Lebanon West Farms I and II

BRONX, NEW YORK

Site Management Plan

NYSDEC Site Number: C203060

Prepared for:

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Revisions to Final Approved Site Management Plan:

Revision #	Submitted Date	Summary of Revision	DEC Approval Date
	2/23/18	Groundwater Frequency Change	

NOVEMBER 2014

CERTIFICATION

I, Nicholas A. Andrianas, P.E., certify that I am currently a NYS registered professional engineer and that this Site Management Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

Nicholas A. Andrianas, P.E. Date 11/26/14

TABLE OF CONTENTS

TABLES

FIGURES

10c. As Built Waterproofing / Sub-Slab Depressurization System Layout for Building 3

11. Elevation of Residuals Management Zone

12. Post remedial Groundwater Monitoring Well Locations & Concentrations in Groundwater above NYSDEC TOGS

13. As Built Composite Cover System

APPENDICES

A. Excavation Work Plan
B. Environmental Easement
C. Metes and Bounds
D. Waterproofing membrane/vapor barrier Specifications; SSDS As-Built Drawings and Specifications; NYSDEC/NYSDOH Passive System Confirmation
E. Generic Health and Safety Plan (HASP)/ Community Air Monitoring Plan (CAMP)
F. Monitoring Well Construction Logs
G. Quality Assurance Project Plan (QAPP)
H. Groundwater Sampling Log
I. Inspection Forms

SITE MANAGEMENT PLAN

1.0 INTRODUCTION AND DESCRIPTION OF REMEDIAL PROGRAM

1.1 INTRODUCTION

This document is required as an element of the remedial program at Lebanon West Farms I and II (hereinafter referred to as the "Site") under the New York State (NYS) Brownfield Cleanup Program (BCP) administered by New York State Department of Environmental Conservation (NYSDEC). The Site was remediated in accordance with Brownfield Cleanup Agreement (BCA) Index# C203060-10-11 Site # C203060, which was executed in November 2011.

1.1.1 General

Lebanon West Farms Associates, L.P. entered into a BCA with the NYSDEC to remediate a 0.7808 acre property located in the Bronx, New York. This BCA required the Remedial Party, Lebanon West Farms Associates, L.P., to investigate and remediate contaminated media at the site. A figure showing the Site location and boundaries of this 0.7808-acre Site is provided in Figure 1. The boundaries of the Site are more fully described in the metes and bounds Site description that is part of the Environmental Easement in Appendix B.

After completion of the remedial work described in the Remedial Action Work Plan, some contamination was left in the subsurface at this Site, which is hereafter referred to as 'remaining contamination." This Site Management Plan (SMP) was prepared to manage remaining contamination at the Site until the Environmental Easement is extinguished in accordance with ECL Article 71, Title 36. All reports associated with the Site can be viewed by contacting the NYSDEC or its successor agency managing environmental issues in New York State.

This SMP was prepared by Nicholas A. Andrianas, P.E., on behalf of Lebanon West Farms Associates, L.P., in accordance with the requirements in NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation, dated May 2010, and the guidelines provided by NYSDEC. This SMP addresses the means for implementing the Institutional Controls (ICs) and Engineering Controls (ECs) that are required by the Environmental Easement for the site.

1.1.2 Purpose

The Site contains contamination left after completion of the remedial action. Engineering Controls have been incorporated into the Site remedy to control exposure to remaining contamination during the use of the Site to ensure protection of public health and the environment. An Environmental Easement granted to the NYSDEC, and recorded with the Office of the City Register, will require compliance with this SMP and all ECs and ICs placed on the Site. The ICs place restrictions on Site use, and mandate operation, maintenance, monitoring and reporting measures for all ECs and ICs. This SMP specifies the methods necessary ensure compliance with all ECs and ICs required by the Environmental Easement for contamination that remains at the Site. This plan has been approved by the NYSDEC, and compliance with this plan is required by the grantor of the Environmental Easement and the grantor's successors and assigns. This SMP may only be revised with the approval of the NYSDEC.

This SMP provides a detailed description of all procedures required to manage remaining contamination at the Site after completion of the Remedial Action, including: (1) implementation and management of all Engineering and Institutional Controls; (2) media monitoring; (3) operation and maintenance of all treatment, collection, containment, or recovery systems; (4) performance of periodic inspections, certification of results, and submittal of Periodic Review Reports; and (5) defining criteria for termination of treatment system operations.

To address these needs, this SMP includes three plans: (1) an Engineering and Institutional Control Plan for implementation and management of EC/ICs; (2) a Monitoring Plan for implementation of Site Monitoring; (3) an Operation and Maintenance Plan for implementation of remedial collection, containment, treatment, and recovery systems (including, where appropriate, preparation of an Operation and Maintenance Manual for complex systems).

This plan also includes a description of Periodic Review Reports for the periodic submittal of data, information, recommendations, and certifications to NYSDEC.

It is important to note that:

- This SMP details the site-specific implementation procedures that are required by the Environmental Easement. Failure to properly implement the SMP is a violation of the environmental easement, which is grounds for revocation of the Certificate of Completion (COC);

- Failure to comply with this SMP is also a violation of Environmental Conservation Law, 6NYCRR Part 375 and the BCA (Index # C203060-10-11; Site #C203060) for the Site, and thereby subject to applicable penalties.

1.1.3 Revisions

Revisions to this plan will be proposed in writing to the NYSDEC's project manager. In accordance with the Environmental Easement for the Site, the NYSDEC will provide a notice of any approved changes to the SMP, and append these notices to the SMP that is retained in its files.

1.2 SITE BACKGROUND

1.2.1 Site Location and Description

The Site is located in New York City, County of the Bronx, New York and is identified as Block: 4007; Lot: 15 and Block: 3909; Lot: 8 on the Bronx County Tax Map. The Site is an approximately 0.7808-acre area bounded by Lebanon Street to the north, East 178th Street to the south, a tire repair shop, vacant lots, residential and commercial buildings to the east, and vacant lots, and residential and commercial buildings to the west. The boundaries of the Site are more fully described in Appendix C – Metes and Bounds.

1.2.2 Site History

Historical records indicate that the Site was vacant in the 1800s and early 1900s. In 1908, part of the Site was developed with a dwelling. By 1918, the Site was developed with a structure and the New York Westchester and Boston Railway. The New York Westchester & Boston Railway was an interurban system that operated from 1912 to 1937. From 1928 to 1977, the Site was developed with the Westchester and Boston Railway, a structure, an office, automobile garages, shops, and a manufacturing office. In 1982, the Site was developed with the New York Westchester and Boston Railway, a vacant office, commercial buildings, a store, and automobile garages. From 1983 to 1996, the Site was developed with an automobile garage and the New York Westchester and Boston Railway. In 2003, the railroad tracks from the Railway were removed by the MTA, although portions of the steel infrastructure remained on the northern property line of the northern parcel and concrete piers remain throughout the Site.

1.2.3 Geologic Conditions

Based upon the Geology and Engineering Geology of the New York Metropolitan Area, Field Trip Guidebook T361, July 20 – 25, 1989, edited by Charles A. Baskerville for the 28th International Geologic Congress (Ref. 4), the Site is located in bedrock belonging to the Ordovician-Cambrian Inwood Marble Formation consisting of dolomite marble, calcschist, and grades to underlying patchy Lowerre Quartzite of early Cambrian age. Surficial geologic materials are characterized as ground moraine and/or urban fill consisting of sand, silt, clay and gravel. According to Site-specific geological data obtained during this RI, the upper five feet of the Site contains unconsolidated fill materials. Geologic sections are shown in Figures 2a and 2b.

According to recent survey measurements, the Site elevation ranges from 20 to 22 feet above mean sea level based on the Borough of the Bronx Datum (BBD). The on-site topography is relatively flat with a minimal slope towards the south. The uppermost groundwater surface occurs at 11.38 to 13.40 feet above mean sea level (BBD) within the unconsolidated materials. Based upon site-specific groundwater elevation data, groundwater flows in a south westerly direction. Underlying groundwater in this area of the South Bronx is not used for potable supply purposes. As such, no potable groundwater resources appear to be threatened by local groundwater quality. A groundwater table contour map is shown in Figure 3.

1.3 SUMMARY OF REMEDIAL INVESTIGATION FINDINGS

A Remedial Investigation (RI) was conducted at the Site in February and March 2011. The RI was completed as a further characterization of the Site based upon the results already reported from a Phase II Environmental Site Assessment (ESA) dated February 2009 conducted by ERM. The Phase II ESA included a Ground Penetrating Radar (GPR) survey, which identified a 15 feet by 2 feet metal anomaly along East Tremont Avenue on the southern portion of the Site. In addition, 11 soil and four groundwater samples were obtained from borings drilled across the Site. Soil samples were collected from the

zero to three feet and nine to 11 feet below grade intervals and groundwater samples were collected from interface, 12 to 16 feet below grade. The data developed by ERM were used as a point of departure for the RI to expand upon the available information. The Scope of Work of the RI included:

- Utility Clearance;
- Soil Vapor Sampling and Analysis;
- Soil Sampling and Analysis;
- Monitoring Well Installation, Surveying, Sampling and Analysis; and,
- Report Preparation.

