

**972-976 Leggett Avenue
BRONX, NEW YORK**

Remedial Action Work Plan

**NYC VCP Project Number 16CVCP073X
OER Project Number 16TEMP082X**

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LIST OF ACRONYMS

Acronym	Definition
AOC	Area of Concern
AS/SVE	Air Sparging/Soil Vapor Extraction
BOA	Brownfield Opportunity Area
CAMP	Community Air Monitoring Plan
C&D	Construction and Demolition
CEQR	City Environmental Quality Review
CFR	Code of Federal Regulations
CHASP	Construction Health and Safety Plan
COC	Certificate of Completion
CQAP	Construction Quality Assurance Plan
CSOP	Contractors Site Operation Plan
DCR	Declaration of Covenants and Restrictions
ECs/ICs	Engineering Controls and Institutional Controls
ELAP	Environmental Laboratory Accreditation Program
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations Emergency Response
IRM	Interim Remedial Measure
MNA	Monitored Natural Attenuation
NOC	Notice of Completion
NYS DEC	New York State Department of Environmental Conservation
NYC DEP	New York City Department of Environmental Protection
NYC DOHMH	New York State Department of Health and Mental Hygiene
NYC OER	New York City Office of Environmental Remediation
NYC VCP	New York City Voluntary Cleanup Program
NYCRR	New York Codes Rules and Regulations
NYS DEC	New York State Department of Environmental Conservation
NYS DEC DER	New York State Department of Environmental Conservation Division of Environmental Remediation
NYS DOH	New York State Department of Health

NYS DOT	New York State Department of Transportation
ORC	Oxygen-Release Compound
OSHA	United States Occupational Health and Safety Administration
PCBs	Polychlorinated Biphenyls
PE	Professional Engineer
PID	Photo Ionization Detector
QEP	Qualified Environmental Professional
QHHEA	Qualitative Human Health Exposure Assessment
RAOs	Remedial Action Objectives
RAR	Remedial Action Report
RAWP	Remedial Action Work Plan or Plan
RCA	Recycled Concrete Aggregate
RD	Remedial Design
RI	Remedial Investigation
RMZ	Residual Management Zone
SCOs	Soil Cleanup Objectives
SCG	Standards, Criteria and Guidance
SMP	Site Management Plan
SPDES	State Pollutant Discharge Elimination System
SSDS	Sub-Slab Depressurization System
SVOC	Semi-Volatile Organic Compound
TAL	Target Analyte List
TCL	Target Compound List
USGS	United States Geological Survey
UST	Underground Storage Tank
VCA	Voluntary Cleanup Agreement
VOC	Volatile Organic Compound

CERTIFICATION

I, Jolanda Jansen, am currently a registered professional engineer licensed by the State of New York. I performed professional engineering services and had primary direct responsibility for designing the remedial program for the 972-976 Leggett Avenue, Borough of Bronx, New York site, site number 16CVCP073X. I certify to the following:

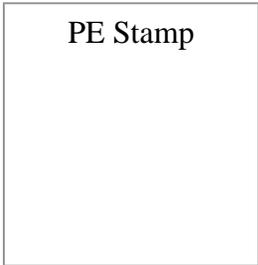
- I have reviewed this document and the Stipulation List, to which my signature and seal are affixed.
- Engineering Controls developed for this remedial action were designed by me or a person under my direct supervision and designed to achieve the goals established in this Remedial Action Work Plan for this site.
- The Engineering Controls to be constructed during this remedial action are accurately reflected in the text and drawings of the Remedial Action Work Plan and are of sufficient detail to enable proper construction.
- This Remedial Action Work Plan (RAWP) has a plan for handling, transport and disposal of soil, fill, fluids and other materials removed from the property in accordance with applicable City, State and Federal laws and regulations. Importation of all soil, fill and other material from off-Site will be in accordance with all applicable City, State and Federal laws and requirements. This RAWP has provisions to control nuisances during the remediation and all invasive work, including dust and odor suppression.

Name

PE License Number

Signature

Date



I, Paul H. Ciminello, am a qualified Environmental Professional. I will have primary direct responsibility for implementation of the remedial program for the 972-976 Leggett Avenue, Borough of Bronx site, site number 16CVCP073X. I certify to the following:

- This Remedial Action Work Plan (RAWP) has a plan for handling, transport and disposal of soil, fill, fluids and other materials removed from the property in accordance with applicable City, State and Federal laws and regulations. Importation of all soil, fill and other material from off-Site will be in accordance with all applicable City, State and Federal laws and requirements. This RAWP has provisions to control nuisances during the remediation and all invasive work, including dust and odor suppression.

QEP Name

QEP Signature

Date

EXECUTIVE SUMMARY

Preservation Development Partners is working with the NYC Office of Environmental Remediation (OER) in the New York City Voluntary Cleanup Program to investigate and remediate a 0.25-square foot site located at 972-976 Leggett Avenue, Borough of Bronx, New York. A remedial investigation (RI) was performed to compile and evaluate data and information necessary to develop this Remedial Action Work Plan (RAWP). The remedial action described in this document provides for the protection of public health and the environment consistent with the intended property use, complies with applicable environmental standards, criteria and guidance and conforms with applicable laws and regulations. NYSDEC was briefed on this project in May, June and July 2016. NYSDOH and NYC Department of Health and Mental Hygiene were briefed in July 2016.

Site Location and Background

The Site is located at 972-976 Leggett Avenue in the Longwood section in Bronx, New York and is identified as Block 2684 and Lot 68 on the New York City Tax Map. Figure 1 shows the Site location. The Site is 10,675-square feet and is bounded by Beck Street to the north, a multifamily residential building to the south, Leggett Avenue to the east, and multifamily residential buildings to the west. A map of the site boundary is shown in Figure 2. Currently, the Site contains a 5-story apartment building (with a full basement), which occupies the entire site with exception of paved alleyways to the west and south, and an open courtyard at the center of the building. The building contains forty-six residential units, and a delicatessen and active dry cleaner on the first floor.

Summary of Redevelopment Plan

The existing 5-story apartment complex (with 1st floor commercial and basement storage) will remain. Building modernization will occur. No changes are proposed for site use. The current zoning designation is R7-1, medium-density apartment house district. The existing use is consistent with existing zoning for the property.

Summary of Surrounding Property

The site and the immediate surrounding area is zoned R7, for medium-density apartment housing. Adjoining properties to the south and west contain multifamily residential buildings, adjoining properties to the north (across Beck Street) contain multifamily residential buildings with street-level commercial uses, and adjoining properties to the east (across Leggett Avenue) contain one-story commercial buildings (including an automotive repair facility). The surrounding area is generally developed multifamily housing.

Public playgrounds are located approximately 250 east (Fox Playground) and northwest (Playground 52 LII), and public schools are located approximately 250 feet to the south (PS 62) and 400 feet to the northwest (MS 302). One day care center (Homes for the Homeless) is located approximately 500 to the northeast.

Summary of Past Site Uses and Areas of Concern

A Phase I Environmental Site Assessment (ESA) for the property, issued by Ecosystems Strategies, Inc. (ESI) in February 2016, documented mixed residential and commercial use of the on-site building since initial construction in 1915. Commercial uses appear to have been limited to street-level store fronts. The property has contained a dry cleaning operation (a potential source of solvent contamination) from as early as 1956 until the present day and is a registered petroleum bulk storage facility (based on an inactive fuel-oil aboveground storage tank); no other relevant environmental issues were identified. The AOCs identified for this site include:

- Releases of chlorinated solvents from current and/or former dry cleaning operations.

Summary of Work Performed under the Remedial Investigation

1. Conducted a Site inspection to identify AOCs and physical obstructions (i.e. structures, buildings, etc.);
2. Installed thirteen soil borings across the entire project Site and eight soil borings in off-site sidewalks, and collected twenty-four soil samples for chemical analysis from the soil borings to evaluate soil quality;
3. Installed two groundwater monitoring wells in off-site sidewalks and collected two groundwater samples for chemical analysis to evaluate groundwater quality. One additional groundwater monitoring well will be installed and used to establish groundwater flow direction;

Installed six soil vapor probes across the entire project Site and one soil vapor probe in an off-site sidewalk, and collected seven samples for chemical analysis (four on-site samples were collected during the Phase II ESA);

5. Collected four indoor and one outdoor air-quality samples.

Summary of Findings of Remedial Investigation

1. Elevation of the property ranges from 51 to 49 feet.
2. Depth to groundwater is approximately 19.88 feet bsg.
3. Groundwater flow is presumed to be in a southerly direction generally from north to south beneath the Site and will be confirmed after the third groundwater well is installed.
4. Depth to bedrock is approximately 12 feet at the Site.
5. The stratigraphy of the site consists of x-x ft of [describe], underlain by bedrock. . Exterior borings encountered bedrock at 12-14 feet below surface grade, consistent with refusals in interior borings at 4-6 feet beneath the basement elevation.
6. Soil/fill sample results were compared to Title 6 New York Codes, Rules, and Regulations (NYCRR) Part 375-6.8 Unrestricted Use and Restricted Use Restricted-Residential Soil Cleanup Objectives (SCOs). Soil/fill samples results showed no VOCs or SVOCs at concentrations above the Unrestricted Use Soil Cleanup Objectives (SCOs). Only trace concentrations of PCE (max. 0.096 ppm) were found in interior soil samples collected from beneath the dry cleaner's basement slab. Pesticides and PCBs were found at concentrations above Unrestricted Use SCOs, but below Restricted Residential Use SCOs, in one sample: 4,4'-DDE (0.114 ppm), 4,4'-DDT (0.115 ppm), dieldrin (0.00624 ppm) and total PCBs (0.226 ppm). Two metals, including barium (peak value 670 ppm) and lead (peak value 631 ppm), were found at concentrations above Restricted Residential SCOs. Chromium (peak value 75.4 ppm), copper (peak value 192 ppm), nickel (peak value 70.7 ppm), selenium (peak value 6.87 ppm) and zinc (peak value 142 ppm) were found at concentrations above Unrestricted Use SCOs.
7. Groundwater samples collected during the RI showed one VOC, chloroform (peak value 37 ppb), detected above NYSDEC 6NYCRR Part 703.5 Groundwater Quality Standards (GQS). One SVOC, bis(2-ethylhexyl)phthalate (peak value 17 ppb), was found above GQS. One dissolved TAL metal, vanadium (peak dissolved value 15.9 ppb, peak total

value 38 ppb), was found above GQS. No pesticides or PCBs were detected in groundwater samples. PCE and TCE were not detected in either sample.

8. Soil vapor analytical results were compared to the Air Guideline Values (AGVs) published in the New York State Department of Health (NYSDOH) *Final Guidance for Evaluating Soil Vapor Intrusion* dated October 2006. Soil vapor samples results showed significantly elevated concentrations of PCE in samples collected beneath the basement slab directly below the active dry cleaner (peak value 160,000 $\mu\text{g}/\text{m}^3$), with less-significant, but still elevated concentrations of PCE found beneath the southern portion of the basement slab (peak value 34 $\mu\text{g}/\text{m}^3$). No PCE was detected across Beck Street near the adjoining property to the north. Elevated concentrations of TCE (peak value 45 $\mu\text{g}/\text{m}^3$) were found in the two samples with the highest PCE concentrations. Detected concentrations were above the monitoring level range established in Table 3.1 Air Guideline Values, provided in the NYS DOH Final Guidance on Soil Vapor Intrusion. Existing data indicate that PCE-contaminated soil vapor is limited to the immediate vicinity of the on-site dry cleaner and do not indicate any significant off-site contamination. Trace to elevated levels of petroleum related compounds and non-chlorinated solvents were found in multiple samples, with the highest concentrations generally found at the off-site sample collected across Beck Street, including 2-butanone (peak value 1,100 $\mu\text{g}/\text{m}^3$). Carbon Tetrachloride and 1,1,1-Trichloroethane were not detected in any of the seven soil gas samples. Indoor air samples collected during the RI showed significantly elevated concentrations of PCE (peak value 450 $\mu\text{g}/\text{m}^3$) in two samples collected in the basement in the vicinity of the dry cleaner, where soil vapor concentrations were elevated for PCE; samples collected from the southern portion of the basement were substantially lower (1.3 $\mu\text{g}/\text{m}^3$ and 11 $\mu\text{g}/\text{m}^3$).

