below:

- Personal protective equipment associated with GWE&TS and groundwater sampling, such as nitrile gloves and hearing protection, etc.

- Polyethylene tubing associated with groundwater sampling.
- Packaging material and ice used to pack and preserve samples to be submitted for laboratory analysis.
- Florescent light bulbs for building lighting.
- Paper and office supplies associated with GWE&TS Site logs, monitoring logs and report preparation.
- Repair and replacement of equipment associated with the GWE&TS, such as transfer pumps and gauges, etc.
- Consumable GWE&TS materials such as, air stripper packing material.

7.0 COST EVALUATION

The total cost of operation of the GWE&TS from January 1, 2016 through December 31, 2016 was approximately $149,085. It should be noted that this total does not include any administrative costs incurred by the NYSDEC in support of this project throughout this reporting period. This total includes engineering and subcontractor costs, as well as utility costs associated with the operation of the GWE&TS (electric, telephone, natural gas and water). A review of these costs is provided on Table 7-1. The following provides a brief review of each cost item:

- Subcontractors include the NYSDEC Remedial Services Contractor, analytical laboratory and maintenance contractors associated with the routine/non-routine maintenance of the GWE&TS. As summarized on Table 7-1, subcontractor costs were approximately 49% of the total costs for this reporting period.
- Engineering costs include effort invoiced in association with project management, report preparation, project planning and other office-related work items. As summarized on Table 7-1, engineering costs were approximately 48% of the total costs for this reporting period.
- Utilities consumed in support of the overall operation of the GWE&TS include electric, telephone, gas and water. As summarized on Table 7-1, utility costs were approximately 3% of the total costs for this reporting period, primarily due to electric usage.

Based on the total cost of $149,086 incurred during this reporting period, with the average monthly cost of approximately $12,424. The majority of this overall cost was the result of ongoing GWE&TS maintenance completed by the NYSDEC Remedial Services Contractor. As the GWE&TS was not operating throughout the vast majority of this reporting period, the GWE&TS removed a minimal amount of VOCs from the groundwater plume. As summarized on Table 3-2.

Table 7-1: Treatment System Cost Summary

COST ITEM	BUDGET EXPENDED (January 1, 2016 THROUGH December 31, 2016)	PERCENT OF TOTAL
ENGINEERING SUPPORT		
D&B Engineers and Architects, P.C.	$70,983	47.61%
SUBCONTRACTORS		
NYSDEC Remedial Services Contractor[1] (Routine/Non-Routine Maintenance Activities)	$71,168	47.74%
Test America (Analytical Laboratory)	$1,785	1.20%
SUB-TOTAL	$72,953	48.93%
UTILITIES		
Electric	$4,049	2.72%
Telephone	$647	0.43%
Natural Gas	$385	0.26%
Water	$68	0.05%
SUB-TOTAL	$5,149	3.45%
TOTAL COSTS	$149,085	100%
AVERAGE COST/MONTH	$12,424	8.33%
COST/POUND OF VOC REMOVED[2]	$876,971	--

Notes:
1. Remedial Services contractor costs do not include utility costs.
2. As the GWE&TS was operating for a brief amount of time throughout this reporting period, 0.17lbs of VOCs were removed throughout this reporting period and, therefore, total costs per pound of VOCs removed are calculated based on removal rates from Quarter 47 (July 2016 - September 2016).

8.0 CONCLUSIONS AND RECOMMENDATIONS

8.1 Conclusions

Based on the evaluation of the GWE&TS performance, effectiveness and protectiveness throughout this reporting period, and as detailed in the preceding sections, the following conclusions have been established:

Operation and Maintenance

- O&M Plan Requirements and Compliance: Routine maintenance of the GWE&TS was performed once throughout this reporting period, as the GWE&TS was operating for only a brief period of time.

  As noted in Section 3.1, although several winter storm events occurred during the winter months of this reporting period, snow plowing/removal activities were not reported to have been completed by the NYSDEC Remedial Services Contractor based on review of the Site Activities logs.

- GWE&TS Downtime: The GWE&TS was shut down for the vast majority of this reporting period, a total of 361 days (or 8,665 hours). The GWE&TS was restarted in August 2016; however, the system was only operational for a few days until Transfer Pump P-2 failed. Due to ongoing issues associated with various GWE&TS components, the system has not been operating since this time for the following reasons: 1) following the replacement and programming of the VFD at Transfer Pump P-1, Transfer Pump P-1 and P-2 were cycling rather than maintaining a constant level in the sump;

2) the identification of a leaking union at the Transfer Pump P-1 effluent line, 3) high liquid levels at Air Stripper Tower 2; and, 4) Transfer Pump P-2 was noted to have a cracked impellor. It should be noted that D&B performed a system evaluation and provided recommendations to the NYSDEC in March 2017, regarding system repairs and modifications in support of restarting the GWE&TS. The recommendations were implemented by the NYSDEC Remedial System Contractor and ALM Systems, a subcontracted controls integrator under the oversight of D&B, subsequently the GWE&TS was brought back on-line in April 2017. These activities will be summarized in upcoming Site Management Quarterly Reports.