Based on the analytical results obtained during the RI conducted in 2011 as well as the analytical data presented in the Phase II ESA dated February 2009, the RI concluded the following:

- The contaminants of concern at the Site include VOCs, SVOCs, pesticides, and metals.

- The subsurface soil encountered generally consisted of organic matter at the surface followed by dark brown medium grained sand with some brick, wood, and concrete, which was in turn underlain by clay and silt.

- The Ground Penetrating Survey (GPR) conducted in 2009 identified a 15 feet by two feet metal subsurface anomaly along East Tremont Avenue on the southern lot. This anomaly was not identified during excavation activities during the redevelopment of the site.

- Twenty-one soil samples were collected from the Site. The PAHs benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene; the pesticides dieldrin, 4,4'-DDD, 4,4'-DDE, and

4,4'-DDT; and, the metals arsenic, barium, cadmium, trivalent and hexavalent chromium, copper, lead, mercury, nickel, and zinc were detected above 6 NYCRR Part 375 Unrestricted Use SCOs (Track 1). The same SVOCs and the metals barium and lead were also detected above the Part 375 Restricted Residential SCOs. VOCs and the PCB Aroclor 1260 were detected below 6 NYCRR Part 375 Unrestricted Use SCOs. The SVOC, pesticides, and metals detected above the Track 1 SCOs are attributed to oil and/or emissions related to the Site's historic auto and railway usage. Pre-remediation soil contaminants are illustrated on Figure 4.

- The shallow groundwater table was encountered from approximately elevation 11 to 13 feet above mean sea level (BBD). The direction of shallow groundwater flow based upon static water levels collected from the network of five newly installed monitoring wells (MW-1 through MW-5) is toward the southwest.

- The petroleum-related compound MTBE was detected above the NYSDEC TOGS class GA standard/guidance value in the groundwater sample collected from MW-1. In addition, the chlorinated solvents cis-1,2-Dichloroethene, and trichloroethene and tetrachloroethene were detected above their NYSDEC TOGS class GA standard/guidance value in the sample collected from MW-1 and MW-2, respectively. The presence of tetrachloroethene and its degradation products is attributed to the Site's historic auto and railway usage as tetrachloroethene was commonly used as a degreaser in the automobile and railway industries. As the Site was most recently used as maintenance and storage for the MTA, the detection of MTBE may be related to the presence of MTA vehicles on–site. Pre-remediation groundwater contaminants are illustrated on Figure 5.

- The dissolved metal manganese was detected above the NYSDEC TOGS class GA standard/guidance value in the samples obtained from wells MW-1, MW-3, and MW-5. Sodium was detected above the NYSDEC TOGS class GA standard/guidance value in all samples obtained. These metals are naturally occurring and are not believed to be related to a discrete spill or release.

- No SVOCs, pesticides, or PCBs were detected in the samples collected from the groundwater monitoring wells.

- Eight temporary soil vapor points (SVP-1 through SVP-8) were installed at the Site. Due to poor air volume recovery, only four of the eight samples were analyzed. The VOCs acetone, benzene, carbon disulfide, chloromethane, cyclohexane, dichlorodifluoromethane, ethanol, ethyl acetate, heptane, hexane, isopropyl alcohol, methylene chloride, methyl ethyl ketone, propylene, 2,2,4-trimethylpentane, tertiary butyl alcohol, tetrachloroethylene, tetrahydrofuran, toluene, trichloroethylene, m,p-Xylene, and total xylenes were detected in the soil vapor throughout the Site. The higher detections were found on the northern lot and the lower detections were found on the southern lot. The detections of VOCs in the soil vapor are related to off-gassing from the presence of VOCs in the soil and groundwater related to the Site's historic auto and railway usage. Pre-remediation soil vapor contaminants are illustrated on Figure 6.

1.4 SUMMARY OF REMEDIAL ACTIONS

The Site was remediated in accordance with the NYSDEC-approved Remedial Action Work Plan dated March 2012.

The following is a summary of the Remedial Actions performed at the Site:

1. Excavation of soil/fill exceeding Track 4 Site Specific Soil Cleanup Objectives (SSSCOs), plus additional soil as needed to install the foundation for the new buildings proposed for the Site. The SSSCOs for the Site are listed in Table 1.

2. Screening for indications of contamination (by visual means, odor, and monitoring with a PID) of all excavated soil during any intrusive Site work.

3. Appropriate off-site disposal of all material removed from the Site in accordance with all Federal, State and local rules and regulations for handling, transport, and disposal. A waste disposal facility was selected based on the data that was collected during the RI as well as from additional soil waste characterization samples that were analyzed as needed to obtain an approval for soil disposal.

4. Collection and analysis of end-point samples in accordance with DER-10 to evaluate the performance of the remedy with respect to attainment of SSSCOs.

5. In-Situ Chemical Oxidation (ISCO) was used to treat chlorinated volatile organic compounds identified in groundwater at the Site.

6. Import of all materials to be used for fill were in compliance with (1) the soil cleanup objectives outlined in 6 NYCRR Part 375-6.7(d); and (2) all Federal, State and local rules and regulations for handling and transport of material.

7. Construction of an engineered composite cover consisting of: (1) a minimum two-foot clean fill buffer with demarcation barrier in all landscaped and non-covered areas; and (2) concrete building foundations, sidewalks/pathways, and asphalt covered parking areas to prevent human exposure to residual contaminated soil remaining under the Site.

8. A waterproofing membrane/vapor barrier and a sub-slab depressurization system (SSDS) were incorporated into the foundation of the three buildings as illustrated on Figure 10. The waterproofing membrane/vapor barrier specifications and SSDS as-built drawings and specifications are enclosed as Appendix D.

9. Collection and analysis of post-remedial groundwater samples to evaluate the performance of the remedy. Post-remedial groundwater monitoring well locations are illustrated on Figure 12.

10. Recording of an Environmental Easement, including ICs, to prevent future exposure to any residual contamination remaining at the Site. A copy of the Environmental Easement is included as Appendix B.

11. Development and implementation of a Site Management Plan for long term management of remaining contamination as required by the Environmental Easement, which includes plans for: (1) Institutional and Engineering Controls, (2) monitoring, (3) operation and maintenance and (4) reporting;

Remedial activities were completed at the Site in July 2014.

1.4.1 Removal of Contaminated Materials from the Site

The removal of materials from the Site included: 1) the demolition of concrete piers; 2) the excavation and removal of subsurface soils; and, 3) excavation and removal of construction and demolition debris. The full extent of excavation is illustrated on Figure 7.

1.4.1.1 Soil Cleanup Objectives

The remedy selected for this Site included a Track 4 cleanup with SSSCOs and implementation of certain IC/ECs. Although some endpoint samples exceeded the Track 4 SSSCOs, the top two feet of all exposed soil meets the SCOs, as required for a Track 4 cleanup. An endpoint sample location map is provided as Figure 9. A list of the SSSCOs for the primary contaminants of concern (COCs) and applicable land use for this Site is provided in Table 1.

1.4.1.2 Removal Quantities

During the remedial action, a total of 10,984.47 tons of soil were removed from the Site. A total of 4,141.22 tons of soil were disposed of at the Clean Earth of Carteret facility in Carteret, NJ; 935.35 tons of soil/fill were disposed of at the Teterboro Landing Development Project in Teterboro, NJ; and, 5,907.90 tons of soil were disposed of at the Soil Safe Facility in Logan Township, NJ. A summary of soil disposal (including disposal dates) is enclosed as Table 2. The volume of construction and demolition debris removed from the Site during demolition/excavation was 2,325 cubic yards. The construction and demolition debris was disposed of at Tilcon New York, Inc. of Bronx, NY.

1.4.1.3 Location of Materials Removed

To comply with the Track 4 SSSCOs, the excavation of soil site-wide to 2, 5 or 10 feet below grade was required. A figure showing areas where excavation was performed as well as the final excavation depths is shown in Figure 7. Tables 3 through 7 include the analytical results from the endpoint soil sampling.

1.4.2 Site-Related Treatment Systems

1.4.2.1 In-Situ Chemical Oxidation

Based upon the detection and distribution of groundwater contaminants, treatment including in-situ chemical oxidation and natural attenuation was performed in the northern portion of the Site. From June 29 through July 6, 2012 Regenox™ (ISCO treatment) was injected into the shallow groundwater. The locations of the injections are illustrated on Figure 8. ISCO injection was performed at injection points IP-1 through IP-18 from a depth of nineteen feet up to nine feet below grade; at a dosage rate of 160-pounds of Regenox™ per point and a water/chemical ratio of one to one.

1.4.2.2 Sub-Slab Depressurization System (SSDS)

To prevent infiltration of vapor from residual VOCs dissolved in groundwater into the new buildings' interior, installation of an SSDS was included in the construction of the new buildings' foundation. The SSDS passively maintains a vacuum underneath the slab while allowing the vapors below the concrete slab to vent outdoors without intruding into the building. The SSDS consists of horizontal trenches filled with perforated pipe. The horizontal pipes are connected to vertical risers that are connected to six-inch headers that extend above the roof of the building. Based on the findings from the post-remedial sub-slab vapor sampling (Table 8) it was determined acceptable by the NYSDEC and NYSDOH that the SSDS remain passive. All pipe penetrations through the waterproofing membrane/vapor barrier were sealed in accordance with the

manufacturer's recommendations. The SSD layout, vent, roof, and trench detail are illustrated on Figure 10. The as-built drawings and specifications for the SSDSs as well as the documentation of the approval to have a passive system are included in Appendix D.