Summary of the Remedial Action

The preferred remedy for the site is Alternative 2, Track 4 Site Specific SCOs remedy. The Alternative 2 remedy will install an Enhanced Subslab Depressurization System (e-SSDS) that will establish and maintain consistent negative pressure under the entire structure, with bias towards that portion of the building (northeast corner) where elevated PCE has been documented in subslab vapor samples. The remedy will treat emissions utilizing carbon filtration to ensure that constituents of concern are not discharged into the ambient air. Groundwater monitoring

and confirmatory indoor air quality testing will occur.

The proposed remedial action achieves protection of public health and the environment for the intended use of the property. The proposed remedial action achieves all of the remedial action objectives established for the project and addresses applicable standards, criterion, and guidance; is effective in both the short-term and long-term and reduces mobility, toxicity and volume of contaminants; is cost effective and implementable; and uses standards methods that are well established in the industry.

The proposed remedial action will consist of:

1. Preparation of a Community Protection Statement and performance of all required NYC VCP Citizen Participation activities according to an approved Citizen Participation Plan.
2. Performance of a Community Air Monitoring Program for particulates and volatile organic carbon compounds.
3. Establishment of Track 4 Site-Specific Soil Cleanup Objectives (SCOs).
4. Groundwater monitoring from two (2) existing monitoring wells, as well as installation and monitoring of one (1) additional monitoring well, to document water quality, with particular concern for concentrations of dissolved PCE and metabolites.
5. Installation of an enhanced subslab depressurization systems (e-SSDS) ((combination of Soil Vapor Extraction System (SVE) and SSDS)) that maintains adequate negative pressure under the entirety of the on-site building, biased to ensure elevated negative pressure in the northeast portion of the Site (“hot spot”). The e-SSDS will utilize carbon filtration of the emission to ensure that the constituent of concern (PCE) is not discharged at unacceptable levels into the ambient air.
6. Repairing of cellar slabs by cementing all slab foundation’s cracks/voids.
7. Installation of a flooring topcoat sealant, [choose manufacturer and provide specs], on the entire interior slab of basement areas of the building, as well as all breaches for utility inlets will be resealed with appropriate sealant [selected industry standard commercial grade 50-year rated caulking sealant].
8. Post-remediation sampling of indoor air quality in the basement portion of the building to document the effectiveness of the e-SSDS on indoor air quality. Outdoor air samples will also be obtained during indoor air monitoring events.
9. Submission of a RAR that describes the remedial activities, certifies that the remedial

requirements have been achieved, defines the Site boundaries, lists any changes from this RAWP, and describes all Engineering and Institutional Controls to be implemented at the Site.

10. Submission of an approved Site Management Plan (SMP) in the Remedial Action Plan (RAR) for long-term management of residual contamination, including plans for operation, maintenance, monitoring, inspection and certification of Engineering and Institutional Controls (e-SSDS) and reporting at a specified frequency.
11. Recording of a Declaration of Covenants and Restrictions that includes a listing of Engineering Controls and Institutional Controls and a requirement that management of these controls must be in compliance with an approved SMP. Institutional Controls will include prohibition of the following: (1) vegetable gardening and farming; (2) use of groundwater without treatment rendering it safe for the intended use; (3) disturbance of residual contaminated material unless it is conducted in accordance with the SMP; and (4) higher level of land usage without OER-approval.

COMMUNITY PROTECTION STATEMENT

The NYC Office of Environmental Remediation (OER) provides governmental oversight for the cleanup of contaminated property in NYC. This Remedial Action Work Plan (“cleanup plan”) describes the findings of prior environmental studies, shows the location of identified contamination at the site, and describes the plans to clean up the site to protect public health and the environment.

This cleanup plan provides a very high level of protection for neighboring communities and also includes many other elements that address common community concerns, such as community air monitoring, odor, dust and noise controls, hours of operation, good housekeeping and cleanliness, truck management and routing, and opportunities for community participation. The purpose of this Community Protection Statement is to explain these community protection measures in non-technical language to simplify community review.

Project Information:

- Site Address: 972-976 Leggett Avenue, Bronx, New York
- NYC Voluntary Cleanup Program Project Number: 16CVCP073X

Project Contacts:

- OER Project Manager: Isabel McRae, 212-788-8841
- Site Project Manager: Paul H. Ciminello, 845-452-1658
- Site Safety Officer: Paul H. Ciminello, 845-452-1658
- Online Document Repository:

<http://www.nyc.gov/html/oer/html/document-repository/document-repository.shtml>

Remedial Investigation and Cleanup Plan: Under the oversight of the NYC OER, a thorough study of this property (called a remedial investigation) has been performed to identify past property usage, to sample and test soils, groundwater and soil vapor, and to identify contaminant sources present on the property. The cleanup plan has been designed to address all contaminant sources that have been identified during the study of this property.

Identification of Sensitive Land Uses: Prior to selecting a cleanup, the neighborhood was evaluated to identify sensitive land uses nearby, such as schools, day care facilities, hospitals and residential areas. The cleanup program was then tailored to address the special conditions of this community.

Qualitative Human Health Exposure Assessment: An important part of the cleanup planning for the Site is a study to find all of the ways that people might come in contact with contaminants at the Site now or in the future. This study is called a Qualitative Human Health Exposure Assessment (QHHEA). A QHHEA was performed for this project. This assessment has considered all known contamination at the Site and evaluated the potential for people to come in contact with this contamination. All identified public exposures will be addressed under this cleanup plan.

Health and Safety Plan: This cleanup plan includes a Construction Health and Safety Plan (CHASP) that is designed to protect community residents and on-Site workers. The elements of this RAWP are in compliance with applicable safety requirements of the United States Occupational Safety and Health Administration (OSHA). This RAWP includes many protective elements including those discussed below.

Site Safety Coordinator: This project has a designated Site safety coordinator to implement the CHASP. The safety coordinator maintains an emergency contact sheet and protocol for management of emergencies. The Site safety coordinator is identified at the beginning of this Community Protection Statement.

Worker Training: Workers participating in cleanup of contaminated material on this project are required to be trained in a 40-hour hazardous waste operators training course and to take annual refresher training. This pertains to workers performing specific tasks including removing contaminated material and installing cleanup systems in contaminated areas.

Community Air Monitoring Plan: Community air monitoring will be performed during this cleanup project to ensure that the community is properly protected from contaminants, dust and odors. Air samples will be tested in accordance with a detailed plan called the Community

Air Monitoring Plan or CAMP. Results will be regularly reported to the NYC Office of Environmental Remediation. This cleanup plan also has a plan to address any unforeseen problems that might occur during the cleanup (called a ‘Contingency Plan’).

Odor, Dust and Noise Control: This cleanup plan includes actions for odor and dust control. These actions are designed to prevent off-Site odor and dust nuisances and includes steps to be taken if nuisances are detected. Generally, dust is managed by application of physical covers and by water sprays. Odors are controlled by limiting the area of open excavations, physical covers, spray foams and by a series of other actions (called operational measures). The project is also required to comply with applicable NYC noise control standards. If you observe problems in these areas, please contact the onsite Project Manager or NYC Office of Environmental Remediation Project Manager listed on the first page of this Community Protection Statement document.

Quality Assurance: This cleanup plan requires that evidence be provided to illustrate that all cleanup work required under the plan has been completed properly. This evidence will be summarized in the final report, called the Remedial Action Report. This report will be submitted to the NYC Office of Environmental Remediation and will be thoroughly reviewed.

Stormwater Management: To limit the potential for soil erosion and discharge, this cleanup plan has provisions for stormwater management. The main elements of the stormwater management include physical barriers such as tarp covers and erosion fencing, and a program for frequent inspection.

Hours of Operation: The hours for operation of cleanup will comply with the NYC Department of Buildings construction code requirements or according to specific variances issued by that agency. For this cleanup project, the hours of operation will conform to requirements of the NYC Department of Buildings.

Signage: While the cleanup is in progress, a placard will be prominently posted at the main entrance of the property with a laminated project Fact Sheet that states that the project is in the NYC Voluntary Cleanup Program and provides project contact names and numbers, and a link to the document repository where project documents can be viewed.

Complaint Management: The contractor performing this cleanup is required to address all complaints. If you have any complaints, you can call the facility Project Manager or the NYC Office of Environmental Remediation Project Manager listed on the first page of this Community Protection Statement document, or call 311 and mention the Site is in the NYC Voluntary Cleanup Program.

Utility Mark-outs: To promote safety during excavation in this cleanup, the contractor is required to first identify all utilities and must perform all excavation and construction work in compliance with NYC Department of Buildings regulations.

Soil and Liquid Disposal: All soil and liquid material removed from the Site as part of the cleanup will be transported and disposed of in accordance with all applicable City, State and Federal regulations, and required permits will be obtained.

Soil Chemical Testing and Screening: All excavations will be supervised by a trained and properly qualified environmental professional. In addition to extensive sampling and chemical testing of soils on the Site, excavated soil will be screened continuously using hand-held instruments, by sight, and by smell to ensure proper material handling and management, and community protection.

Stockpile Management: Soil stockpiles will be kept covered with tarps to prevent dust, odor and erosion. Stockpiles will be frequently inspected. Damaged tarp covers will be promptly replaced. Stockpiles will be protected with silt fences. Hay bales will be used, as needed, to protect storm water catch basins and other discharge points.

Trucks and Covers: Loaded trucks leaving the Site will be covered in compliance with applicable laws and regulations to prevent dust and odor. Trucks will be properly recorded in logs and records and placarded in compliance with applicable City, State and Federal laws, including those of the New York State Department of Transportation. If loads contain wet material that can leak, truck liners will be used. All transport of materials will be performed by licensed truckers and in compliance with applicable laws and regulations.

Imported Material: All fill materials proposed to be brought onto the Site will comply with rules outlined in this cleanup plan and will be inspected and approved by a qualified worker located on the Site. Waste materials will not be brought onto the Site. Trucks entering the Site with imported clean materials will be covered in compliance with applicable laws and regulations.

Equipment Decontamination: All equipment used for cleanup work will be inspected and washed, if needed, before it leaves the Site. Trucks will be cleaned at a truck inspection station on the property before leaving the Site.

Housekeeping: Locations where trucks enter or leave the Site will be inspected every day and cleaned regularly to ensure that they are free of dirt and other materials from the Site.

Truck Routing: Truck routes have been selected to: (a) limit transport through residential areas and past sensitive nearby properties; (b) maximize use of city-mapped truck routes; (c) limit total distance to major highways; (d) promote safety in entry to highways; (e) promote overall safety in trucking; and (f) minimize off-Site line-ups (queuing) of trucks entering the property. Operators of loaded trucks leaving the Site will be instructed not to stop or idle in the local neighborhood.

Final Report: The results of all cleanup work will be fully documented in a final report (called the Remedial Action Report) that will be available for public review online. A link to the online document repository and the public library with Internet access nearest the Site are listed on the first page of this Community Protection Statement document

Long-Term Site Management: If long-term protection is needed after the cleanup is complete, the property owner will be required to comply with an ongoing Site Management Plan that calls for continued inspection of protective controls, such as Site covers. The Site Management Plan is evaluated and approved by the NYC Office of Environmental Remediation. Requirements that the property owner must comply with are defined either in the property's deed or established through a city environmental designation registered with the Department of Buildings. A certification of continued protectiveness of the cleanup will be required from time to time to show that the approved cleanup is still effective.

REMEDIAL ACTION WORK PLAN

1.0 Project Background

Preservation Development Partners is working with the NYC Office of Environmental Remediation (OER) in the New York City Voluntary Cleanup Program and/or in the “E” Designation Program to investigate and remediate a property located at 972-976 Leggett Avenue in the South Bronx section of Bronx, New York (the “Site”). A Remedial Investigation (RI) was performed to compile and evaluate data and information necessary to develop this Remedial Action Work Plan (RAWP) in a manner that will render the Site protective of public health and the environment consistent with the contemplated end use. This RAWP establishes remedial action objectives, provides a remedial alternatives analysis that includes consideration of a permanent cleanup, and provides a description of the selected remedial action. The remedial action described in this document provides for the protection of public health and the environment, and complies with applicable environmental standards, criteria and guidance and applicable laws and regulations.