Monitoring Plan

- System Monitoring: Routine monitoring of the GWE&TS was only completed once in August 2016 as the system was off-line for the vast majority of this reporting period.
- Aqueous-Phase Influent and Effluent Sampling: One aqueous-phase influent and effluent sample was collected throughout this reporting period, as the GWE&TS was operating for only a brief amount of time during this reporting period.
- Vapor-Phase Effluent Sampling: Vapor-phase effluent samples were not collected throughout this reporting period, as the GWE&TS was not operating for the vast majority of this reporting period.
- Monitoring Well Conditions: All groundwater monitoring wells were located as indicated on the Site map; however, it should be noted that the NYSDEC Remedial Services Contractor observed that well locks were not present at groundwater monitoring wells MW-4 and RW-2 during the Quarter 48 reporting period (October to December 2016.)
- Monitoring Well Contaminant Concentrations: Site-specific VOCs have been detected at concentrations in exceedance of their Class GA Standard in several monitoring wells during this monitoring period (on-site monitoring wells MW-104 through MW-106, MW-108, MW-4D, as well as off-site monitoring well MW-2S and off-site extraction well RW-2). It should be noted that site-specific contaminant concentrations during this reporting period have generally decreased or have remained stable in the majority of wells. In addition, it should be noted that contaminant concentrations in RW-2 and MW-4D have varied widely during previous reporting periods; however, contaminant concentrations in MW-4D significantly decreased, as compared to the previous reporting period and have remained generally stable throughout this reporting period.

Treatment System Operational Issues

- Transfer Pump P-1: As discussed in Section 3.1, the NYSDEC Remedial Services Contractor completed VFD programming activities for Transfer Pump P-1 on August 23, 2016. Following programming at Transfer Pump P-1, the system was successfully restarted with Transfer Pumps P-1 and P-2 operating; however, the pumps were cycling rather than maintaining a constant level in the sumps. According to the NYSDEC Remedial Services Contractor, Transfer Pump P-2 was not receiving a modulating signal from the PLC.
- Transfer Pump P-2: The NYSDEC Remedial Services Contractor replaced Transfer Pump P-2 on October 28, 2015. The system was successfully restarted on August 23, 2016 with Transfer Pumps P-1 and P-2 operating; however, the pumps were cycling rather than maintaining a constant level in the sumps. According to the NYSDEC Remedial Services Contractor, Transfer Pump P-2 was not receiving a modulating signal from the PLC. However, on August 29, 2016 the NYSDEC Remedial Services Contractor noted the system was off due to a high liquid level at Air Stripper Tower 2; however, AST-2 could not be pumped out or restarted. The NYSDEC Remedial Services Contractor returned to Site on August 30, 2016 to troubleshoot Transfer Pump P-2 and noted a crack in the pump impellor. As such, Transfer Pump P-2 has remained off since this time.
- Influent and Effluent Piping: The GWE&TS is currently limited to approximately 130 gpm, below its design capacity of approximately 200 gpm due to what was initially believed to be a blockage within the effluent line. Following an unsuccessful blockage investigation in 2010, as previously reported, D&B prepared an effluent line investigation scope of work, dated January 14, 2015, for the investigation of any restrictions within the effluent piping. In addition, the January 14, 2015 scope of work also included provisions for the investigation of the influent piping for each extraction well to locate any below grade damage which may be allowing sand and gravel to enter the influent piping, as well

as provisions for the installation of filter screens within each influent pipe to trap any such debris in an effort to limit damage to the system transfer pumps. The NYSDEC Remedial Services Contractor completed the installation of the two filter screens within the influent piping on February 25, 2015. The NYSDEC Remedial Services Contractor initiated boroscoping activities on March 11, 2015 in an effort to identify any below grade damage or blockages within the effluent line. Boroscoping activities then continued at the influent and effluent lines from April 3 through April 16, 2015. The NYSDEC Remedial Services Contractor did not identify any significant or obvious blockages; however, the entire effluent line exhibited approximately 1/8 to 1/4 inches of residue and scaling throughout its entire inner diameter. This thickness of residue and scaling is not expected to greatly effect system effluent flow potential, though it is currently believed that this scaling may be contributing to any system flow limitations. The NYSDEC Remedial Services Contractor attempted to restart the GWE&TS on April 17, 2015; however, as the Transfer Pump P-1 VFD was not allowing Transfer Pump P-1 to operate at less than 100% capacity, the system could not be placed into routine operation at that time. The NYSDEC Remedial Services Contractor was on-site to troubleshoot the VFD on April 17 through 30, 2015 and attempted to restart the GWE&TS on April 30, 2015; however, upon restarting the system, the effluent pipe ruptured. Following two effluent pipe repair events, the effluent pipe was ultimately repaired on October 28, 2015. It should be noted that the effluent pipe was not tested following its repair due to the NYSDEC Remedial Services Contractor's concerns regarding possibly rupturing the line again.