1.4.3 Remaining Contamination

To comply with the SSSCOs, soil was excavated down to depths required for the foundations of the buildings. After completion of soil excavation activities, the top of the residual contaminated zone was surveyed. The elevation of the residual contaminated zone is illustrated on Figure 11. The residual contamination zone beneath the building's foundation was covered with a physical demarcation barrier/layer consisting of a Stego™ 15-mil vapor barrier. The vapor barrier was laid at the final excavation depth, beneath all of the building slabs. This demarcation layer constitutes the top of the 'Residuals Management Zone', the zone that requires adherence to special conditions for disturbance of contaminated residual soils defined in this SMP. Included within this zone are the utilities for the new building as well as the piping and gravel that were installed as part of the SSDS. Exposure to residual contaminated soils will be prevented by the composite cover system.. This composite cover system is comprised of (1) a two-foot clean fill buffer in all landscaped areas. The two-foot thick cover consists of clean soil/sand underlain by the demarcation barrier (orange snow fence) to demarcate the cover soil from the residual soil. Clean soil meets the soil cleanup objectives outlined in 6 NYCRR Part 375-6.7(d); and, (2) impermeable areas (concrete building foundations (slab/walls), aphalt parking lot, and sidewalks/pathways) to prevent human exposure to residual contaminated soil remaining under the Site. The waterproofing membrane/vapor barrier and the composite cover system are shown on Figure 13.

Soil excavation endpoint samples were collected from the final excavation depths. The analytical results from the samples illustrated that the remaining contamination consists of the polyaromatic hydrocarbons benzo(a)anthracene, benzo(k)fluoranthene, benzo(a)pyrene, benzo(b)fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene, the pesticides 4,4'-DDE, 4,4'-DDT, Dieldrin, and 4,4'-DDD, and the metals arsenic, barium, chromium, copper, lead, nickel, zinc and mercury in limited areas throughout the Site at levels above Track 1 UUSCOs.

Tables 3 through 7 summarize the results of all soil samples remaining at the Site that exceed Track 1 (unrestricted) SCOs after completion of the Remedial Action. Tables 3 through 7 also summarize the results of all soil samples that meet the SCOs for unrestricted use of the Site. It is noted that the SVOCs data summarized on Table 4 details compounds benzo(a)pyrene and dibenzo(a,h)anthracene, contain concentrations in select end-points above the SSSCOs. Additionally, the metals data summarized on Table 7 details compounds arsenic, barium, and copper contain concentrations in select end-points above the SSSCOs. It is important to note, that for a Track 4 remedy, the SSSCOs must be achieved in the top two feet of exposed surface soils. SVOCs and metals remaining in the soil do not represent contaminant source material. End-point sample locations are illustrated on Figure 9.

2.0 ENGINEERING AND INSTITUTIONAL CONTROL PLAN

2.1 INTRODUCTION

2.1.1 General

Since remaining contaminated soil and groundwater/soil vapor exists beneath the Site, Engineering Controls and Institutional Controls (EC/ICs) are required to protect human health and the environment. This Engineering and Institutional Control Plan describes the procedures for the implementation and management of all EC/ICs at the Site. The EC/IC Plan is one component of the SMP and is subject to revision by NYSDEC.

2.1.2 Purpose

This plan provides:

- A description of all EC/ICs on the Site;
- The basic implementation and intended role of each EC/IC;
- A description of the key components of the ICs set forth in the Environmental Easement;
- A description of the features to be evaluated during each required inspection and periodic review;
- A description of plans and procedures to be followed for implementation of EC/ICs, such as the implementation of the Excavation Work Plan for the proper handling of remaining contamination that may be disturbed during maintenance or redevelopment work on the site; and
- Any other provisions necessary to identify or establish methods for implementing the EC/ICs required by the site remedy, as determined by the NYSDEC.

2.2 ENGINEERING CONTROLS

2.2.1 Engineering Control Systems

2.2.1.1 Composite Cover System

Exposure to remaining contamination in soil at the Site is prevented by a composite cover system placed over the Site. This cover system is comprised of a minimum of 24 inches of clean soil with demarcation barrier in all landscaped and non-covered areas, asphalt parking areas, concrete-covered sidewalks/pathways, and concrete building slabs/walls. The Excavation Work Plan that appears in Appendix A outlines the procedures required to be implemented in the event the cover system is breached, penetrated or temporarily removed, and any underlying remaining contamination is disturbed. Procedures for the inspection and maintenance of this cover are provided in the Monitoring Plan included in Section 4 of this SMP.

2.2.1.2 In-Situ Chemical Oxidation

Based upon the detection and distribution of groundwater contaminants, treatment including in-situ chemical oxidation and monitored natural attenuation was performed in the northern portion of the Site. From June 29 through July 6, 2012 Regenox™(ISCO treatment) was injected into the shallow groundwater.. The locations of the injections are illustrated on Figure 8. ISCO injection was performed at injection points IP-1 through IP-18 from a depth of nineteen feet up to nine feet below grade; at a dosage rate of 160-pounds of Regenox™ per point and a water/chemical ratio of one to one.

This treatment constitutes a one-time injection via temporary injection points utilizing direct-push drilling. As such, no system operation or maintenance is required. Groundwater monitoring activities to assess the effectiveness of the ISCO injections will continue, as determined by the NYSDEC, until residual groundwater concentrations are

found to be consistently below NYSDEC standards or have become asymptotic at an acceptable level over an extended period. System monitoring will include annual groundwater monitoring utilizing newly-installed monitoring wells. The first round of post remedial monitoring was performed in July 2014 and results are summarized on Table 14. Procedures for the maintenance of the monitoring well network and the annual monitoring are outlined in the Monitoring Plan (Section 3 of this SMP).

2.2.1.3 Sub-slab Depressurization (SSD) System

Based on the results of the sub-slab vapor sampling, a passive SSDS was installed at the Site for additional protection in preventing the off-gassing of any residual VOCs in the groundwater. The SSDS passively maintains a vacuum underneath the slab while allowing the vapors below the concrete slab to vent outdoors without intruding into the building. The SSDS consists of horizontal trenches with perforated pipe, a filter sock, and gravel. The horizontal pipes are connected to vertical risers that connect to a header, which extends above the roof of the building. Any pipe penetrations through the waterproofing membrane/vapor barrier were sealed in accordance with the manufacturer's recommendations. The SSD layout, vent, roof, and trench detail is illustrated on Figure 10. The as-built drawings and specifications for the SSDS are included in Appendix D.

Procedures for operating and maintaining the SSDS are documented in the Operation and Maintenance Plan (Section 4 of this SMP). Procedures for monitoring the system are included in the Monitoring Plan (Section 3 of this SMP). The Monitoring Plan also addresses severe condition inspections in the event that a severe condition, which may affect controls at the site, occurs.

2.2.2 Criteria for Completion of Remediation/Termination of Remedial Systems

Generally, remedial processes are considered completed when effectiveness monitoring indicates that the remedy has achieved the remedial action objectives identified by the decision document. The framework for determining when remedial processes are complete is provided in Section 6.6 of NYSDEC DER-10.

2.2.2.1 Composite Cover System

The composite cover system is a permanent control and the quality and integrity of this system will be inspected at defined, regular intervals in perpetuity.

2.2.2.2 Sub-slab Depressurization System (SSDS)

Based on the results of the post-remedial sub-slab vapor sampling, written approval was granted by the NYSDEC to have a passive SSDS at the site as opposed to an active SSDS which was originally proposed in the approved RAWP. However, an additional round of soil vapor sampling will be performed.

2.2.2.3 In-Situ Chemical Oxidation/Monitored Natural Attenuation

GROUNDWATER MONITORING ACTIVITIES TO ASSESS THE EFFECTIVENESS OF THE ISCO INJECTIONS WILL CONTINUE, AS DETERMINED BY THE NYSDEC, UNTIL RESIDUAL GROUNDWATER CONCENTRATIONS ARE FOUND TO BE CONSISTENTLY BELOW NYSDEC STANDARDS OR HAVE BECOME ASYMPTOTIC AT AN ACCEPTABLE LEVEL OVER AN EXTENDED PERIOD. MONITORING WILL CONTINUE UNTIL PERMISSION TO DISCONTINUE IS GRANTED IN WRITING BY THE NYSDEC. IF CONDITIONS WARRANT, ADDITIONAL TREATMENT WILL BE COMPLETED. IF GROUNDWATER CONTAMINANT LEVELS BECOME ASYMPTOTIC AT A LEVEL THAT IS NOT ACCEPTABLE TO THE NYSDEC,

ADDITIONAL SOURCE REMOVAL, TREATMENT AND/OR CONTROL MEASURES WILL BE EVALUATED. 2.3 INSTITUTIONAL CONTROLS

A series of Institutional Controls is required by the Decision Document to: (1) implement, maintain and monitor Engineering Control systems; (2) prevent future exposure to remaining contamination by controlling disturbances of the subsurface contamination; and, (3) limit the use and development of the Site to restricted residential, commercial and/or industrial uses only. Adherence to these Institutional Controls on the Site is required by the Environmental Easement and will be implemented under this Site Management Plan.