1.1 Site Location and Background

The Site is located at 972-976 Leggett Avenue in the Longwood section in Bronx, New York and is identified as Block 2684 and Lot 68 on the New York City Tax Map. Figure 1 shows the Site location. The Site is 10,675-square feet and is bounded by Beck Street to the north, a multifamily residential building to the south, Leggett Avenue to the east, and multifamily residential buildings to the west. A map of the site boundary is shown in Figure 2. Currently, the Site contains a 5-story apartment building (with a full basement), which occupies the entire site with exception of paved alleyways to the west and south, and an open courtyard at the center of the building. The building contains forty-six residential units, and a delicatessen and active dry cleaner on the first floor.

1.2 Redevelopment Plan

The existing 5-story apartment complex (with 1st floor commercial and basement storage) will remain. Building modernization will occur. No physical changes are proposed for site use. The current zoning designation is R7-1, medium-density apartment house district. The existing use is consistent with existing zoning for the property.

The remedial action contemplated under this RAWP may be implemented independently of the proposed redevelopment plan.

1.3 Description of Surrounding Property

The site and the immediate surrounding area is zoned R7, for medium-density apartment housing. Adjoining properties to the south and west contain multifamily residential buildings, adjoining properties to the north (across Beck Street) contain multifamily residential buildings with street-level commercial uses, and adjoining properties to the east (across Leggett Avenue) contain one-story commercial buildings (including an automotive repair facility). The surrounding area is generally developed multifamily housing.

Public playgrounds are located approximately 250 east (Fox Playground) and northwest (Playground 52 LII), and public schools are located approximately 250 feet to the south (PS 62) and 400 feet to the northwest (MS 302). One day care center (Homes for the Homeless) is located approximately 500 to the northeast.

Figure 3 shows the surrounding land usage.

1.4 Summary of Past Site Uses and Areas of Concern

A Phase I Environmental Site Assessment (ESA) for the property, issued by Ecosystems Strategies, Inc. (ESI) in February 2016, documented mixed residential and commercial use of the on-site building since initial construction in 1915. Commercial uses appear to have been limited to street-level store fronts. The property has contained a dry cleaning operation (a potential source of solvent contamination) from as early as 1956 until the present day and is a registered petroleum bulk storage facility (based on an inactive fuel-oil aboveground storage tank); no other relevant environmental issues were identified. The AOCs identified for this site include:

- Releases of chlorinated solvents from current and/or former dry cleaning operations.

1.5 Summary of Work Performed under the Remedial Investigation

1. Conducted a Site inspection to identify AOCs and physical obstructions (i.e. structures, buildings, etc.);
2. Installed thirteen soil borings across the entire project Site and eight soil borings in off-site sidewalks, and collected twenty-four soil samples for chemical analysis from the soil borings to evaluate soil quality;

3. Installed two groundwater monitoring wells in off-site sidewalks to establish groundwater flow and collected two groundwater samples for chemical analysis to evaluate groundwater quality;
4. Installed six soil vapor probes across the entire project Site and one soil vapor probe in an off-site sidewalk, and collected seven samples for chemical analysis (four on-site samples were collected during the Phase II ESA);
5. Collected four indoor and one outdoor air-quality samples.

1.6 Summary of Findings of Remedial Investigation

A remedial investigation was performed and the results are documented in a companion document called “Remedial Investigation Report, 972-976 Leggett Avenue, Bronx, New York”, dated June 2016 (RIR).

1. Elevation of the property ranges from 51 to 49 feet.
2. Depth to groundwater is approximately 19.88 feet bsg.
3. Groundwater flow is assumed to be generally from north to south beneath the Site.
4. Depth to bedrock is approximately 12 feet at the Site.
5. The stratigraphy of the site is not known as the entirety of the Site is occupied by the structure. Exterior borings encountered bedrock at 12-14 feet below surface grade, consistent with refusals in interior borings at 4-6 feet beneath the basement elevation.
6. Soil/fill samples collected during the RI showed no VOCs or SVOCs at concentrations above NYSDEC Part 375-6 Unrestricted Use (UU, Track 1) Soil Cleanup Objectives (SCOs). Only trace concentrations of PCE were found in interior soil samples. Pesticides and PCBs were found at concentrations above UU SCOs, but below Restricted Residential Use (RR, Track 2) SCOs, in one sample: 4,4'-DDE (0.114 ppm), 4,4'-DDT (0.115 ppm), dieldrin (0.00624 ppm) and total PCBs (0.226 ppm). Elevated concentrations of metals were found in five of six samples. Barium (peak value 670 ppm) and lead (peak value 631 ppm) were found at concentrations above RR SCOs. Chromium (peak value 75.4 ppm), copper (peak value 192 ppm), nickel (peak value 70.7 ppm), selenium (peak value 6.87 ppm) and zinc (peak value 142 ppm) were found at concentrations above UU SCOs.

7. Groundwater samples collected during the RI showed one VOC, chloroform (peak value 37 ppb), detected above NYSDEC 6NYCRR Part 703.5 Groundwater Quality Standards (GQS). One SVOC, bis(2-ethylhexyl)phthalate (peak value 17 ppb), was found above GQS. One dissolved TAL metal, vanadium (peak dissolved value 15.9 ppb, peak total value 38 ppb), was found above GQS. No pesticides or PCBs were found in groundwater samples.
8. Soil vapor samples collected during the RI showed significantly elevated concentrations of PCE in samples collected beneath the basement slab directly below the active dry cleaner (peak value 160,000 $\mu\text{g}/\text{m}^3$), with low-grade impacts found beneath the southern portion of the basement slab (peak value 34 $\mu\text{g}/\text{m}^3$). No PCE was detected across Beck Street near the adjoining property to the north. Elevated concentrations of TCE were found in the two samples with the highest PCE concentrations (peak value 45 $\mu\text{g}/\text{m}^3$). Detected concentrations were above the monitoring level range established in Table 3.1 Air Guideline Values, provided in the NYS DOH Final Guidance on Soil Vapor Intrusion. Existing data indicate a soil vapor “hot spot” in the immediate vicinity of the on-site dry cleaner but do not indicate any significant off-site contamination. Trace to elevated levels of petroleum related compounds and non-chlorinated solvents were found in multiple samples, with the highest concentrations generally found at the off-site sample collected across Beck Street, including 2-butanone (peak value 1,100 $\mu\text{g}/\text{m}^3$). Carbon Tetrachloride was not detected in any of the seven soil gas samples.
9. Air samples collected during the RI showed significantly elevated concentrations of PCE in two samples collected in the basement in the vicinity of the dry cleaner and the elevated soil vapor concentrations (peak value 450 $\mu\text{g}/\text{m}^3$); samples collected from the southern portion of the basement were below NYSDOH values. No other notable concentrations of VOCs were found at levels above background air concentrations.

For more detailed results, consult the RIR. Based on an evaluation of the data and information from the RIR and this RAWP, disposal of significant amounts of hazardous waste is not suspected at this site.

2.0 Remedial Action Objectives

Based on the results of the RI, the following Remedial Action Objectives (RAOs) have been identified for this Site:

Soil

- Prevent direct contact with contaminated soil.
- Prevent exposure to contaminants volatilizing from contaminated soil.

Groundwater

- Remove contaminant sources having the potential to impact to groundwater.
- Prevent direct exposure to contaminated groundwater.
- Prevent exposure to contaminants volatilizing from contaminated groundwater.

Soil Vapor

- Prevent exposure to contaminants in soil vapor.
- Prevent migration of soil vapor into dwelling and other occupied structures.

3.0 Remedial Alternatives Analysis

The goal of the remedy selection process is to select a remedy that is protective of human health and the environment taking into consideration the current, intended and reasonably anticipated future use of the property. The remedy selection process begins by establishing RAOs for media in which chemical constituents were found in exceedance of applicable standards, criteria and guidance values (SCGs). Remedial alternatives are then developed and evaluated based on the following ten criteria:

- Protection of human health and the environment;
- Compliance with SCGs;
- Short-term effectiveness and impacts;
- Long-term effectiveness and permanence;
- Reduction of toxicity, mobility, or volume of contaminated material;
- Implementability;
- Cost effectiveness;
- Community acceptance;
- Land use; and
- Sustainability.

As required, a Track 1 Unrestricted Use scenario is evaluated for the remedial action. The following is a detailed description of the alternatives analyzed to address impacted media at the Site:

Alternative 1:

- Selection of NYSDEC 6NYCRR Part 375 Unrestricted Use (Track 1) Soil Cleanup Objectives (SCOs).
- Removal of all soil/fill located beneath the on-site building exceeding Track 1 Unrestricted Use SCOs throughout the Site and confirmation that Track 1 Unrestricted Use SCOs have been achieved with post-excavation endpoint sampling. Based on the results of the Remedial Investigation, it is expected that this alternative would be achieved by removing two feet of soil from limited areas of the building; current estimate is that no more than 1,000 cubic yards of soil would need to be removed. Subsequent to removal, clean fill material would be imported and the basement floor would be reconstructed. If soil/fill containing analytes at concentrations above Unrestricted Use

SCOs is still present at the base of the excavation after removal of all soil required for construction of the new building's cellar level is complete, additional excavation would be performed to ensure complete removal of soil/ fill that does not meet Track 1 Unrestricted Use SCOs.

- No Engineering or Institutional Controls are required for a Track 1 cleanup. However, an Soil Vapor Extraction (SVE) and a Sub Slab Depressurization System (SSDS) combined as enhanced (e-SSDS) are necessary because PCE source areas are unknown and therefore the above-referenced soil removal is not expected to eliminate the need for vapor intrusion management. Installation and operation of an e-SSDS sufficient to reduce concentrations of VOCs (predominately but not exclusively PCE) in subgrade soils and concurrently eliminating infiltration of VOC vapors into the on-site structure.
- Establishment of use restrictions including prohibitions on the use of groundwater from the Site; prohibitions of restricted Site uses, such as farming or vegetable gardening, to prevent future exposure pathways; and prohibition of a higher level of land use without OER approval.

Alternative 2:

- Establishment of Site-Specific (Track 4) SCOs and no soil removal, relying on the existing slab as a cover layer.
- Installation and operation of e-SSDS sufficient to reduce concentrations of VOCs (predominately but not exclusively PCE) in subgrade soils and concurrently eliminating infiltration of VOC vapors into the on-site structure.
- Establishment of use restrictions including prohibitions on the use of groundwater from the Site; prohibitions of restricted Site uses, such as farming or vegetable gardening, to prevent future exposure pathways; and prohibition of a higher level of land use without OER approval.
- Establishment of an approved Site Management Plan (SMP) to ensure long-term management of these Engineering and Institutional Controls including the performance of periodic inspections and certification that the controls are performing as they were intended. The SMP will note that the property owner and property owner's successors and assigns must comply with the approved SMP.
- Placement of a deed notice to record the ECs/ICs on the deed to ensure that future owners of the Site continue to comply with the SMP, as required.

3.1 Threshold Criteria

Protection of Public Health and the Environment

This criterion is an evaluation of the remedy's ability to protect public health and the environment, and an assessment of how risks posed through each existing or potential pathway of exposure are eliminated, reduced or controlled through removal, treatment, and implementation of Engineering Controls or Institutional Controls. Protection of public health and the environment must be achieved for all approved remedial actions.

Alternative 1 would be protective of human health and the environment by removing all soil/fill exceeding Track 1 Unrestricted Use SCOs and groundwater protection standards, thus eliminating potential for direct contact with contaminated soil/fill once construction is complete and eliminating the risk of contaminants leaching into groundwater. Alternative 1 is not allowed because for the need for installation and long-term operation of the SVE and SSDS since the source of on-site soil vapors is not known.

Alternative 2 would achieve comparable protections of human health and the environment by repairing and maintaining the existing slab (and thus a barrier layer to underlying soils that exceed SCOs) and by installing and operating a SVE/SSDS system to remove organic vapors. Implementing Institutional Controls including a Site Management Plan and instituting a deed notice on the property would ensure that the engineering controls remain intact and protective of public health. Establishment of Track 4 Site-Specific SCOs would minimize the risk of contamination leaching into groundwater.