- Extraction Well Redevelopment: On August 8 and 10, 2016, the NYSDEC Remedial Services Contractor performed well redevelopment and pump re-deployment activities at extraction well RW-1. Additionally, on August 9, 2016, well redevelopment activities were attempted at extraction well RW-2. Approximately 13 feet of material was identified in the well. After several attempts approximately 6 feet of the accumulated material was removed; however, NYSDEC Remedial Services Contractor was unable to successfully complete the slated well redevelopment. On August 16, 2016, the NYSDEC Remedial Services Contractor was on-site to complete boroscoping activities at extraction well RW-2 to identify any structural issues within the well. The inspection did not identify any structural issues with RW-2.

Institutional and Engineering Controls

- IC/EC Compliance Status: ICs consisting of a Declaration of Covenant and Restrictions, including groundwater and land-use restrictions, is currently filed with the Suffolk County Clerk's office or the Village of Lindenhurst. There is no on-site use of groundwater for potable purposes and the use of the property has been and will continue to be restricted to operation of the GWE&TS only. No changes have been made to the property during this reporting period. Although the treatment system EC is not currently operational, all EC requirements are currently in place and the treatment system will be placed into routine operation once the operational issues identified above are addressed, per NYSDEC direction.

8.2 Recommendations

Based on evaluation of the operation of the GWE&TS throughout this reporting period, and as detailed in the preceding sections, the following recommendations have been established to improve the overall performance, effectiveness and protectiveness of the GWE&TS:

Operation and Maintenance

- GWE&TS Operation: The GWE&TS was not operating for the vast majority of this reporting period with the exception of a brief period in August 2016; therefore, routine GWE&TS inspection and maintenance services were not completed throughout the majority of this reporting period. It is recommended that operation of the GWE&TS is continued once the system is made operational. It should be noted that D&B performed a system evaluation and provided recommendations to the NYSDEC in March 2017, regarding system repairs and modifications in support of restarting the GWE&TS. The recommendations were implemented by the NYSDEC Remedial System Contractor and ALM Systems, a subcontracted controls integrator under the oversight of D&B, subsequently the GWE&TS was brought back on-line in April 2017. These activities will be summarized in upcoming Site Management Quarterly Reports.
- Facility Maintenance: Ensure snow plowing/removal activities and lawn maintenance activities, as well as proper reporting of such, are completed, as necessary.
- OM&M Logs: D&B recommends that the NYSDEC Remedial Services Contractor record more clear and detailed

descriptions of completed field activities and issues encountered, as well as alarm triggers, downtime dates and times and the steps taken to bring the GWE&TS back online on the Site Activities and System Operation Logs, as appropriate. In addition, multiple copies of logs, including some differing information is periodically reviewed. As such, D&B further recommends that the NYSDEC Remedial Services Contractor make an effort to provide one set of logs with all descriptions and dates of activities clearly indicated. These steps will help enable D&B to better understand the current status of the GWE&TS and facilitate a more efficient preparation of the Site Management Quarterly Reports. In addition, it is recommended that the NYSDEC Remedial Systems Contractor adhere to the routine maintenance schedule.

Monitoring Plan

- Monitoring/Extraction Well Sampling: Based on the widely varying VOC concentrations detected in several wells over previous reporting periods, it is recommended that the NYSDEC ensures that the Remedial Services Contractor is utilizing proper and consistent sampling techniques during each groundwater and system sampling event. In addition, ensure that the RW-2 effluent piping is properly purged by the NYSDEC Remedial Services contractor prior to collecting routine groundwater samples from this well, and that consistent sampling techniques are utilized in order to ensure consistent, usable analytical data. Additionally, as extraction well RW-2 has exhibited widely varying concentrations ranging from non-detect to a maximum of 258.83 ug/l (detected on March 21, 2014), since the well has been sampled along with the quarterly monitoring wells in mid-2011. It is recommended that the GWE&TS be restarted with both extraction wells operating and reamin operational to ensure that site-specific contamination is adequately captured and not extending from the Site.
- Off-Site Monitoring Well Network: Due to varying concentrations of total VOC's exhibited in RW-2 it is recommended that the shallow groundwater monitoring well network be expanded to include the installation of additional shallow monitoring wells on Lane Street, Grove Street, Willow Lane and Palm Street.
- Treatment System Sampling: Aqueous-phase influent and effluent samples were collected in August 2016 as the GWE&TS was only operating for a brief amount of time this reporting period. The NYSDEC Remedial Systems Contractor should collect all system samples as soon as the system is again placed into routine operation.
- Routine Maintenance of the Pressure Blower and Transfer Pumps: In order to reduce the likelihood of premature equipment failure and resulting system downtime, D&B recommends that the NYSDEC Remedial Services contractor perform maintenance of the pressure blower and transfer pumps, and all other system components, in accordance with their respective manufacturer's specifications when the system is again placed into routine operation.