These Institutional Controls are:

- Compliance with the Environmental Easement and this SMP by the Grantor and the Grantor's successors and assigns;
- All Engineering Controls must be operated and maintained as specified in this SMP;
- All Engineering Controls on the Controlled Property must be inspected at a frequency and in a manner defined in the SMP.
- Groundwater and other environmental or public health monitoring must be performed as defined in this SMP;
- Data and information pertinent to Site Management of the Controlled Property must be reported at the frequency and in a manner defined in this SMP;

Institutional Controls identified in the Environmental Easement may not be discontinued without an amendment to or extinguishment of the Environmental Easement.

The Site has a series of Institutional Controls in the form of site restrictions. Adherence to these Institutional Controls is required by the Environmental Easement. Site restrictions that apply to the Controlled Property are:

- The property may only be used for restricted residential, commercial, and/or industrial uses provided that the long-term Engineering and Institutional Controls included in this SMP are employed;
- The property may not be used for a higher level of use, such as unrestricted use without additional remediation and amendment of the Environmental Easement, as approved by the NYSDEC;
- All future activities on the property that will disturb remaining contaminated material must be conducted in accordance with this SMP;
- The use of the groundwater underlying the property is prohibited without treatment rendering it safe for intended use;
- Vegetable gardens and farming on the property are prohibited (this does not include raised bed gardens with imported clean soil or green roofs);
- The Site owner or remedial party will submit to NYSDEC a written statement that certifies, under penalty of perjury, that: (1) controls employed at the Controlled Property are unchanged from the previous certification or that any changes to the controls were approved by the NYSDEC; and, (2) nothing has occurred that impairs the ability of the controls to protect public health and environment or that constitute a violation or failure to comply with the SMP. NYSDEC retains the right to access such Controlled Property at any time in order to evaluate the continued maintenance of any and all controls. This certification shall be submitted annually, or an alternate period of time that NYSDEC may allow and will be made by an expert that the NYSDEC finds acceptable.

2.3.1 Excavation Work Plan

The Site has been remediated for restricted residential use. Any future intrusive work that will penetrate the composite cover system, or encounter or disturb the remaining contamination, including any modifications or repairs to the existing cover system will be performed in compliance with the Excavation Work Plan (EWP) that is attached as Appendix A to this SMP. Any work conducted pursuant to the EWP must also be

conducted in accordance with the procedures defined in a Health and Safety Plan (HASP) and Community Air Monitoring Plan (CAMP) prepared for the Site (see Appendix E). A sample HASP is attached as Appendix E to this SMP that is in current compliance with DER-10, and 29 CFR 1910, 29 CFR 1926, and all other applicable Federal, State and local regulations. Based on future changes to State and federal health and safety requirements, and specific methods employed by future contractors, the HASP and CAMP will be updated and re-submitted with the notification provided in Section A-1 of the EWP. Any intrusive construction work will be performed in compliance with the EWP, HASP and CAMP, and will be included in the periodic inspection and certification reports submitted under the Site Management Reporting Plan (See Section 5).

The Site owner and associated parties preparing the remedial documents submitted to the State, and parties performing this work, are completely responsible for the safe performance of all intrusive work, the structural integrity of excavations, proper disposal of excavation de-water, control of runoff from open excavations into remaining contamination, and for structures that may be affected by excavations (such as building foundations and bridge footings). The Site owner will ensure that Site development activities will not interfere with, or otherwise impair or compromise, the engineering controls described in this SMP.

2.4 INSPECTIONS AND NOTIFICATIONS

2.4.1 Inspections

Inspections of all remedial components installed at the Site will be conducted at the frequency specified in the SMP Monitoring Plan schedule. A comprehensive site-wide inspection will be conducted annually, regardless of the frequency of the Periodic Review Report. The inspections will determine and document the following:

- Whether Engineering Controls continue to perform as designed;
- If these controls continue to be protective of human health and the environment;

- Compliance with requirements of this SMP and the Environmental Easement;
- Achievement of remedial performance criteria;
- Sampling and analysis of appropriate media during monitoring events;
- If Site records are complete and up to date; and,
- Changes, or needed changes, to the remedial or monitoring system;

Inspections will be conducted in accordance with the procedures set forth in the Monitoring Plan of this SMP (Section 3). The reporting requirements are outlined in the Periodic Review Reporting section of this plan (Section 5).

If an emergency, such as a natural disaster or an unforeseen failure of any of the ECs occurs, an inspection of the Site will be conducted within 5 days of the event to verify the effectiveness of the EC/ICs implemented at the Site by a qualified environmental professional as determined by NYSDEC.

2.4.2 Notifications

Notifications will be submitted by the property owner to the NYSDEC as needed for the following reasons:

- 60-day advance notice of any proposed changes in Site use that are required under the terms of the BCA, 6NYCRR Part 375, and/or Environmental Conservation Law.
- 7-day advance notice of any proposed ground-intrusive activities pursuant to the Excavation Work Plan.
- Notice within 24-hours of any damage or defect to the foundations structures that reduces or has the potential to reduce the effectiveness of other Engineering Controls and likewise any action to be taken to mitigate the damage or defect.
- Verbal notice by noon of the following day of any emergency, such as a fire, flood, or earthquake that reduces or has the potential to reduce the effectiveness of Engineering Controls in place at the Site, with written confirmation within 7 days

that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.

- Follow-up status reports on actions taken to respond to any emergency event requiring ongoing responsive action shall be submitted to the NYSDEC within 45 days and shall describe and document actions taken to restore the effectiveness of the ECs.

Any change in the ownership of the Site or the responsibility for implementing this SMP will include the following notifications:

- At least 60 days prior to the change, the NYSDEC will be notified in writing of the proposed change. This will include a certification that the prospective purchaser has been provided with a copy of the BCA, and all approved work plans and reports, including this SMP.
- Within 15 days after the transfer of all or part of the Site, the new owner's name, contact representative, and contact information will be confirmed in writing.

2.5 CONTINGENCY PLAN

Emergencies may include injury to personnel, fire or explosion, environmental release, or serious weather conditions.

2.5.1 Emergency Telephone Numbers

In the event of any environmentally related situation or unplanned occurrence requiring assistance the Owner or Owner's representative(s) should contact the appropriate party from the contact list below. For emergencies, appropriate emergency response personnel should be contacted. Prompt contact should also be made to CA RICH. These emergency contact lists must be maintained in an easily accessible location at the Site.

Table 2: Emergency Contact Numbers

Medical, Fire, and Police:	911
One Call Center:	**(800) 272-4480** **(3 day notice required for utility markout)**
Poison Control Center:	(800) 222-1222
Pollution Toxic Chemical Oil Spills:	(800) 424-8802
NYSDEC Spills Hotline	(800) 457-7362
CA RICH CONSULTANTS, INC.	(516) 576-8844
Lebanon West Farms Associates, L.P.	(646) 388-8216
Remedial Engineer (Nicholas A. Andrianas, P.E.)	(631)-269-2680
NYSDEC Project Manager (Dana Kaplan)	(718)-482-7541.

* Note: Contact numbers subject to change and should be updated as necessary

2.5.2 Map and Directions to Nearest Health Facility

Site Location: 1160 Lebanon Street, Bronx, New York

Nearest Hospital Name: East Tremont Medical Center

Hospital Location: 930 East Tremont Avenue, Bronx, NY 10460

Hospital Telephone: (718) 860-1111

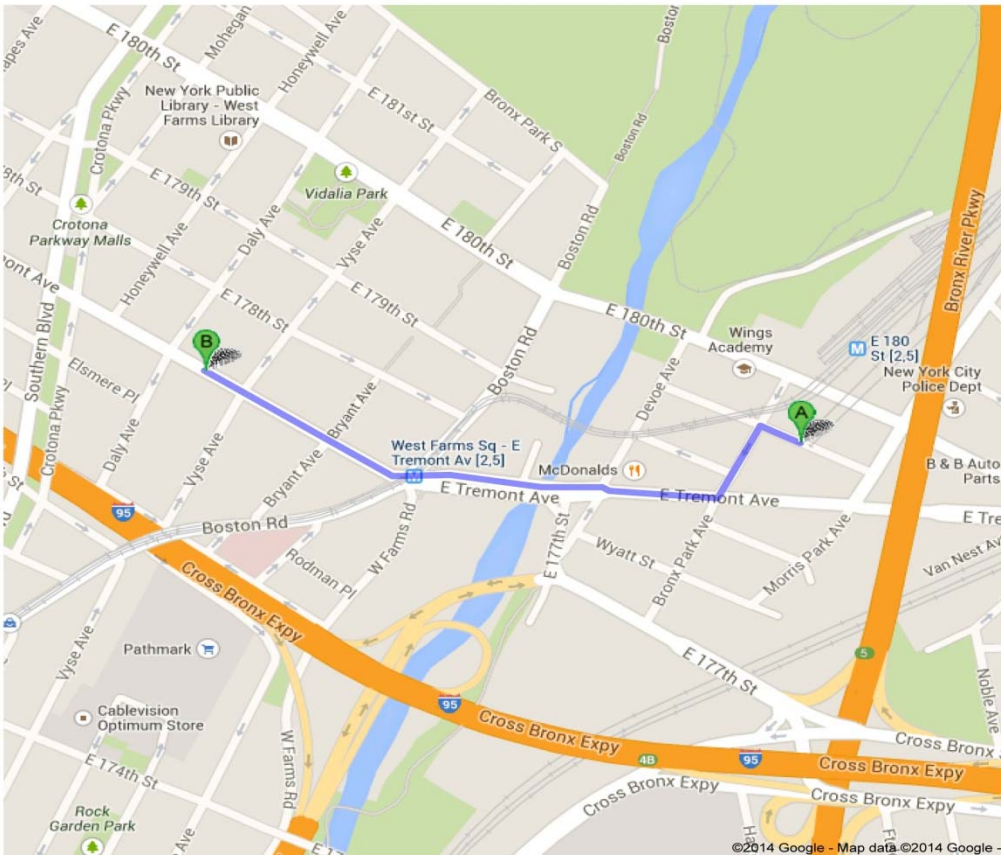
Directions to the Hospital:

1. Head northwest on Lebanon St toward Bronx Park Ave
2. Take the 1st left onto Bronx Park Ave
3. Take the 2nd right onto E Tremont Ave

Total Distance: 0.5 miles

Total Estimated Time: 2 minutes

Map Showing Route from the Site to the Hospital:



2.5.3 Response Procedures

As appropriate, the fire department and other emergency response group will be notified immediately by telephone of the emergency. The emergency telephone number list is found at the beginning of this Contingency Plan (Table 2). The list will also be posted prominently at the Site and made readily available to all personnel at all times.

2.5.3.1 Procedures for spills

If visual inspection and/or soil screening identify evidence of a petroleum release, either from equipment inside the new building or petroleum encountered during future excavation/construction activities, the owner and Remedial Engineer will be contacted, and all work activities will be halted until further instructions are received from the Remedial Engineer. The spill will be reported to the NYSDEC Spill Hotline (1-800-457-7362) within two hours of discovery.

2.5.3.2 Evacuation plans

- In case of a fire, employees/contractors/residents should activate the nearest fire alarm box and/or make a telephone call to the local Fire Department via 911. The locations of the fire alarm boxes are noted on the evacuation floor plans in the new building.
- It may be necessary to activate additional fire alarm boxes, or shout the alarm, if people are still in the building and the alarm has stopped sounding, or if the alarm does not sound. This can be done while exiting.
- Persons discovering a fire, smoky condition, or explosion should pull the fire alarm box. Any pertinent fire or rescue information should be conveyed to the Fire Department. All emergency telephone numbers are listed in Section 2.5.1.
- When the fire alarm sounds, all personnel should ensure that nearby personnel are aware of the emergency, quickly shutdown operating equipment, close doors and exit the building using stairwells.

- All occupants should exit the building.
- All occupants and workers should know where primary and alternate exits are located, and be familiar with the various evacuation routes available. Floor plans with escape routes, alternate escape routes, and exit locations should be posted in the building.
- Building occupants must NOT use elevators as an escape route in the event of a fire.
- To report all other emergencies and injuries, a call should be placed to 911. State you name, your location, and the nature of the call. Speak slowly and clearly. Wait for the dispatcher to hang up first. On occasion the dispatcher may need additional information or may provide you with additional instructions.
- Small fires can be extinguished only if you are trained to use a fire extinguisher. However, an immediate readiness to evacuate is essential.
- All fires, even those that have been extinguished, must be reported to the property owner immediately.
- Do not enter a room that is smoke filled.
- Do not enter a room if the door is warm to touch.

2.5.3.3 Procedures for Breach of Composite Cover System

The following procedures will be required if breaching of the composite cover system is needed or occurs or is discovered during a monitoring/inspection event in accordance with Section 3.2. If site excavation activities are planned the "Excavation Work Plan" applies (Appendix A). It is noted that no planned breach beneath any on-site building will be allowed that damages the SSDS piping. The map of the PE-certified as-built drawings for the SSDS (Appendix D) must be consulted prior to disturbance of the slab to avoid digging in pipe locations. If work must be done below the cover system, people should be directed to the Excavation Work Plan. Emergency procedures should only be followed in the case of an accident.

- The NYSDEC and NYSDOH will be notified of the request, and approval will need to be granted prior to the planned breach. If an unplanned breach occurs, the above agencies will be notified within 24 hours of the discovery of the occurrence.
- A written plan detailing the proposed repair or replacement activities will be submitted for review. A Site Plan indicating the area of the breach will be included in the plan.
- Once approval is received, the NYSDEC and NYSDOH will be notified at least five days prior to plan implementation to afford the ability to be on-site during the repair/replacement activities.
- If a breach should occur, grout injection will be performed, where applicable, to eliminate water infiltrations, fill voids, and repair any cracks of the waterproofing membrane/vapor barrier. It is noted that no planned breach will be allowed that damages the SSDS piping. The map of the piping layout (Figure 10 and Appendix D) must be consulted to avoid digging in pipe locations. The basic steps for this type of crack repair are:

    1. Clean the area to be injected; remove any delaminated concrete, dust, dirt, etc. in and around the crack;
    2. Drill holes for injection packers at an angle to intersect the crack; the spacing for the holes is determined by a NYS-licensed P.E. based on the size and severity of the crack(s);
    3. Install and tighten packers;
    4. Flush crack with water; in the event that there is water seeping through the crack, this step shall not be necessary;
    5. Inject the chemical grout beginning at the bottom; continue along the crack from one end to the other; and,
    6. Remove the injection packers, patch the holes, remove any excess surface grout and clean the equipment.

- If a breach of an area greater than 12 inches in diameter is requested, the concrete foundation in the area will be saw cut, removed, and disposed of properly as construction and demolition debris. The concrete area to be saw cut will be greater than the area of waterproofing membrane/vapor barrier to be breached. Upon completion of the subsurface activities, the waterproofing membrane/vapor barrier will be installed according to the manufacturer's product specifications with the waterproofing membrane/vapor barrier overlapping the original barrier appropriately. The ends of the barrier will be sealed as per the manufacturer's product specifications to ensure a vapor proof seal. It is noted that no planned breach will be allowed that damages the SSDS piping. The map of the piping layout (Figure 10) must be consulted to avoid digging in pipe locations.

- As all soil was removed above the level of the waterproofing membrane/vapor barrier, there will not be any soil to be removed or managed due to a breach. However, if work is to be done beneath the demarcation layer (vapor barrier) the Excavation Work Plan must be followed.

- All repairs to Composite Cover System breaches must be inspected and certified by a Professional Engineer licensed in NY State.

3.0 SITE MONITORING PLAN

3.1 INTRODUCTION

3.1.1 General

The Monitoring Plan describes the measures for evaluating the performance and effectiveness of the remedy to reduce or mitigate contamination at the Site, the composite cover system, and all affected site media identified below. Monitoring of other Engineering Controls is described in Chapter 4, Operation, Monitoring and Maintenance Plan. This Monitoring Plan may only be revised with the approval of NYSDEC.

3.1.2 Purpose and Schedule

This Monitoring Plan describes the methods to be used for:

- Sampling and analysis of all appropriate media (e.g., groundwater, indoor air, soil vapor, soils);
- Assessing compliance with applicable NYSDEC standards, criteria and guidance, particularly ambient groundwater standards and Part 375 SCOs for soil;
- Assessing achievement of the remedial performance criteria.
- Evaluating Site information periodically to confirm that the remedy continues to be effective in protecting public health and the environment; and,
- Preparing the necessary reports for the various monitoring activities.

To adequately address these issues, this Monitoring Plan provides information on:

- Sampling locations, protocol, and frequency;
- Information on all designed monitoring systems (e.g., well logs);
- Analytical sampling program requirements;
- Reporting requirements;

- Quality Assurance/Quality Control (QA/QC) requirements;
- Inspection and maintenance requirements for monitoring wells;
- Monitoring well decommissioning procedures; and,
- Annual inspection and periodic certification.

Monitoring of the performance of the remedy and overall reduction in contamination on-site will be conducted annually.. The frequency thereafter will be determined by NYSDEC. Trends in contaminant levels in groundwater in the affected areas, will be evaluated to determine if the remedy continues to be effective in achieving remedial goals. Monitoring programs are summarized in Table 3 and outlined in detail in Sections 3.2 and 3.3 below.

Table 3: Monitoring/Inspection Schedule

Monitoring Program	Frequency*	Event	Matrix	Analysis	Termination Criteria
Groundwater Monitoring and Sampling	Annual.	Monitoring and Sampling	Ground water	VOCs via EPA Method 8260	See Section 2.2.2.3
Composite Cover System	Annual. First inspection no more than 18 months after COC	Inspection	Visual	None	See Section 2.2.2.1
Passive SSDS	Annual. First inspection no more than 18 months after COC	Inspection	Visual	None	See Section 2.2.2.2
Soil Vapor	Single event or as determined necessary	Sampling	Soil Vapor	VOCs via TO-15	In consultation with NYSDEC and NYSDOH

* The frequency of events will be conducted as specified until otherwise approved by NYSDEC and NYSDOH

3.2 COMPOSITE COVER SYSTEM MONITORING

Exposure to residual contaminated soils is being prevented by an engineered, composite cover system that was built on the Site. The composite cover system is shown on Figure 13.