For both Alternatives, potential exposure to contaminated soils or groundwater during construction would be minimized by implementing a Construction Health and Safety Plan, an approved Soil/Materials Management Plan, and Community Air Monitoring Plan (CAMP) during limited soil disturbance. Potential contact with contaminated groundwater would be prevented as its use is prohibited by city laws and regulations. Potential future migration of off-Site soil vapors into the new building would be prevented by installing a vapor barrier below the building slab and outside foundations walls below grade.

3.2 Balancing Criteria

Compliance with Standards, Criteria and Guidance (SCGs)

This evaluation criterion assesses the ability of the alternative to achieve applicable standards, criteria and guidance.

Alternative 1 would achieve compliance with the remedial goals, chemical-specific SCGs and RAOs for soil through removal of soil to achieve Track 1 Unrestricted Use SCOs and Protection of Groundwater SCOs.

Alternative 2 would achieve compliance with the remedial goals, chemical-specific SCGs and RAOs for soil through maintaining the building's slab as a cover layer over soils exceeding SCOs. Constituents in soil vapor would be effectively managed by the subslab depressurization system. A Site Management Plan would ensure that these controls remained protective for the long term. Health and safety measures contained in the CHASP and Community Air Monitoring Plan (CAMP) will be implemented during Site redevelopment under this RAWP.

For both Alternatives, focused attention on means and methods employed during the remedial action would ensure that handling and management of contaminated material would be in compliance with applicable SCGs. These measures will protect on-site workers and the surrounding community from exposure to Site-related contaminants.

Short-Term Effectiveness and Impacts

This evaluation criterion assesses the effects of the alternative during the construction and implementation phase until remedial action objectives are met. Under this criterion, alternatives are evaluated with respect to their short term effects during the remedial action on public health and the environment during implementation of the remedial action, including protection of the community, protection of onsite workers and environmental impacts.

Both Alternative 1 and 2 have similar short-term effectiveness during their implementation, as each requires the installation and operation of a subslab depressurization system. Short-term impacts could potentially be higher for Alternative 1 since excavation of some historical fill material would take place. However, focused attention to means and methods during a Track 1

removal action, including community air monitoring and appropriate truck routing, would minimize the overall impact of these activities.

The potential adverse impact to the community, workers and the environment for both alternatives would be minimized through implementation of control plans including a Construction Health and Safety Plan, a Community Air Monitoring Plan (CAMP) and a Soil/Materials Management Plan (SMMP), during all on-Site soil disturbance activities and would minimize the release of contaminants into the environment. Both alternatives provide short-term effectiveness in protecting the surrounding community by decreasing the risk of contact with on-Site contaminants. Construction workers operating under appropriate management procedures and a Construction Health and Safety Plan (CHASP) would provide protection from on-Site contaminants by using personal protective equipment would be worn consistent with the documented risks within the respective work zones.

Long-Term Effectiveness and Permanence

This evaluation criterion addresses the results of a remedial action in terms of its permanence and quantity/nature of waste or residual contamination remaining at the Site after response objectives have been met, such as permanence of the remedial alternative, magnitude of remaining contamination, adequacy of controls including the adequacy and suitability of Engineering Controls/Institutional Controls (ECs/ICs) that may be used to manage contaminant residuals that remain at the Site and assessment of containment systems and ICs that are designed to eliminate exposures to contaminants, and long-term reliability of ECs.

Alternative 1 would achieve long-term effectiveness and permanence related to on-Site contamination by permanently removing all impacted soil/fill above Track 1 Unrestricted Use SCO's and by implementing an aggressive approach to vapor intrusion.

Alternative 2 would provide long-term effectiveness in the same way as Alternative 1.

Reduction of Toxicity, Mobility, or Volume of Contaminated Material

This evaluation criterion assesses the remedial alternative's use of remedial technologies that permanently and significantly reduce toxicity, mobility, or volume of contaminants as their principal element. The following is the hierarchy of source removal and control measures that are to be used to remediate a Site, ranked from most preferable to least preferable: removal and/or treatment, containment, elimination of exposure and treatment of source at the point of exposure. It is preferred to use treatment or removal to eliminate contaminants at a Site, reduce

the total mass of toxic contaminants, cause irreversible reduction in contaminants mobility, or reduce of total volume of contaminated media.

Alternative 1 will permanently eliminate the toxicity, mobility, and volume of contaminants from on-Site soil by removing all soil in excess of Track 1 Unrestricted Use SCO's. However, because these soils do not represent a threat to human health and because these soils are not considered a source of groundwater contamination, the overall benefit of removal of soils exceeding SCOs is considered minimal.

Alternative 2 would include no soil removal, permitting soils that exceed SCOs to remain under the building.

Implementability

This evaluation criterion addresses the technical and administrative feasibility of implementing an alternative and the availability of various services and materials required during its implementation, including technical feasibility of construction and operation, reliability of the selected technology, ease of undertaking remedial action, monitoring considerations, administrative feasibility (e.g. obtaining permits for remedial activities), and availability of services and materials.

Alternative 1 has implementability concerns. The removal of limited volumes of soil in the building is feasible, but creates logical considerations in the actively used residential building. Alternative 2 is easily implemented.

Cost Effectiveness

This evaluation criterion addresses the cost of alternatives, including capital costs (such as construction costs, equipment costs, and disposal costs, engineering expenses) and site management costs (costs incurred after remedial construction is complete) necessary to ensure the continued effectiveness of a remedial action.

The costs associated with Alternative 1 would be significantly higher than Alternative 2 because of the added expenses associated with the removal of soils exceeding UUSCOs. These soils are currently encapsulated by the building slab.

The remedial plan would couple the remedial action with the redevelopment of the Site, lowering total costs. The remedial plan will also consider the selection of the most appropriate disposal facilities to reduce transportation and disposal costs during cleanup and redevelopment of the Site.

Community Acceptance

This evaluation criterion addresses community opinion and support for the remedial action.

Observations here will be supplemented by public comment received on the RAWP.

This RAWP will be subject to a public review under the NYC VCP and will provide the opportunity for detailed public input on the remedial alternatives and the selected remedy. This public comment will be considered by OER prior to approval of this plan. The Citizen Participation Plan for the project is provided in Appendix 1. Observations here will be supplemented by public comment received on the RAWP. Under both alternatives, the overall goals of the remedial program, to protect public health and the environment and eliminate potential contaminant exposures, have been broadly supported by citizens in NYC communities.

Land Use

This evaluation criterion addresses the proposed use of the property. This evaluation has considered reasonably anticipated future uses of the Site and takes into account: current use and historical and/or recent development patterns; applicable zoning laws and maps; NYS Department of State's Brownfield Opportunity Areas (BOA) pursuant to section 970-r of the general municipal law; applicable land use plans; proximity to real property currently used for residential use, and to commercial, industrial, agricultural, and/or recreational areas; environmental justice impacts, Federal or State land use designations; population growth patterns and projections; accessibility to existing infrastructure; proximity of the site to important cultural resources and natural resources, potential vulnerability of groundwater to contamination that might emanate from the site, proximity to flood plains, geography and geology; and current Institutional Controls applicable to the site.

The current, intended, and reasonably anticipated future land use of the Site and its surroundings are compatible with the selected remedy of soil remediation. Use of the Site will not change and therefore this criterion is not a factor in the decision.

The Site is not in close proximity to important cultural resources, including federal or state historic or heritage sites or Native American religious sites, natural resources, waterways, wildlife refuges, wetlands, or critical habitats of endangered or threatened species. The Site is located in an urban area and not in proximity to fish or wildlife and neither alternative would result in any potential exposure pathways of contaminant migration affecting fish or wildlife.

The remedial action is also protective of groundwater natural resources. The Site does not lie in a

Federal Emergency Management Agency (FEMA)-designated flood plain. Both alternatives are equally protective of natural resources and cultural resources. Improvements in the current environmental condition of the property achieved by both alternatives considered in this plan are consistent with the City's goals for cleanup of contaminated land.

Sustainability of the Remedial Action

This criterion evaluates the overall sustainability of the remedial action alternatives and the degree to which sustainable means are employed to implement the remedial action including those that take into consideration NYC's sustainability goals defined in PlaNYC: A Greener, Greater New York. Sustainability goals may include: maximizing the recycling and reuse of non-virgin materials; reducing the consumption of virgin and non-renewable resources; minimizing energy consumption and greenhouse gas emissions; improving energy efficiency; and promotion of the use of native vegetation and enhancing biodiversity during landscaping associated with Site development.

There is no difference between Alternatives 1 and 2 with respect to this criterion.

Selection of the Preferred Remedy

Alternative 1 requires removal of existing slab and excavations of soil underneath to achieve Unrestricted Use SCOs. Due to high soil vapor beneath the existing drycleaner, an SVE and active SSDS are required to manage soil vapor intrusion. Active systems are not allowed in Track 1 cleanups. Additionally, deed restrictions are also not allowed in Unrestricted Use cleanups. Due to above reasons, Track 1 Unrestricted Use remedy is not feasible. Therefore, the preferred remedy for the site is Alternative 2, a Track 4 Site-Specific SCOs remedy.

The Alternative 2 remedy addresses all environmental concerns on the Site in a cost-effective manner that is protective of human health and the environment. Engineering and Institutional Controls are required for vapor management for the Alternative 2 remedy. Both post-remediation air quality testing and on-going groundwater testing will confirm the effectiveness of the e-SSDS.

Use restrictions will be imposed on the site (including prohibitions on any use higher than Restricted Residential, e.g. the use of groundwater from the Site; prohibitions of restricted Site

uses, such as farming or vegetable gardening, to prevent future exposure pathways; and prohibition of a higher level of land use without NYSDEC approval). The property would receive a Covenants of Restrictions with the county clerk memorializing institutional controls.

4.0 Remedial Action

4.1 Summary of Preferred Remedial Action

The preferred remedial action alternative is Alternative 2, the Track 4 remedial action. The preferred remedial action achieves protection of public health and the environment for the intended use of the property. The preferred remedial action will achieve all of the remedial action objectives established for the project and addresses applicable SCGs. The preferred remedial action is effective in both the short-term and long-term and reduces mobility, toxicity and volume of contaminants. The preferred remedial action alternative is cost effective and implementable and uses standards methods that are well established in the industry.

The proposed remedial action will consist of:

1. Preparation of a Community Protection Statement and performance of all required NYC VCP Citizen Participation activities according to an approved Citizen Participation Plan.
2. Performance of a Community Air Monitoring Program for particulates and volatile organic carbon compounds.
3. Establishment of Track 4 Site-Specific Soil Cleanup Objectives (SCOs).
4. Groundwater monitoring from two (2) existing monitoring wells, as well as installation and monitoring of one (1) additional monitoring well, to document water quality, with particular concern for concentrations of dissolved PCE and metabolites.
5. Installation of an enhanced subslab depressurization systems (e-SSDS) ((combination of Soil Vapor Extraction System (SVE) and SSDS)) that maintains adequate negative pressure under the entirety of the on-site building, biased to ensure elevated negative pressure in the northeast portion of the Site (“hot spot”). The e-SSDS will utilize carbon filtration of the emission to ensure that the constituent of concern (PCE) is not discharged at unacceptable levels into the ambient air.
6. Repairing of cellar slabs by cementing all slab foundation’s cracks/voids.
7. Installation of a flooring topcoat sealant, [choose manufacturer and provide specs], on the entire interior slab of basement areas of the building, as well as all breaches for utility inlets will be resealed with appropriate sealant [selected industry standard commercial grade 50-year rated caulking sealant].
8. Post-remediation sampling of indoor air quality in the basement portion of the building to document the effectiveness of the e-SSDS on indoor air quality. Outdoor air samples will

also be obtained during indoor air monitoring events.

9. Submission of a RAR that describes the remedial activities, certifies that the remedial requirements have been achieved, defines the Site boundaries, lists any changes from this RAWP, and describes all Engineering and Institutional Controls to be implemented at the Site.
10. Submission of an approved Site Management Plan (SMP) in the Remedial Action Plan (RAR) for long-term management of residual contamination, including plans for operation, maintenance, monitoring, inspection and certification of Engineering and Institutional Controls (e-SSDS) and reporting at a specified frequency.
11. Recording of a Declaration of Covenants and Restrictions that includes a listing of Engineering Controls and Institutional Controls and a requirement that management of these controls must be in compliance with an approved SMP. Institutional Controls will include prohibition of the following: (1) vegetable gardening and farming; (2) use of groundwater without treatment rendering it safe for the intended use; (3) disturbance of residual contaminated material unless it is conducted in accordance with the SMP; and (4) higher level of land usage without OER-approval.