Treatment System Operational Issues

- Transfer Pump P-1: D&B recommends that the NYSDEC Remedial Services Contractor verify proper programing of the VFD and PLC control logic to allow for proper operation of Transfer Pump P-1.
- Transfer Pump P-2: D&B recommends that, the NYSDEC Remedial Services Contractor repair or replace Transfer Pump P-2. Additionally, the NYSDEC Remedial Services Contractor shall verify proper programing of the VFD and PLC control logic to allow for proper operation of Transfer Pump P-2.
- Influent/Effluent Piping Investigation: Following repair of the GWE&TS, it is recommended that the NYSDEC Remedial Services Contractor test the effluent line.
- Extraction Wells: D&B recommends that the NYSDEC Remedial Services Contractor complete well redevelopment activities at extraction well RW-2 to remove the remaining 7 feet of sediment that has been identified in the well.
- Overall Treatment System: D&B recommends that all system components and controls be inspected and repaired, as necessary, prior to restart of the GWE&TS to ensure safe and efficient operation of the treatment system.

Institutional Controls/Engineering Controls

- IC/EC Operation: ICs in the form of a Declaration of Covenant and Restrictions, which includes land and groundwater use restrictions, are in place at the Site. The Covenant ensures that the current owner and any future property owners are aware of these site-specific restrictions until no longer deemed necessary by the NYSDEC. On-site groundwater restrictions remain in-place and the use of the property has been and will continue to be restricted to operation of

the GWE&TS only. No changes have been made to the property during this reporting period. Although the treatment system EC was not operational during the majority of this reporting period, all EC requirements are currently in place and the treatment system will be placed into routine operation once the operational issues identified above are addressed, per NYSDEC direction. As discussed above the GWE&TS was restarted in April 2017. The events associated with restarting of the GWE&TS will be summarized in upcoming Site Management Quarterly Reports.

- IC/EC Compliance Status: These ICs should be included with the property deed as a legal document to ensure that the current property owner and any future property owners are aware of these site-specific restrictions until no longer deemed necessary by the NYSDEC. However, it should be noted that the intent of the ICs are currently being met as groundwater is not used for potable purposes and the use of the property has been and will continue to be restricted to operation of the GWE&TS only. No changes have been made to the property during this reporting period. As previously discussed, the GWE&TS was off-line throughout the majority of this reporting period. It should be noted that site-specific contaminant concentrations in the network of on-site and off-site monitoring wells have generally not increased while the system has been shut down.

Green and Sustainability Recommendations

- Building Heaters: D&B recommends that the building heaters be replaced with new high-efficiency natural gas-powered units.
- Building Lighting: It is recommended that all light bulbs within the building be replaced with high efficiency bulbs, when needed.
- Renewable Energy Feasibility Assessment: D&B recommends evaluating the feasibility of installing alternate energy sources or purchasing renewable energy credits in order to off-set the electricity usage for the GWE&TS from non-renewable energy sources.
- Reduction of Paper Use: Continue transmitting reports electronically as PDF files to the NYSDEC for review and approval.

General Recommendations

- General GWE&TS Operation: The GWE&TS should remain in-place and operating as designed until remedial objectives have been obtained.
- RSO Evaluation: A system repair and upgrade effort is planned to be completed at the Site in the near future. RSO activities will continue once the system repairs are completed. It should be noted that the GWE&TS was restarted in April 2017. The events associated with restarting of the GWE&TS will be summarized in upcoming Site Management Quarterly Reports.
- SMP Revisions: It is recommended to revise the Site SMP to include the revised sampling frequencies and include additional information regarding remaining contamination at the site.
- PRR Reporting Frequency: Based on a review of the guidance documents provided by the NYSDEC, it is recommended that PRRs be completed on an annual basis. The frequency of follow-up PRRs will be determined by the NYSDEC based on future Site conditions and compliance.