The composite cover system will remain intact 24-hours a day, seven days a week, for 365 days a year. Breaching of the demarcation barrier underneath the clean fill buffer, concrete sidewalks, foundation walls and slabs or waterproofing membrane/vapor barrier is prohibited by the Environmental Easement. In the unlikely event of an unanticipated accidental or requested breach, the procedure for response to breach of the composite cover system is outlined in Section 2.5.3.3. If work must be done below the cover system, then the Excavation Work Plan applies to the planned activities. Emergency procedures should only be followed in the case of an accident.

Monitoring of the composite cover system will occur on an annual basis as long as the Environmental Easement is in effect to ensure the system's integrity. Monitoring will consist of inspection and certification by a NYS-licensed P.E. or a QEP as per sections 1.5 and 6.3 of NYSDEC DER-10, which shall evaluate the structural integrity of the concrete floor, support columns into the floor and the wall joints. If any cracks or openings are identified, they shall be screened for organic vapors with a field PID and any readings shall be noted. In addition, any cracks or openings in the floor shall then be sealed. The results of the inspection will be included in the Periodic Review Report. In addition, the composite cover system must be inspected and certified any time a breach in the system occurs. The inspection frequency is subject to change with the approval of the NYSDEC. Unscheduled inspections and/or sampling may take place when a suspected failure of the composite cover system has been reported or an emergency occurs that is deemed likely to affect the operation of the system.

3.3 MEDIA MONITORING PROGRAM

3.3.1 Groundwater Monitoring

Groundwater monitoring will be performed on a periodic basis to assess the performance of the remedy. The network of monitoring wells has been installed to monitor both up-gradient and down-gradient groundwater conditions at the Site. The network of on-site wells has been designed based on the results of the RI.

MW-2 was installed at the Site as part of the Remedial Investigation in February 2011. The remaining newly installed monitoring wells, MW-6, MW-7, and MW-8 were installed at the Site in July 2013 and July 2014 and will serve as the groundwater monitoring wells for the post-remedial groundwater monitoring (see Figure 12 for well locations). Monitoring well construction logs are included in Appendix F. Groundwater samples will be collected from the wells using the low-flow sampling methodology as specified in the QAPP (Appendix G), submitted to an Environmental Laboratory Approval Program (ELAP) Certified Laboratory, and analyzed for TCL VOCs via EPA Method 8260 with NYSDEC ASP Category B deliverables. Additional ISCO parameters including dissolved oxygen (DO) and oxidation/reduction potential (ORP) will be monitored in the field during sampling.

All wells will be sampled on an annual basis. The monitoring will continue, as determined by NYSDOH and NYSDEC, until residual groundwater concentrations are found to be below NYSDEC standards or have become asymptotic over an extended period. Sampling will continue on an annual basis until such time as NYSDEC approves the proposed revised sampling schedule. QA/QC samples will be collected and analyzed in connection with the testing as set forth in the Quality Assurance Project Plan (QAPP) (Appendix G) and will include one trip blank, one field blank, one duplicate, one matrix spike, and one matrix spike duplicate. In addition, the data will be validated by a qualified third-party and a Data Usability Summary Report (DUSR) will be prepared and submitted with each PRR. All data will be submitted in the NYSDEC-approved

Electronic Data Deliverable (EDD) format. The sampling frequency may be modified with the approval NYSDEC. The SMP will be modified to reflect changes in sampling plans approved by NYSDEC. Deliverables for the groundwater monitoring program are specified below.

3.3.1.1 Sampling Protocol

All monitoring well sampling activities will be recorded in a field book and a groundwater-sampling log presented in Appendix H. Other observations (e.g., well integrity, etc.) will be noted on the well sampling log. The well sampling log will serve as the inspection form for the groundwater monitoring well network.

First, depth-to-water and depth-to-bottom measurements will be collected from the monitoring wells. Purging/sampling will be performed in accordance with EPA's Low-Flow (minimal drawdown) Groundwater Sampling Procedures[1] (see the QAPP in Appendix G). Purging and sampling will be performed using a low-flow sampling pump at a pumping rate no greater than 0.5 liters per min (LPM). Water levels within the well will be monitored using an electronic water level indicator and a pumping rate will be maintained to limit drawdown to less than 0.33 feet if possible. In-line water quality field parameters will be measured at a frequency no less than every five minutes. Purging will continue until the readings of pH, temperature, conductivity, ORP, and DO have stabilized (i.e. three successive readings within approximately 0.1 for pH, 3% for conductivity, 10mv for ORP, and 10% for DO). Purge water will be contained in 55-gallon drums and disposed of in accordance with applicable regulations.

After purging is complete, a sample of the groundwater will be collected at the established low-flow pumping rate directly from the pump discharge into laboratory-issued containers by a QEP. The samples will be placed in a cooler on ice and sent to an ELAP certified laboratory via overnight delivery for analysis as specified in Section

[1] EPA Region 1. Low Stress (low flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells. January 2010.

3.3.1, above. The following samples will also be collected for QA/QC purposes: trip blank, field blank, duplicate sample, matrix spike, and matrix spike duplicate.

A qualified third-party Data Validator will review the groundwater laboratory data and prepare a DUSR. All data will be provided in the NYSDEC-approved EDD format.

3.3.1.2 Sampling QA/QC

All on-site sampling equipment will be decontaminated between each use in the following manner: laboratory grade detergent and fresh water wash using scrub brush, followed by two fresh water rinses and final air dry. The submersible pump used for groundwater sample collection will be decontaminated between sample collection by passing the detergent and water mixture through the pump, followed by two fresh water rinses. Gloves worn for sample handling will be discarded between sample collections. Dedicated, new polyethylene tubing will be used at each well location for purging and sampling. Samples will be packaged in 40-mil vials supplied by the laboratory by QEPs and stored on ice pending same day or overnight shipment to a NYS-certified laboratory. The vials will be filled completely and checked to ensure no air bubbles are present. Additional field and laboratory QA/QC protocol is included in the QAPP (Appendix G).

3.3.1.3 Monitoring Well Repairs, Replacement and Decommissioning

If biofouling or silt accumulation occurs in the on-site and off-site monitoring wells, the wells will be physically agitated/surged and redeveloped. Additionally, monitoring wells will be properly decommissioned and replaced (as per the Monitoring Plan), if an event renders the wells unusable. Repairs and/or replacement of wells in the monitoring well network will be performed based on assessments of structural integrity and overall performance.

The NYSDEC will be notified prior to any repair or decommissioning of monitoring wells for the purpose of replacement, and the repair or decommissioning and replacement

process will be documented in the subsequent periodic report. Well decommissioning without replacement will be done only with the prior approval of NYSDEC. Well abandonment will be performed in accordance with NYSDEC's "Groundwater Monitoring Well Decommissioning Procedures". Monitoring wells that are decommissioned because they have been rendered unusable will be reinstalled in the nearest available location, unless otherwise approved by the NYSDEC.

3.3.2 Soil Vapor Sampling Protocol and QA/QC

Sampling of the nine permanent sub-slab vapor sampling points will be performed approximately one year from the initial sampling that was performed in May 2014. The points were installed just beneath the bottom of the concrete building slab.

The soil vapor points will be sampled in accordance with New York State Department of Health's (NYSDOH) prevailing Guidance for Evaluating Soil Vapor Intrusion in the State of New York dated October 2006. In addition, the soil vapor samples will be chemically analyzed using the procedures and protocols described in the Sampling, Sample Preparation, and Analysis Requirements of EPA Compendium Method T0-15. A three-way "T" connector valve assembly will be connected to a vacuum pump and a pre-cleaned six-liter SUMMA® air sampling canister. Prior to collecting the soil vapor samples, the sample tubing will be purged using a vacuum pump set at a rate of approximately 0.2 liters per minute. A helium tracer gas will be used to enrich the atmosphere around the sampling location. The tracer gas verifies that interior ambient air is not inadvertently drawn down into the soil vapor sample. Both the purge volume from the sampling tube and the helium-enriched air within the container will be screened for the tracer gas using a Gowmac® Model 21-250 gas leak detector.

Following the purging and tracer gas verification steps, the soil vapor samples will be collected using the SUMMA® canister set to fill at a rate of not more than 0.2 liters per minute with an approximate fill time of 24-hours. The samples will analyzed

for VOCs using USEPA Method T0-15 by a NYS-certified laboratory. One field duplicate will also be collected for QA/QC purposes.

3.4 SITE-WIDE INSPECTION

Site-wide inspections will be performed on a regular schedule at a minimum of once a year. Site-wide inspections will also be performed after all severe weather conditions that may affect Engineering Controls or monitoring devices. During these inspections, an inspection form will be completed (Appendix I). The form will compile sufficient information to assess the following:

- Compliance with all ICs, including Site usage;
- An evaluation of the condition and continued effectiveness of ECs;
- General Site conditions at the time of the inspection;
- The Site management activities being conducted including, where appropriate, confirmation sampling and a health and safety inspection;
- Compliance with permits and schedules included in the Operation and Maintenance Plan; and,
- Confirm that site records are up to date.