4.2 Soil Cleanup Objectives and Soil/ Fill Management

The following Track 4 Site-Specific SCO's will be utilized for this project:

<u>Contaminant</u>	<u>Site-Specific SCO's</u>
Lead	1,000 ppm
SVOCs	100 ppm

Soil/Fill Excavation and Removal

No excavation beyond the limited removal of soil for the e-SSDS extraction pit and extraction points is anticipated.

Import of Soils

No soil other than the limited volume of stone for the construction of the e-SSDS extraction pit is anticipated.

4.3 Engineering Controls

Engineering Controls will be employed in the remedial action to address residual contamination remaining at the site. The Site has two primary Engineering Control Systems. These are:

- (1) Vapor Barrier (sealant)
- (2) Active SVE/SSDS system

4.4 Vapor Barrier

In the areas where the SSDS/suction pits will be installed, a [select manufacturer] geomembrane, or equivalent, will be placed immediately beneath the slab to mitigate potential vapor intrusion in these areas. The seams of the geomembrane will be sealed against the existing concrete slab bordering the utility trenches using double-sided adhesive sealant tape. In addition, all penetrations, including the repairs to the cracked concrete, will be properly sealed.

Details of the vapor barrier installation and penetration sealing are provided in Appendix #. So as to minimize the potential for soil vapor intrusion, we are proposing that flooring topcoat sealant, [select manufacturer] (see attached manufacturer's information), will be applied to the entire basement slab. Additionally, as applicable, all cracks and breaches for utility inlets will be resealed with appropriate sealant ([select manufacturer] or similar) to ensure the integrity of the basement floors. Appendix # includes the manufacturer specifications for all products that will be used, as well as a compatibility chart from the manufacturer indicating that the proposed vapor mitigation materials are compatible with the site conditions.

An engineering inspection letter and as-built drawings will be prepared by a Professional Engineer and submitted with the final Remedial Action Report.

Enhanced Subslab Depressurization System (e-SSDS)

Migration of soil vapor into the building will be mitigated by the installation and operation of an e-SSDS. The e-SSDS will consist of a series of one extraction pit and six or seven extraction points located throughout the basement of the building, with vertical piping connected to a fan

(or fans) located outside of the building to ensure that all interior portions of the e-SSDS operate under negative pressure. Pits will be situated such that the entire subgrade of the building demonstrates (through measurements at monitoring points) adequate negative pressure. Upon completion of system installation, the existing and repaired concrete slab (including, as necessary, floor/wall interface) will be properly sealed to enhance system effectiveness. A schematic drawing of the e-SSDS is provided as Appendix 4.

The e-SSDS is a permanent engineering control. The system will be inspected and its performance certified at specified intervals as required by this RAWP and the Site Management Plan. Maintenance of this e-SSDS will be described in the Site Management Plan in the Remedial Action Report.

The effectiveness of the e-SSDS will be determined via field management of negative pressure at the monitoring points. Readings greater than -0.004 inches of water will be considered evidence of adequate negative pressure.

Post-Installation Air Quality Testing

Air quality sampling will be conducted after the e-SSDS has been installed. Samples will be collected in the approximate locations of Indoor Air Quality samples collected as part of the site investigation (see RIR for discussion of data).

Samples will be collected using 6 hour regulators using laboratory provided Summa canisters. Analyses (USEPA Method TO-15) will be completed by the NYSDOH approved laboratory and data will be compared to the pre-installation data.

Should post-installation sampling data demonstrate no meaningful reduction in ambient levels of PCE, additional response measures will be implemented in consultation with OER.

Groundwater Monitoring

The existing off-site groundwater monitoring wells will be sampled on a quarterly basis (1st sampling event to commence upon completion of e-SSDS installation). Wells will be sampled using the USEPA low-flow method and all samples will be analyzed for VOCs (USEPA Method 8260).

Should groundwater data indicate a meaningful increase in dissolved PCE (or metabolites), additional response measures will be implemented in consultation with OER.

4.5 Institutional Controls

A series of Institutional Controls (ICs) are required under this Remedial Action to assure permanent protection of public health by elimination of exposure to residual materials. These IC's define the program to operate, maintain, inspect and certify the performance of Engineering Controls and Institutional Controls on this property. Institutional Controls would be implemented in accordance with a Site Management Plan included in the final Remedial Action Report (RAR). Institutional Controls would be:

A Track 4 remedial action is proposed and Institutional Controls (ICs) will be incorporated in this remedial action to manage residual soil/fill and other media and render the Site protective of public health and the environment. These ICs define the program to operate, maintain, inspect and certify the performance of Engineering Controls and Institutional Controls on this property. Institutional Controls would be implemented in accordance with a Site Management Plan included in the final Remedial Action Report (RAR). Institutional Controls would be:

- Recording of an OER-approved Declaration of Covenant and Restrictions (DCR) with the City Register or county clerk, as appropriate. The DCR will include a description of all ECs and ICs, will summarize the requirements of the SMP, and will note that the property owner and property owner's successors and assigns must comply with the DCR and the approved SMP. The recorded DCR will be submitted in the Remedial Action Report. The DCR will be recorded prior to OER issuance of the Notice of Completion;
- Submittal of a SMP in the RAR for approval by OER that provides procedures for appropriate operation, maintenance, inspection, and certification of ECs and IC's. SMP will require that the property owner and property owner's successors and assigns will submit to OER a periodic written statement that certifies that: (1) controls employed at the Site are unchanged from the previous certification or that any changes to the controls were approved by OER; 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. OER retains the right to enter the Site in order to evaluate the continued maintenance of any controls. This certification shall be submitted at a frequency to be determine by OER in the SMP and will comply with RCNY §43-1407(1)(3).
- Vegetable gardens and farming on the Site are prohibited in contact with residual soil materials;
- Use of groundwater underlying the Site is prohibited without treatment rendering it safe

for its intended use;

- All future activities on the Site that will disturb residual material must be conducted pursuant to the soil management provisions in an approved SMP;
- The Site will be used for residential use and will not be used for a higher level of use without prior approval by OER.

4.6 Site Management Plan

Site Management is the last phase of remediation and begins with the approval of the Remedial Action Report and issuance of the Notice of Completion (NOC) for the Remedial Action. The Site Management Plan (SMP) describes appropriate methods and procedures to ensure implementation of all ECs and ICs that are required by this RAWP. The Site Management Plan is submitted as part of the RAR but will be written in a manner that allows its use as an independent document. Site Management continues until terminated in writing by OER. The property owner is responsible to ensure that all Site Management responsibilities defined in the Site Management Plan are implemented.

The SMP will provide a detailed description of the procedures required to manage all engineering controls, with particular focus on maintenance of the e-SSDS. This includes a plan for: (1) implementation of EC's and ICs; (2) operation and maintenance of EC's; (3) inspection and certification of IC's and EC's.

Site management activities and EC/IC certification will be scheduled by OER on a periodic basis to be established in the RAR and the SMP and will be subject to review and modification by OER. The Site Management Plan will be based on a calendar year and certification reports will be due for submission to OER by July 30 of the year following the reporting period.

4.7 Qualitative Human Health Exposure Assessment

The objective of the qualitative exposure assessment is to identify potential receptors and pathways for human exposure to the contaminants of concern (COC) that are present at, or migrating from, the Site. The identification of exposure pathways describes the route that the COC takes to travel from the source to the receptor. An identified pathway indicates that the potential for exposure exists; it does not imply that exposures actually occur.

Data and information reported in the Remedial Investigation Report (RIR) are sufficient to complete a Qualitative Human Health Exposure Assessment (QHHEA) for this project. As part of the VCP process, a QHHEA was performed to determine whether the Site poses an existing or future health hazard to the Site's exposed or potentially exposed population. The sampling data from the RI were evaluated to determine whether there is any health risk under current and future conditions by characterizing the exposure setting, identifying exposure pathways, and evaluating contaminant fate and transport. This QHHEA was prepared in accordance with Appendix 3B and Section 3.3 (b) 8 of the NYSDEC Draft DER-10 Technical Guidance for Site Investigation and Remediation.

Known and Potential Contaminant Sources

Based on the results of the RIR, the contaminants of concern are:

Soil: A total of 24 soil samples (from 21 borings) were collected for chemical analysis. All soil samples were analyzed for VOCs by EPA Method 8260C (rev. 2006) (eight samples were analyzed for chlorinated compounds, only); SVOCs by EPA Method 8270D (rev. 2007) (twenty samples); pesticides BYEPA Method 8081B (rev. 2000); PCBs by EPA Method 8082A (rev. 2000); and TAL metals (six samples) by EPA Method 6010C (rev. 2007).

Groundwater: Two groundwater samples were collected for chemical analysis during this RI. Samples were analyzed for TAL Metals by EPA Method 6010C (rev. 2007); VOCs by EPA Method 8260C (rev. 2006); SVOCs by EPA Method 8270D (rev. 2007); Pesticides by EPA Method 8081B (rev. 2000); and PCBs by EPA Method 8082A (rev. 2000).

Soil Vapor: Six soil vapor probes were installed and six soil vapor samples were collected for chemical analysis. Samples were analyzed for VOCs by TO-15 VOC parameters.

Ambient Air Quality Samples: Five ambient air samples (four indoor and one exterior) were collected for chemical analysis. Samples were analyzed for VOCs by TO-15 VOC parameters.

Nature, Extent, Fate and Transport of Contaminants

Soil: No constituents of concern above RRSCOs were identified on the Site. Low grade contamination of metals and pesticides were documented in soil samples beneath the existing concrete slab. No likely exposure to these contaminants will occur so long as the existing concrete slab is maintained.

Groundwater: No significant constituents of concern were identified in on-site groundwater. One organic compound (bis (z-ethylhexyl) phthalate) was identified above its Groundwater Quality Standards and one metal (vanadium) was identified above its Groundwater Quality Standards.

Soil Vapor: Peak levels of PCE were detected under the portion of the building occupied by an active dry cleaner. Off-site sampling documents an absence of PCE in soil vapor. These concentrations of PCE represent a concern for indoor air quality.

Receptor Populations

On-Site Receptors: The site is currently residential with ground floor contamination. Onsite receptors include residential units on the upper floors.

Off-Site Receptors: No off-site receptors are affected by Site conditions, based on off-site soil vapor and groundwater testing.

Potential Routes of Exposure

Three potential primary routes exist by which chemicals can enter the body: ingestion, inhalation, and dermal absorption. Exposure can occur based on the following potential media:

- Ingestion of groundwater or fill/ soil;
- Inhalation of vapors or particulates; and
- Dermal absorption of groundwater or fill/ soil.

Potential Exposure Points

Current Conditions: The site is currently covered by a building or concrete (courtyard) and there are no potential exposure pathways from ingestion, inhalation, or dermal absorption of soil. Groundwater is not exposed at the site. The site is served by the public water supply and groundwater is not used at the site for potable supply and there is no potential for exposure. Vapor intrusion may occur.

Overall Human Health Exposure Assessment

These are two potential exposure pathways for known constituents on Site:

- Ingestion of soils
- Inhalation of vapors

Under existing conditions, ingestion is not likely given that all constituents of concern are encapsulated below an existing slab. The slab will remain on the Site in the future; therefore this potential exposure pathway is not a concern.

Under existing conditions, vapors (specifically, PCE) documented under the slab have the potential to enter the building and become threat to the health of occupants. Current indoor air quality data confirm the presence of elevated PCE in indoor air. During remedial construction, on-Site and off-Site exposures to contaminated dust from historic fill material will be addressed through dust controls, and through the implementation of the Soil/Materials Management Plan, and a Construction Health and Safety Plan.

After the remedial action is complete, there will be no remaining exposure pathways as a vapor barrier system and composite cover system will have been repaired/installed. The operation of e-SSDS (proposed remedial action) will effectively eliminate vapor intrusion concerns at the Site. Potential post-construction use of groundwater is not considered an option because groundwater in this area of New York City is not used as a potable water source.

5.0 Remedial Action Management

5.1 Project Organization and Oversight

Principal personnel who will participate in the remedial action include Paul H. Ciminello, Ecosystems Strategies, Inc. Qualified Environmental Professionals (QEP) and The Professional Engineer (PE) Jolanda Jansen (Jansen Engineering).

5.2 Site Security

Site access is to be controlled by locked entrance; only project personnel will be permitted entry.

5.3 Work Hours

The hours for operation of cleanup will comply with the NYC Department of Buildings construction code requirements or according to specific variances issued by that agency. The hours of operation will be conveyed to OER during the pre-construction meeting.

5.4 Construction Health and Safety Plan

The Health and Safety Plan is included in Appendix 3. The Site Safety Coordinator will be Paul H. Ciminello. Remedial work performed under this RAWP will be in full compliance with applicable health and safety laws and regulations, including Site and OSHA worker safety requirements and HAZWOPER requirements. Confined space entry, if any, will comply with OSHA requirements and industry standards and will address potential risks. The parties performing the remedial construction work will ensure that performance of work is in compliance with the HASP and applicable laws and regulations. The HASP pertains to remedial and invasive work performed at the Site until the issuance of the Notice of Completion.

All field personnel involved in remedial activities will participate in training required under 29 CFR 1910.120, such as 40-hour hazardous waste operator training and annual 8-hour refresher training. Site Safety Officer will be responsible for maintaining workers training records. Personnel entering any exclusion zone will be trained in the provisions of the HASP and will comply with all requirements of 29 CFR 1910.120. Site-specific training will be provided to field personnel. Additional safety training may be added depending on the tasks performed. Emergency telephone numbers will be posted at the site location before any remedial work

begins. A safety meeting will be conducted before each shift begins. Topics to be discussed include task hazards and protective measures (physical, chemical, environmental); emergency procedures; PPE levels and other relevant safety topics. Meetings will be documented in a log book or specific form.

An emergency contact sheet with names and phone numbers is included in the CHASP. That document will define the specific project contacts for use in case of emergency.

5.5 Community Air Monitoring Plan

Real-time air monitoring for volatile organic compounds (VOCs) and particulate levels at the perimeter of the exclusion zone or work area will be performed. Continuous monitoring will be performed for all ground intrusive activities and during the handling of contaminated or potentially contaminated media. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pit excavation or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be performed during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. Periodic monitoring during sample collection, for instance, will consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well bailing/purging, and taking a reading prior to leaving a sample location. Depending upon the proximity of potentially exposed individuals, continuous monitoring may be performed during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence. Exceedances of action levels observed during performance of the Community Air Monitoring Plan (CAMP) will be reported to the OER Project Manager and included in the Daily Report.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) will be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis during invasive work. Upwind concentrations will be measured at the start of each workday and periodically thereafter to establish background conditions. The monitoring work will be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The

equipment will be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment will be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

- If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities will be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities will resume with continued monitoring.
- If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities will be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities will resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.
- If the organic vapor level is above 25 ppm at the perimeter of the work area, activities will be shutdown.

All 15-minute readings must be recorded and be available for OER personnel to review.

Instantaneous readings, if any, used for decision purposes will also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations will be monitored continuously during the excavation of e-SSDS extraction pits. The particulate monitoring will be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment will be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m³) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques will be employed. Work will continue with dust suppression techniques provided that downwind PM-10

particulate levels do not exceed 150 mcg/m³ above the upwind level and provided that no visible dust is migrating from the work area.

- If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m³ above the upwind level, work will be stopped and a re-evaluation of activities initiated. Work will resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m³ of the upwind level and in preventing visible dust migration.

All readings will be recorded and be available for OER personnel to review.

5.6 Agency Approvals

All permits or government approvals required for remedial construction have been or will be obtained prior to the start of remedial construction. Approval of this RAWP by OER does not constitute satisfaction of these requirements and will not be a substitute for any required permit.

5.7 Site Preparation

Pre-Construction Meeting

OER will be invited to attend the pre-construction meeting at the Site with all parties involved in the remedial process prior to the start of remedial construction activities.

Mobilization

Mobilization will be conducted as necessary for each phase of work at the Site. Mobilization includes field personnel orientation, equipment mobilization (including securing all sampling equipment needed for the field investigation), marking/staking sampling locations and utility mark-outs. Each field team member will attend an orientation meeting to become familiar with the general operation of the Site, health and safety requirements, and field procedures.

Utility Marker Layouts, Easement Layouts

The presence of utilities and easements on the Site will be fully investigated prior to the performance of invasive work such as excavation or drilling under this plan by using, at a minimum, the One-Call System (811). Underground utilities may pose an electrocution, explosion, or other hazard during excavation or drilling activities. All invasive activities will be

performed in compliance with applicable laws and regulations including NYC Building Code to assure safety. Utility companies and other responsible authorities will be contacted to locate and mark the locations, and a copy of the Mark-Out Ticket will be retained by the contractor prior to the start of drilling, excavation or other invasive subsurface operations. Overhead utilities may also be present within the anticipated work zones. Electrical hazards associated with drilling in the vicinity of overhead utilities will be prevented by maintaining a safe distance between overhead power lines and drill rig masts.

Proper safety and protective measures pertaining to utilities and easements, and compliance with all laws and regulations will be employed during invasive and other work contemplated under this RAWP. The integrity and safety of on-Site and off-Site structures will be maintained during all invasive, excavation or other remedial activity performed under the RAWP.

Dewatering

Dewatering is not anticipated during remediation and construction.

Equipment and Material Staging

Equipment and materials will be stored and staged in a manner that complies with applicable laws and regulations.

Stabilized Construction Entrance

No construction entrance is required for this project.

Truck Inspection Station

No truck inspection stations is required for this project.

Extreme Storm Preparedness and Response Contingency Plan

Damage from flooding or storm surge can include dislocation of soil and stockpiled materials, dislocation of site structures and construction materials and equipment, and dislocation of support of excavation structures. Damage from wind during an extreme storm event can create unsafe or unstable structures, damage safety structures and cause downed power lines creating dangerous site conditions and loss of power. In the event of emergency conditions caused by an extreme storm event, the enrollee will undertake the following steps for site preparedness prior to the event and response after the event.

Storm Preparedness

Preparations in advance of an extreme storm event will include the following: containerized hazardous materials and fuels will be removed from the property; loose materials will be secured to prevent dislocation and blowing by wind or water; heavy equipment such as excavators and generators will be removed from excavated areas, trenches and depressions on the property to high ground or removed from the property; an inventory of the property with photographs will be performed to establish conditions for the site and equipment prior to the event; stockpile covers for soil and fill will be secured by adding weights such as sandbags for added security and worn or ripped stockpile covers will be replaced with competent covers; stockpiled hazardous wastes will be removed from the property; stormwater management systems will be inspected and fortified, including, as necessary: clean and reposition silt fences, hay bales; clean storm sewer filters and traps; and secure and protect pumps and hosing.

Storm Response

At the conclusion of an extreme storm event, as soon as it is safe to access the property, a complete inspection of the property will be performed. A site inspection report will be submitted to OER at the completion of site inspection and after the site security is assessed. Site conditions will be compared to the inventory of site conditions and material performed prior to the storm event and significant differences will be noted. Damage from storm conditions that result in acute public safety threats, such as downed power lines or imminent collapse of buildings, structures or equipment will be reported to public safety authorities via appropriate means such as calling 911. Petroleum spills will be reported to NYS DEC within 2 hours of identification and consistent with State regulations. Emergency and spill conditions will also be reported to OER. Public safety structures, such as construction security fences will be repaired promptly to eliminate public safety threats. Debris will be collected and removed. Dewatering will be performed in compliance with existing laws and regulations and consistent with emergency notifications, if any, from proper authorities. Eroded areas of soil including unsafe slopes will be stabilized and fortified. Dislocated materials will be collected and appropriately managed. Support of excavation structure will be inspected and fortified as necessary. Impacted stockpiles will be contained and damaged stockpile covers will be replaced. Stormwater control systems and structures will be inspected and maintained as necessary. If soil or fill materials are discharged off site to adjacent properties, property owners and OER will be notified and

corrective measure plan designed to remove and clean dislocated material will be submitted to OER and implemented following approval by OER and granting of site access by the property owner. Impacted offsite areas may require characterization based on site conditions, at the discretion of OER. If onsite petroleum spills are identified, a qualified environmental professional will determine the nature and extent of the spill and report to NYS DEC's spill hotline at DEC 800-457-7362 within statutory defined timelines. If the source of the spill is ongoing and can be identified, it should be stopped if this can be done safely. Potential hazards will be addressed immediately, consistent with guidance issued by NYS DEC.

Storm Response Reporting

A site inspection report will be submitted to OER at the completion of site inspection. An inspection report established by OER is available on OER's website (www.nyc.gov/oer) and will be used for this purpose. Site conditions will be compared to the inventory of site conditions and material performed prior to the storm event and significant differences will be noted. The site inspection report will be sent to the OER project manager and will include the site name, address, tax block and lot, site primary and alternate contact name and phone number. Damage and soil release assessment will include: whether the project had stockpiles; whether stockpiles were damaged; photographs of damage and notice of plan for repair; report of whether soil from the site was dislocated and whether any of the soil left the site; estimates of the volume of soil that left the site, nature of impact, and photographs; description of erosion damage; description of equipment damage; description of damage to the remedial program or the construction program, such as damage to the support of excavation; presence of onsite or offsite exposure pathways caused by the storm; presence of petroleum or other spills and status of spill reporting to NYS DEC; description of corrective actions; schedule for corrective actions. This report should be completed and submitted to OER project manager with photographs within 24 hours of the time of safe entry to the property after the storm event.

5.8 Traffic Control

No trucks will be used for soil removal as part of this project.

5.9 Demobilization

Demobilization will include:

- As necessary, restoration of temporary access areas and areas that may have been disturbed to accommodate support areas (e.g., staging areas, decontamination areas, storage areas, temporary water management areas, and access area);
- Removal of sediment from erosion control measures and truck wash and disposal of materials in accordance with applicable laws and regulations;
- Equipment decontamination, and;
- General refuse disposal.

Equipment will be decontaminated and demobilized at the completion of all field activities. Investigation equipment and large equipment (e.g., soil excavators) will be washed at the truck inspection station as necessary. In addition, all investigation and remediation derived waste will be appropriately disposed.

5.10 Reporting and Record Keeping

Daily reports

Daily reports providing a general summary of activities for each day of active remedial work will be emailed to the OER Project Manager by the end of the following business day. Those reports will include:

- Project number and statement of the activities and an update of progress made and locations of excavation and other remedial work performed;
- Quantities of material imported and exported from the Site;
- Status of on-Site soil/fill stockpiles;
- A summary of all citizen complaints, with relevant details (basis of complaint; actions taken; etc.);
- A summary of CAMP results noting all excursions. CAMP data may be reported;
- Photograph of notable Site conditions and activities.

The frequency of the reporting period may be revised in consultation with OER project manager based on planned project tasks. Daily email reports are not intended to be the primary mode of communication for notification to OER of emergencies (accidents, spills), requests for changes

to the RAWP or other sensitive or time critical information. However, such information will be included in the daily reports. Emergency conditions and changes to the RAWP will be communicated directly to the OER project manager by personal communication. Daily reports will be included as an Appendix in the Remedial Action Report.

Record Keeping and Photo Documentation

Job-site record keeping for all remedial work will be performed. These records will be maintained on-Site during the project and will be available for inspection by OER staff. Representative photographs will be taken of the Site prior to any remedial activities and during major remedial activities to illustrate remedial program elements and contaminant source areas. Photographs will be submitted at the completion of the project in the RAR in digital format (i.e. jpeg files).

5.11 Complaint Management

All complaints from citizens will be promptly reported to OER. Complaints will be addressed and outcomes will also be reported to OER in daily reports. Notices to OER will include the nature of the complaint, the party providing the complaint, and the actions taken to resolve any problems.

5.12 Deviations From The Remedial Action Work Plan

All changes to the RAWP will be reported to, and approved by, the OER Project Manager and will be documented in daily reports and reported in the Remedial Action Report. The process to be followed if there are any deviations from the RAWP will include a request for approval for the change from OER noting the following:

- Reasons for deviating from the approved RAWP;
- Effect of the deviations on overall remedy; and
- Determination with basis that the remedial action with the deviation(s) is protective of public health and the environment.