3.5 MONITORING QUALITY ASSURANCE/QUALITY CONTROL

All sampling and analyses will be performed in accordance with the requirements of the Quality Assurance Project Plan (QAPP) prepared for the Site (Appendix G). Main Components of the QAPP include:

- QA/QC Objectives for Data Measurement;
- Sampling Program:
    - Sample containers will be properly washed, decontaminated, and appropriate preservative will be added (if applicable) prior to their use by

the analytical laboratory. Containers with preservative will be tagged as such.

- Sample holding times will be in accordance with the NYSDEC ASP requirements.
- Field QC samples (e.g., trip blanks, coded field duplicates, and matrix spike/matrix spike duplicates) will be collected as necessary.

- Sample Tracking and Custody;
- Calibration Procedures:
  - All field analytical equipment will be calibrated immediately prior to each day's use. Calibration procedures will conform to manufacturer's standard instructions.
  - The laboratory will follow all calibration procedures and schedules as specified in USEPA SW-846 and subsequent updates that apply to the instruments used for the analytical methods.

Analytical Procedures;

- Preparation of a Data Usability Summary Report (DUSR), which will present the results of data validation, including a summary assessment of laboratory data packages, sample preservation and chain of custody procedures, and a summary assessment of precision, accuracy, representativeness, comparability, and completeness for each analytical method.
- Internal QC and Checks;
- QA Performance and System Audits;
- Preventative Maintenance Procedures and Schedules;
- Corrective Action Measures.

3.6 MONITORING REPORTING REQUIREMENTS

Forms and any other information generated during regular monitoring events and inspections will be kept on file on-site. All forms, and other relevant reporting formats used during the monitoring/inspection events, will be (1) subject to approval by NYSDEC and (2) submitted at the time of the Periodic Review Report, as specified in the Reporting Plan of this SMP.

All monitoring results will be reported to NYSDEC on a periodic basis in the Periodic Review Report. A letter report will also be prepared and submitted within 15 days of receipt of validated data after each sampling event. The report will include, at a minimum:

- Date of event;
- Personnel conducting sampling;
- Description of the activities performed;
- Type of samples collected (e.g., sub-slab vapor, indoor air, outdoor air, etc);
- Copies of all field forms completed (e.g., well sampling logs, chain-of-custody documentation, etc.);
- Sampling results in comparison to appropriate standards/criteria;
- A figure illustrating sample type and sampling locations;
- Copies of all laboratory data sheets and the required laboratory data deliverables required for all points sampled (to be submitted electronically in the NYSDEC-identified format);
- Any observations, conclusions, or recommendations; and,
- A determination as to whether groundwater conditions have changed since the last reporting event.

Data will be reported in hard copy or digital format as determined by NYSDEC. A summary of the monitoring program deliverables are summarized in Table 4 below.

Table 4: Schedule of Monitoring/Inspection Reports

Task	Reporting Frequency*

Periodic Review Report	Annually beginning 18 months after receipt of COC until termination of Environmental Easement or termination of requirement by NYSDEC
Groundwater Sampling Report	Annually, following each groundwater sampling event.

* The frequency of events will be conducted as specified until otherwise approved by NYSDEC

4.0 OPERATION AND MAINTENANCE PLAN

4.1 INTRODUCTION

This Operation and Maintenance Plan describes the measures necessary to operate, monitor and maintain the mechanical components of the remedy selected for the Site. This Operation and Maintenance Plan:

- Includes the steps necessary to allow individuals unfamiliar with the Site to operate and maintain the SSDS;
- Includes an operation and maintenance contingency plan; and,
- Will be updated periodically to reflect changes in Site conditions or the manner in which the SSDS are operated and maintained.

Information on non-mechanical Engineering Controls (i.e., composite cover system) is provided in Section 3 - Engineering and Institutional Control Plan. A copy of this Operation and Maintenance Plan, along with the complete SMP, will be kept at the Site and will be located in the on-site maintenance room and/or the building management's office. This Operation and Maintenance Plan is not to be used as a stand-alone document, but as a component document of the SMP.

4.2 ENGINEERING CONTROL SYSTEM OPERATION AND MAINTENANCE

4.2.1 Sub-Slab Depressurization System

4.2.1.1 Scope

As an additional measure to prevent vapor-phase VOCs remaining in groundwater from entering the new building's interior, installation of an SSDS was included in the construction of the new buildings' foundation. The sub-slab piping for the SSDS was installed from April through July 2013.

The SSDS passively maintains a vacuum underneath the slab while allowing the vapors below the concrete slab to vent outdoors without intruding into the building. The SSDS consists of horizontal trenches filled with perforated pipe. The horizontal pipes are connected to vertical risers that are connected to four-inch headers that extend above the roof of the building. Based on the findings from the post-remedial sub-slab vapor sampling (Table 8) it was determined by the NYSDEC and NYSDOH that the SSDS may remain passive. As-built drawings for the SSDS are illustrated on Figures 10a, 10b, and 10c.

4.2.1.2 System Start-Up and Testing

As the SSDS is passive there will be no system start up or testing.

4.2.1.3 System Operation: Routine Operation Procedures

The SSDS will be monitored in accordance with Table 3 by a QEP or Professional Engineer. Monitoring of the SSDS will consist of a visual inspection of the complete system to identify and repair leaks (if any). In addition, the building floor will be inspected for wear-related cracks or pitting and repaired as needed.

4.2.1.4 System Operation: Routine Equipment Maintenance

As the SSDS is passive there is no manufacturers' required maintenance. However, any maintenance will be performed during the inspection/monitoring event as shown in the schedule on Table 3.

4.2.1.5 System Operation: Non-Routine Equipment Maintenance

Any non-routine equipment maintenance shall be performed in accordance with the equipment's owner's manual.

4.2.2 In-Situ Chemical Oxidation and Groundwater Monitoring Wells

4.2.2.1 Scope

Based upon the detection and distribution of groundwater contaminants, treatment including in-situ chemical oxidation and natural attenuation was performed in the northern portion of the Site. From June 29 through July 6, 2012 Regenox™ (ISCO treatment) was injected into the shallow groundwater.. The objective of this injection was to directly oxidize the residual organic chemicals within the shallow groundwater underlying the Site. The location of the injections is illustrated on Figure 8.

This treatment constituted a one-time injection via temporary injection points utilizing direct-push drilling. As such, no system operation or maintenance is required. However, after Regenox™ was injected into the overburden, groundwater monitoring occurred after the initial injection, 24-hours later, and weekly for the first month. Monitoring consisted of obtaining field readings for pH, Dissolved Oxygen (DO), Oxidation/Reduction Potential (ORP), temperature, and conductivity from the downgradient monitoring wells. Procedures for the maintenance of the monitoring well network and the annual monitoring are outlined in the Monitoring Plan (Section 3 of this SMP).

4.2.2.2 System Start-Up and Testing

As the in-situ-chemical oxidation is not a mechanical system, no start-up testing was required.

4.2.2.3 System Operation: Routine Operation Procedures

As the in-situ-chemical oxidation is not a mechanical system, there are no routine operating procedure requirements**.**

4.2.2.4 System Operation: Routine Equipment Maintenance

As there are no mechanical components of the in-situ-chemical oxidation – periodic maintenance is not warranted.

4.2.2.5 System Operation: Non-Routine Equipment Maintenance

As the in-situ-chemical oxidation is not a mechanical system, there are no equipment maintenance requirements. In the event the initial chemical oxidation injection does not reduce the concentrations of VOCs in the overburden water in the on-site wells to or close to the NYSDEC TOGS groundwater standards or guidance values for class GA after one year of post remedial monitoring, a contingent remedy will be developed.

This treatment constitutes a one-time injection via temporary injection points utilizing direct-push drilling. As such, no system operation or maintenance is required. Groundwater monitoring activities to assess the effectiveness of the ISCO injections will continue, as determined by the NYSDEC, until residual groundwater concentrations are found to be consistently below NYSDEC standards or have become asymptotic at an acceptable level over an extended period. System monitoring will include annual groundwater monitoring utilizing four newly-installed monitoring wells. The first round

of post remedial monitoring was performed in July 2014 and results are summarized on Table 14 and shown on Figure 12. See Figure 5 and Tables 9-13 for baseline results

4.3 ENGINEERING CONTROL SYSTEM PERFORMANCE MONITORING

4.3.1 SSDS Monitoring

A SSDS has been installed to mitigate possible soil vapor intrusion into occupied buildings.

4.3.1.1 Monitoring Schedule

The operations and maintenance schedule for the SSDS has been established and is included in Table 3. The inspection frequency is subject to change with the approval of the NYSDEC. Monitoring deliverables for the SSDS are specified in Sections 4.4, 5.1, and 5.3 of this Plan.

4.3.1.2 General Equipment Monitoring

A visual inspection of the complete system will be conducted during the monitoring event. SSDS components to be monitored include the general above-ground system piping, where accessible.