6.0 Remedial Action Report

A Remedial Action Report (RAR) will be submitted to OER following implementation of the remedial action defined in this RAWP. The RAR will document that the remedial work required under this RAWP has been completed and has been performed in compliance with this plan. The RAR will include:

- Information required by this RAWP;
- Text description with thorough detail of all engineering and institutional controls (if Track 1 remedial action is not achieved)
- As-built drawings for all constructed remedial elements;
- Manifests for all soil or fill disposal;
- Photographic documentation of remedial work performed under this remedy;
- Site Management Plan (if Track 1 remedial action is not achieved);
- Description of any changes in the remedial action from the elements provided in this RAWP and associated design documents;
- Tabular summary of all end point sampling results (including all soil test results from the remedial investigation for soil that will remain on site) and all soil/fill waste characterization results, QA/QC results for end-point sampling, and other sampling and chemical analysis performed as part of the remedial action;
- Test results or other evidence demonstrating that remedial systems are functioning properly;
- Account of the source area locations and characteristics of all soil or fill material removed from the Site including a map showing the location of these excavations and hotspots, tanks or other contaminant source areas;
- Full accounting of the disposal destination of all contaminated material removed from the Site. Documentation associated with disposal of all material will include transportation and disposal records, and letters approving receipt of the material;
- Account of the origin and required chemical quality testing for material imported onto the Site;
- Recorded Declaration of Covenants and Restrictions. OR Continue registration of the property with an E-Designation by the NYC Department of Buildings (if Track 1 remedial action is not achieved);

- The RAWP and Remedial Investigation Report will be included as appendices to the RAR;
- Reports and supporting material will be submitted in digital form and final PDF's will include bookmarks for each appendix.

Remedial Action Report Certification

I, Jolanda Jansen, am currently a registered professional engineer licensed by the State of New York. I performed professional engineering services and had primary direct responsibility for implementation of the remedial program for the 972-976 Leggett Avenue, Bronx, New York site, site number [VCP site number]. I certify to the following:

- I have reviewed this document, to which my signature and seal are affixed.
- Engineering Controls implemented during this remedial action were designed by me or a person under my direct supervision and achieve the goals established in the Remedial Action Work Plan for this site.
- The Engineering Controls constructed during this remedial action were professionally observed by me or by a person under my direct supervision and (1) are consistent with the Engineering Control design established in the Remedial action Work Plan and (2) are accurately reflected in the text and drawings for as-built design reported in this Remedial Action Report.
- The OER-approved Remedial Action Work Plan dated [date] and Stipulations in a letter dated [date] were implemented and that all requirements in those documents have been substantively complied with. I certify that contaminated soil, fill, liquids or other material from the property were taken to facilities licensed to accept this material in full compliance with applicable laws and regulations.

Name

PE License Number

Signature

Date

PE Stamp

I, Paul H. Ciminello, am a Qualified Environmental Professional. I had primary direct responsibility for implementation of the remedial program for the 972-976 Leggett Avenue, Bronx, New York site, site number [VCP site number]. I certify to the following:

- The OER-approved Remedial Action Work Plan dated August 15, 2012 and Stipulations in a letter dated September 10, 2014 were implemented and that all requirements in those documents have been substantively complied with. I certify that contaminated soil, fill, liquids or other material from the property were taken to facilities licensed to accept this material in full compliance with applicable laws and regulations.

QEP Name

QEP Signature

Date

7.0 Schedule

The table below presents a schedule for the proposed remedial action and reporting. If the schedule for remediation and development activities changes, it will be updated and submitted to OER. Currently, a 4 month remediation period is anticipated.

Schedule Milestone	Weeks from Remedial Action Start	Duration (weeks)
OER Approval of RAWP	0	0
Fact Sheet 2 announcing start of remedy	1	1
SVE Design	1-3	3
System Installation	4-7	3
System Testing/IAQ Testing	8-11	3
Submit Remedial Action Report	12-16	4
Groundwater Monitoring	12/48	NA

APPENDIX 1

CITIZEN PARTICIPATION PLAN

The NYC Office of Environmental Remediation and Preservation Development Partners have established this Citizen Participation Plan because the opportunity for citizen participation is an important component of the NYC Voluntary Cleanup Program. This Citizen Participation Plan describes how information about the project will be disseminated to the Community during the remedial process. As part of its obligations under the NYC VCP, Preservation Development Partners will maintain a repository for project documents and provide public notice at specified times throughout the remedial program. This Plan also takes into account potential environmental justice concerns in the community that surrounds the project Site. Under this Citizen Participation Plan, project documents and work plans are made available to the public in a timely manner. Public comment on work plans is strongly encouraged during public comment periods. Work plans are not approved by the NYC Office of Environmental Remediation (OER) until public comment periods have expired and all comments are formally reviewed. An explanation of cleanup plans in the form of a public meeting or informational session is available upon request to OER's project manager assigned to this Site, Isabel McRae, who can be contacted about these issues or any others questions, comments or concerns that arise during the remedial process at (212) 788-8841.

Project Contact List: OER has established a Site Contact List for this project to provide public notices in the form of fact sheets to interested members of the Community.

Communications will include updates on important information relating to the progress of the cleanup program at the Site as well as to request public comments on the cleanup plan. The Project Contact List includes owners and occupants of adjacent buildings and homes, principal administrators of nearby schools, hospitals and day care centers, the public water supplier that serves the area, established document repositories, the representative Community Board, City Council members, other elected representatives and any local Brownfield Opportunity Area (BOA) grantee organizations. Any member of the public or organization will be added to the

Site Contact List on request. A copy of the Site Contact List is maintained by OER's project manager. If you would like to be added to the Project Contact List, contact NYC OER at (212) 788-8841 or by email at brownfields@cityhall.nyc.gov.

Repositories: A document repository is maintained online. Internet access to view OER's document repositories is available at public libraries. This document repository is intended to house, for community review, all principal documents generated during the cleanup program including Remedial Investigation plans and reports, Remedial Action work plans and reports, and all public notices and fact sheets produced during the lifetime of the remedial project. The library nearest the Site is:

New York Public Library – Morrisania Branch

610 E 169th Street, Bronx, New York

718-589-9268

Mon – Thurs -10AM to 7PM

Fri – Sat -10AM to 5PM

Sun - Closed

Digital Documentation: NYC OER requires the use of digital documents in our repository as a means of minimizing paper use while also increasing convenience in access and ease of use.

Issues of Public Concern: The documented on-site presence of elevated levels of PCE in subgrade soil vapor as well as the elevated levels of PCE in indoor (basement) air quality represents the sole issue of public concern. There is no evidence of contaminant migration.

Public Notice and Public Comment: Public notice to all members of the Project Contact List is required at three major steps during the performance of the cleanup program (listed below) and at other points that may be required by OER. Notices will include Fact Sheets with descriptive project summaries, updates on recent and upcoming project activities, repository information, and important phone and email contact information. All notices will be reviewed and approved by OER prior to distribution and mailed by the Enrollee. Public comment is

solicited in public notices for all work plans developed under the NYC Voluntary Cleanup Program. Final review of all work plans by OER will consider all public comments. Approval will not be granted until the public comment period has been completed.

Citizen Participation Milestones: Public notice and public comment activities occur at several steps during a typical NYC VCP project. These steps include:

- **Public Notice of the availability of the Remedial Investigation Report and Remedial Action Work Plan and a 30-day public comment period on the Remedial Action Work Plan:** Public notice in the form of a Fact Sheet is sent to all parties listed on the Site Contact List announcing the availability of the Remedial Investigation Report and Remedial Action Work Plan and the initiation of a 30-day public comment period on the Remedial Action Work Plan. The Fact Sheet summarizes the findings of the RIR and provides details of the RAWP. The public comment period will be extended an additional 15 days upon public request. A public meeting or informational session will be conducted by OER upon request.
- **Public Notice announcing the approval of the RAWP and the start of remediation:** Public notice in the form of a Fact Sheet is sent to all parties listed on the Site Contact List announcing the approval of the RAWP and the start of remediation.
- **Public Notice announcing the completion of remediation, designation of Institutional and Engineering Controls and issuance of the Notice of Completion:** Public notice in the form of a Fact Sheet is sent to all parties listed on the Site Contact List announcing the completion of remediation, providing a list of all Institutional and Engineering Controls implemented for to the Site and announcing the issuance of the Notice of Completion.

APPENDIX 2

SUSTAINABILITY STATEMENT

This Sustainability Statement documents sustainable activities and green remediation efforts planned under this remedial action. This RAWP minimizes site disturbance while focusing remedial effort in the physical space where contaminant levels are greatest.

Reuse of Clean, Recyclable Materials and Reduced Consumption of Non-Renewable Resources: Reuse of clean, locally-derived recyclable materials reduces consumption of non-renewable virgin resources and can provide energy savings and greenhouse gas reduction. Limited volumes of materials necessary for construction of extraction pits will be imported.

An estimate of the quantity (in tons) of clean, non-virgin materials (reported by type of material) reused under this plan will be quantified and reported in the RAR.

Reduced Energy Consumption and Promotion of Greater Energy Efficiency:

Reduced energy consumption lowers greenhouse gas emissions, improves local air quality, lessens in-city power generation requirements, can lower traffic congestion, and provides substantial cost savings.

Energy efficient fans will be used. Best efforts will be made to quantify energy efficiencies achieved during the remediation and will be reported in the Remedial Action Report (RAR). Where energy savings cannot be easily quantified, a gross indicator of the amount of energy saved or the means by which energy savings was achieved will be reported.

Linkage with Green Building: Green buildings provide a multitude of benefits to the city across a broad range of areas, such as reduction of energy consumption, conservation of resources, and reduction in toxic materials use.

All emissions from the e-SSDS will be properly treated with carbon to minimize discharges. The number of Green Buildings that are associated with this brownfield redevelopment property will be reported in the RAR. The total square footage of green building space created as a

function of this brownfield redevelopment will be quantified for residential, commercial and industrial/manufacturing uses.

Paperless Voluntary Cleanup Program: Preservation Development Partners is participating in OER's Paperless Voluntary Cleanup Program. Under this program, submission of electronic documents will replace submission of hard copies for the review of project documents, communications and milestone reports.

Low-Energy Project Management Program: Preservation Development Partners is participating in OER's low-energy project management program. Under this program, whenever possible, meetings are held using remote communication technologies, such as videoconferencing and teleconferencing to reduce energy consumption and traffic congestion associated with personal transportation.

APPENDIX 3

CONSTRUCTION HEALTH AND SAFETY PLAN

APPENDIX 4

SOIL/MATERIALS MANAGEMENT PLAN

1.1 Soil Screening Methods

Visual, olfactory and PID soil screening and assessment will be performed under the supervision of a Qualified Environmental Professional and will be reported in the final remedial report. Soil screening will be performed during invasive work performed during the remedy and development phases prior to issuance of final signoff by OER.

1.2 Stockpile Methods

Excavated soil from suspected areas of contamination (e.g., hot spots, USTs, drains, etc.) will be stockpiled separately and will be segregated from clean soil and construction materials.

Stockpiles will be used only when necessary and will be removed as soon as practicable. While stockpiles are in place, they will be inspected daily, and before and after every storm event.

Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by OER. Excavated soils will be stockpiled on, at minimum, double layers of 8-mil minimum sheeting, will be kept covered at all times with appropriately anchored plastic tarps, and will be routinely inspected. Broken or ripped tarps will be promptly replaced.

All stockpile activities will be compliant with applicable laws and regulations. Soil stockpile areas will be appropriately graded to control run-off in accordance with applicable laws and regulations. Stockpiles of excavated soils and other materials shall be located at least of 50 feet from the property boundaries, where possible. Hay bales or equivalent will surround soil stockpiles except for areas where access by equipment is required. Silt fencing and hay bales will be used as needed near catch basins, surface waters and other discharge points.

1.3 Characterization of Excavated Materials

Soil/fill or other excavated media that is transported off-Site for disposal will be sampled in a manner required by the receiving facility, and in compliance with applicable laws and regulations. Soils proposed for reuse on-Site will be managed as defined in this plan.

1.4 Materials Excavation, Load-Out, and Departure

The PE/QEP overseeing the remedial action will:

- oversee remedial work and the excavation and load-out of excavated material;
- ensure that there is a party responsible for the safe execution of invasive and other work performed under this work plan;
- ensure that Site development activities and development-related grading cuts will not interfere with, or otherwise impair or compromise the remedial activities proposed in this RAWP;
- ensure that the presence of utilities and easements on the Site has been investigated and that any identified risks from work proposed under this plan are properly addressed by appropriate parties;
- ensure that all loaded outbound trucks are inspected and cleaned if necessary before leaving the Site;
- ensure that all egress points for truck and equipment transport from the Site will be kept clean of Site-derived materials during Site remediation.

Locations where vehicles exit the Site shall be inspected daily for evidence of soil tracking off premises. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to Site-derived materials.

Open and uncontrolled mechanical processing of historical fill and contaminated soil on-Site will not be performed without prior OER approval.

1.5 Off-Site Materials Transport

Loaded vehicles leaving the Site will comply with all applicable materials transportation requirements (including appropriate covering, manifests, and placards) in accordance with applicable laws and regulations, including use of licensed haulers in accordance with 6 NYCRR Part 364. If loads contain wet material capable of causing leakage from trucks, truck liners will be used. Queuing of trucks will be performed on-Site, when possible in order to minimize off Site disturbance. Off-Site queuing will be minimized.

Outbound truck transport routes are described in the remedial report. This routing takes into account the following factors: (a) limiting transport through residential areas and past sensitive

sites; (b) use of mapped truck routes; (c) minimizing off-Site queuing of trucks entering the facility; (d) limiting total distance to major highways; (e) promoting safety in access to highways; and (f) overall safety in transport. To the extent possible, all trucks loaded with Site materials will travel from the Site using these truck routes. Trucks will not stop or idle in the neighborhood after leaving the project Site.

1.6 Materials Disposal Off-Site

The following documentation will be established and reported by the PE/QEP for each disposal destination used in this project to document that the disposal of regulated material exported from the Site conforms with applicable laws and regulations: (1) a letter from the PE/QEP or Enrollee to each disposal facility describing the material to be disposed and requesting written acceptance of the material. This letter will state that material to be disposed is regulated material generated at an environmental remediation Site in New York City under a governmental remediation program. The letter will provide the project identity and the name and phone number of the PE/QEP or Enrollee. The letter will include as an attachment a summary of all chemical data for the material being transported; and (2) a letter from each disposal facility stating it is in receipt of the correspondence (1, above) and is approved to accept the material. These documents will be included in the final remedial report.

The Remedial Action Report will include an itemized account of the destination of all material removed from the Site during this remedial action. Documentation associated with disposal of all material will include records and approvals for receipt of the material. This information will be presented in the final remedial report.

All impacted soil/fill or other waste excavated and removed from the Site will be managed as regulated material and will be disposed in accordance with applicable laws and regulations. Historic fill and contaminated soils taken off-Site will be handled as solid waste and will not be disposed at a Part 360-16 Registration Facility (also known as a Soil Recycling Facility). Waste characterization will be performed for off-Site disposal in a manner required by the receiving facility and in conformance with its applicable permits. Waste characterization sampling and analytical methods, sampling frequency, analytical results and QA/QC will be reported in the final remedial report. A manifest system for off-Site transportation of exported materials will be employed. Manifest information will be reported in the final remedial report. Hazardous wastes derived from on-Site will be stored, transported, and disposed of in compliance with applicable laws and regulations.

If disposal of soil/fill from this Site is proposed for unregulated disposal (i.e., clean soil removed for development purposes), including transport to a Part 360-16 Registration Facility, a formal request will be made for approval by OER with an associated plan compliant with 6NYCRR Part 360-16. This request and plan will include the location, volume and a description of the material to be recycled, including verification that the material is not impacted by site uses and that the material complies with receipt requirements for recycling under 6NYCRR Part 360. This material will be appropriately handled on-Site to prevent mixing with impacted material.

1.7 Materials Reuse On-Site

Soil and fill that is derived from the property that meets the Soil Cleanup Objectives (SCOs) established in this plan may be reused on-Site. The SCOs for on-Site reuse are listed in Section 4.2 of this cleanup plan. 'Reuse on-Site' means material that is excavated during the remedy or development, does not leave the property, and is relocated within the same property and on land with comparable levels of contaminants in soil/fill material, compliant with applicable laws and regulations, and addressed pursuant to the NYC VCP agreement subject to Engineering and Institutional Controls. The PE/QEP will ensure that reused materials are segregated from other materials to be exported from the Site and that procedures defined for material reuse in this remedial plan are followed. The expected location for placement of reused material is shown in Section 4.2.

Provide additional details, as necessary, for methods to be followed for materials reuse on-Site, such as stockpile segregation plan for on-Site reuse, including the maximum size of stockpiles and proposed location(s) to be shown on a map.

Organic matter (wood, roots, stumps, etc.) or other waste derived from clearing and grubbing of the Site will not be buried on-Site. Soil or fill excavated from the site for grading or other purposes will not be reused within a cover soil layer or within landscaping berms.

1.8 Demarcation

After completion of hotspot removal and any other invasive remedial activities, and prior to backfilling, the top of the residual soil/fill will be defined by one of three methods: (1) placement of a demarcation layer. The demarcation layer will consist of geosynthetic fencing or equivalent material to be placed on the surface of residual soil/fill to provide an observable reference layer. A description or map of the approximate depth of the demarcation layer will be provided in the SMP; or (2) a land survey of the top elevation of residual soil/fill before the placement of cover

soils, pavement and associated sub-soils, or other materials or structures or, (3) all materials beneath the approved cover will be considered impacted and subject to site management after the remedy is complete. Demarcation may be established by one or any combination of these three methods. As appropriate, a map showing the method of demarcation for the Site and all associated documentation will be presented in the RAR.

This demarcation will constitute the top of the site management horizon. Materials within this horizon require adherence to special conditions during future invasive activities as defined in the Site Management Plan.

1.9 Import of Backfill Soil From Off-Site Sources

This Section presents the requirements for imported fill materials to be used below the cover layer and within the clean soil cover layer. All imported soils will meet OER-approved backfill and cover soil quality objectives for this Site. Imported soils will not exceed groundwater protection standards established in Part 375. Imported soils for Track 1 remedial action projects will not exceed Track 1 SCO's.

A process will be established to evaluate sources of backfill and cover soil to be imported to the Site, and will include an examination of source location, current and historical use(s), and any applicable documentation. Material from industrial sites, spill sites, environmental remediation sites or other potentially contaminated sites will not be imported to the Site.

The following potential sources may be used pending attainment of backfill and cover soil quality objectives:

- Clean soil from construction projects at non-industrial sites in compliance with applicable laws and regulations;
- Clean soil from roadway or other transportation-related projects in compliance with applicable laws and regulations;
- Clean recycled concrete aggregate (RCA) from facilities permitted or registered by the regulations of NYS DEC.
- All materials received for import to the Site will be approved by a PE/QEP and will be in compliance with provisions in this remedial plan. The final remedial report will report the source of the fill, evidence that an inspection was performed on the source, chemical sampling results, frequency of testing, and a Site map indicating the locations where backfill or soil cover was placed.
- All material will be subject to source screening and chemical testing.

- Inspection of imported fill material will include visual, olfactory and PID screening for evidence of contamination. Materials imported to the Site will be subject to inspection, as follows:
- Trucks with imported fill material will be in compliance with applicable laws and regulations and will enter the Site at designated locations;
- The PE/QEP is responsible to ensure that every truck load of imported material is inspected for evidence of contamination; and
- Fill material will be free of solid waste including pavement materials, debris, stumps, roots, and other organic matter, as well as ashes, oil, perishables or foreign matter.

Composite samples of imported material will be taken at a minimum frequency of one sample for every 500 cubic yards of material. Once it is determined that the fill material meets imported backfill or cover soil chemical requirements and is non-hazardous, and lacks petroleum contamination, the material will be loaded onto trucks for delivery to the Site.

Recycled concrete aggregate (RCA) will be imported from facilities permitted or registered by NYSDEC. Facilities will be identified in the final remedial report. A PE/QEP is responsible to ensure that the facility is compliant with 6NYCRR Part 360 registration and permitting requirements for the period of acquisition of RCA. RCA imported from compliant facilities will not require additional testing, unless required by NYSDEC under its terms for operation of the facility. RCA imported to the Site must be derived from recognizable and uncontaminated concrete. RCA material is not acceptable for, and will not be used as cover material.

1.10 Fluids Management

All liquids to be removed from the Site, including dewatering fluids, will be handled, transported and disposed in accordance with applicable laws and regulations. Liquids discharged into the New York City sewer system will receive prior approval by New York City Department of Environmental Protection (NYC DEP). The NYC DEP regulates discharges to the New York City sewers under Title 15, Rules of the City of New York Chapter 19. Discharge to the New York City sewer system will require an authorization and sampling data demonstrating that the groundwater meets the City's discharge criteria. The dewatering fluid will be pretreated as necessary to meet the NYC DEP discharge criteria. If discharge to the City sewer system is not appropriate, the dewatering fluids will be managed by transportation and disposal at an off-Site treatment facility.

Discharge of water generated during remedial construction to surface waters (i.e. a stream or river) is prohibited without a SPDES permit issued by New York State Department of Environmental Conservation.

1.11 Stormwater Pollution Prevention

Applicable laws and regulations pertaining to stormwater pollution prevention will be addressed during the remedial program. Erosion and sediment control measures identified in this remedial plan (silt fences and barriers, and hay bale checks) will be installed around the entire perimeter of the remedial construction area and inspected once a week and after every storm event to ensure that they are operating appropriately. Discharge locations will be inspected to determine whether erosion control measures are effective in preventing significant impacts to receptors. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by OER. All necessary repairs shall be made immediately. Accumulated sediments will be removed as required to keep the barrier and hay bale check functional. Undercutting or erosion of the silt fence toe anchor will be repaired immediately with appropriate backfill materials. Manufacturer's recommendations will be followed for replacing silt fencing damaged due to weathering.

1.12 Contingency Plan for Unknown Contamination Sources

This contingency plan is developed for the remedial construction to address the discovery of unknown structures or contaminated media during excavation. Identification of unknown contamination source areas during invasive Site work will be promptly communicated to OER's Project Manager. Petroleum spills will be reported to the NYS DEC Spill Hotline. These findings will be included in the daily report. If previously unidentified contaminant sources are found during on-Site remedial excavation or development-related excavation, sampling will be performed on contaminated source material and surrounding soils and reported to OER. Chemical analytical testing will be performed for TAL metals, TCL volatiles and semi-volatiles, TCL pesticides and PCBs, as appropriate.

1.13 Odor, Dust, and Nuisance Control

Odor Control

All necessary means will be employed to prevent on- and off-Site odor nuisances. At a minimum, procedures will include: (a) limiting the area of open excavations; (b) shrouding open excavations with tarps and other covers; and (c) use of foams to cover exposed odorous soils. If odors develop and cannot otherwise be controlled, additional means to eliminate odor nuisances will include: (d) direct load-out of soils to trucks for off-Site disposal; and (e) use of chemical odorants in spray or misting systems.

This odor control plan is capable of controlling emissions of nuisance odors. If nuisance odors are identified, work will be halted and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. OER will be notified of all odor complaint events. Implementation of all odor controls, including halt of work, will be the responsibility of the PE/QEP's certifying this remedial plan.

Dust Control

Dust management during invasive on-Site work will include, at a minimum:

- Use of a dedicated water spray methodology for roads, excavation areas and stockpiles.
- Use of properly anchored tarps to cover stockpiles.
- Exercise extra care during dry and high-wind periods.
- Use of gravel or recycled concrete aggregate on egress and other roadways to provide a clean and dust-free road surface.

This dust control plan is capable of controlling emissions of dust. If nuisance dust emissions are identified, work will be halted and the source of dusts will be identified and corrected. Work will not resume until all nuisance dust emissions have been abated. OER will be notified of all dust complaint events. Implementation of all dust controls, including halt of work, will be the responsibility of the PE/QEP's responsible for certifying this remedial plan.

Other Nuisances

Noise control will be exercised during the remedial program. All remedial work will conform, at a minimum, to NYC noise control standards.

Rodent control will be provided during Site clearing and grubbing and during the remedial program, as necessary, to prevent nuisances.

APPENDIX 5

VAPOR BARRIER SPECIFICATIONS

APPENDIX 6

E-SSDS SPECIFICATIONS