4.3.2 In-Situ Chemical Oxidation Monitoring

Based upon the detection and distribution of groundwater contaminants, groundwater treatment including in-situ chemical oxidation was conducted at the Site. In-situ chemical oxidation monitoring included the collection and analysis of groundwater samples from the newly-installed network of four groundwater monitoring wells. The location of the wells is illustrated on Figure 12 and well construction details and boring logs are included in Appendix F.

4.3.2.1 Monitoring Schedule

System monitoring will include annual groundwater monitoring. Future monitoring frequency will be submitted for approval in the first Periodic Review Report. The inspection frequency is subject to change with the approval of the NYSDEC. Unscheduled inspections and/or sampling may take place when a suspected failure of the monitoring well network has been reported. Monitoring deliverables for the monitoring well network are specified in Sections 4.4 , 5.1 and 5.3 of this Plan.

4.3.2.2 General Equipment Monitoring

A visual inspection of the monitoring well network will be conducted during each monitoring event. Procedures for the maintenance of the monitoring well network and the annual monitoring are outlined in the Monitoring Plan (Section 3 of this SMP).

4.3.2.3 Sampling Event Protocol

Prior to sampling, a depth-to-water and depth to bottom measurements will be taken and recorded using a clean electronic water-level measurement device. Purging/sampling will be performed in accordance with EPA's Low-Flow (minimal drawdown) Groundwater Sampling Procedures. Purging and sampling will be performed using a low-flow sampling pump at a pumping rate no greater than 0.5 liters per min (LPM). Water levels

within the well will be monitored using an electronic water level indicator and a pumping rate will be maintained to limit drawdown to less than 0.33 feet if possible. In-line water quality field parameters will be measured at a frequency no less than every five minutes. Purging will continue until the readings of pH, temperature, conductivity, ORP, and DO have stabilized (i.e. three successive readings within approximately 0.1 for pH, 3% for conductivity, 10mv for ORP, and 10% for DO). Purge water will be contained in 55-gallon drums and disposed of in accordance with applicable regulations.

After purging is complete, a sample of the groundwater will be collected at the established low-flow pumping rate directly from the pump discharge into laboratory-issued containers by a QEP. The samples will be placed in a cooler on ice and sent to an ELAP and CLP certified laboratory via overnight delivery for analysis as specified in Section 3.3.1, above. The following samples will also be collected for QA/QC purposes: trip blank, field blank, duplicate sample, matrix spike, and matrix spike duplicate.

A qualified third-party Data Validator will review the groundwater laboratory data and prepare a DUSR.

4.3.3 System Monitoring Devices and Alarms

As the SSDS is passive there will be no monitoring devices or alarms incorporated into the system.

4.4 MAINTENANCE AND PERFORMANCE MONITORING REPORTING REQUIREMENTS

Maintenance reports and any other information generated during regular operations at the Site will be kept on-file on-site. All reports, forms, and other relevant information generated will be available upon request to the NYSDEC and submitted as part of the Periodic Review Report, as specified in Section 5 of this SMP.

4.4.1 Routine Maintenance Reports

Checklists or forms (see Appendix I) will be completed during each routine maintenance event. Checklists/forms will include, but not be limited to the following information:

- Date;
- Name, company, and position of person(s) conducting maintenance activities;
- Maintenance activities conducted;
- Any modifications to the system;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet); and,
- Other documentation such as copies of invoices for maintenance work, receipts for replacement equipment, etc., (attached to the checklist/form).

4.4.2 Non-Routine Maintenance Reports

During each non-routine maintenance event, a form will be completed which will include, but not be limited to, the following information:

- Date;
- Name, company, and position of person(s) conducting non-routine maintenance/repair activities;
- Presence of leaks;
- Date of leak repair;
- Other repairs or adjustments made to the system;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents (included either on the form or on an attached sheet); and,
- Other documentation such as copies of invoices for repair work, receipts for replacement equipment, etc. (attached to the checklist/form).

5.0 INSPECTIONS, REPORTING AND CERTIFICATIONS

5.1 SITE INSPECTIONS

5.1.1 Inspection Frequency

All inspections will be conducted at the frequency specified in the schedules provided in Section 3 Monitoring Plan and Section 4 Operation and Maintenance Plan of this SMP. At a minimum, a site-wide inspection will be conducted annually. Inspections of remedial components will also be conducted when a breakdown of any treatment system component has occurred or whenever a severe condition has taken place, such as an erosion or flooding event that may affect the ECs.

5.1.2 Inspection Forms, Sampling Data, and Maintenance Reports

All inspections and monitoring events will be recorded on the appropriate forms for their respective system. Additionally, a general site-wide inspection form will be completed during the site-wide inspection (see Appendix I). These forms are subject to NYSDEC revision.

All applicable inspection forms and other records, including all media sampling data and system maintenance reports, generated for the Site during the reporting period will be provided in electronic format in the Periodic Review Report.

5.1.3 Evaluation of Records and Reporting

The results of the inspection and Site monitoring data will be evaluated as part of the EC/IC certification to confirm that the:

- EC/ICs are in place, are performing properly, and remain effective;
- The Monitoring Plan is being implemented;
- Operation and maintenance activities are being conducted properly; and, based on the above items,
- The Site remedy continues to be protective of public health and the environment and is performing as designed in the RAWP and FER.

5.2 CERTIFICATION OF ENGINEERING AND INSTITUTIONAL CONTROLS

After the last inspection of the reporting period, a Professional Engineer licensed to practice in New York State or a QEP as per sections 1.5 and 6.3 of NYSDEC DER-10 will prepare the following certification:

For each institutional or engineering control identified for the Site, I certify that all of the following statements are true:

- The inspection of the Site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under my direction;
- The institutional control and/or engineering control employed at this Site is unchanged from the date the control was put in place, or last approved by the Department;
- Nothing has occurred that would impair the ability of the control to protect the public health and environment;
- Nothing has occurred that would constitute a violation or failure to comply with any site management plan for this control;
- Access to the Site will continue to be provided to the Department to evaluate the remedy, including access to evaluate the continued maintenance of this control;
- If a financial assurance mechanism is required under the oversight document for the Site, the mechanism remains valid and sufficient for the intended purpose under the document;
- Use of the Site is compliant with the environmental easement;
- The engineering control systems are performing as designed and are effective;
- To the best of my knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program and generally accepted engineering practices; and,
- The information presented in this report is accurate and complete.
- I certify that all information and statements in this certification form are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law. I, [name], of [business address], am certifying as Owner's Designated Site Representative: I have been authorized and designated by all site owners to sign this certification for the Site.

- No new information has come to my attention, including groundwater monitoring data from wells located at the site boundary, if any, to indicate that the assumptions made in the qualitative exposure assessment of off-site contamination are no longer valid; and

Every five years the following certification will be added:

- The assumptions made in the qualitative exposure assessment remain valid.

The signed certification will be included in the Periodic Review Report described below.

5.3 PERIODIC REVIEW REPORT

A Periodic Review Report will be submitted to the Department every year, beginning eighteen months after the Certificate of Completion is issued. In the event that the Site is subdivided into separate parcels with different ownership, a single Periodic Review Report will be prepared that addresses the site described in Appendix C (Metes and Bounds). The report will be prepared in accordance with NYSDEC DER-10 and submitted within 45 days of the end of each certification period. Media sampling results will also incorporated into the Periodic Review Report. The report will include:

- Identification, assessment and certification of all ECs/ICs required by the remedy for the site;
- Results of the required annual Site inspections and severe condition inspections, if applicable;
- All applicable inspection forms and other records generated for the Site during the reporting period in electronic format;
- A summary of any discharge monitoring data and/or information generated during the reporting period with comments and conclusions;
- Data summary tables and graphical representations of contaminants of concern by media (groundwater, soil vapor), which include a listing of all compounds

analyzed, along with the applicable standards, with all exceedances highlighted. These will include a presentation of past data as part of an evaluation of contaminant concentration trends;

- Results of all analyses, copies of all laboratory data sheets, and the required laboratory data deliverables for all samples collected during the reporting period will be submitted electronically in a NYSDEC-approved format;
- A Site evaluation, which includes the following:
    - The compliance of the remedy with the requirements of the site-specific RAWP, ROD or Decision Document;
    - The operation and the effectiveness of all treatment units, etc., including identification of any needed repairs or modifications;
    - Any new conclusions or observations regarding Site contamination based on inspections or data generated by the Monitoring Plan for the media being monitored;
    - Recommendations regarding any necessary changes to the remedy and/or Monitoring Plan; and ,
    - The overall performance and effectiveness of the remedy.

The Periodic Review Report will be submitted, in hard-copy format, to the NYSDEC Regional Office in which the Site is located, and in electronic format to NYSDEC Regional Office and the NYSDOH Bureau of Environmental Exposure Investigation.

5.4 CORRECTIVE MEASURES PLAN

If any component of the remedy is found to have failed, or if the periodic certification cannot be provided due to the failure of an institutional or engineering control, a corrective measures plan will be submitted to the NYSDEC for approval. This plan will explain the failure and provide the details and schedule for performing work necessary to correct the failure. Unless an emergency condition exists, no work will be performed pursuant to the corrective measures plan until it is approved by the NYSDEC.