

150 UNION AVENUE

BROOKLYN, NEW YORK

Remedial Action Report

NYC VCP Project Number 15CVCP058K

E-Designation Project Number 14EH-A462K

Prepared For:

120 Union Avenue LLC

850 Third Avenue, Suite 13-D, New York, NY

josh@adamamericare.com

Prepared By:

Tarek Z. Khouri P.E.

HydroTech Environmental Engineering and Geology, DPC

15 Ocean Avenue, Suite B, Brooklyn, New York 11225

(718) 636-0800

pmatli@hydrotechenvironmental.com

OCTOBER 2018

REMEDIAL ACTION REPORT

TABLE OF CONTENTS

LIST OF ACRONYMS	7
CERTIFICATION	8
EXECUTIVE SUMMARY	9
REMEDIAL ACTION REPORT	21
1.0 SITE BACKGROUND	21
1.1 Site Location And Background	21
1.2 Redevelopment Plan	22
1.3 Description of Surrounding Property	23
1.4 Summary Of Past Site Uses And Areas Of Concern	23
1.5 Summary Of Work Performed Under The Remedial Investigation	
24	
1.6 Summary Of Findings Of Remedial Investigation	24
2.0 DESCRIPTION OF REMEDIAL ACTIONS	27
3.0 COMPLIANCE WITH REMEDIAL ACTION WORK PLAN	33
3.1 Construction Health & Safety Plan	33
3.2 Community Air Monitoring Plan	33
3.3 Soil/Materials Management Plan	33
3.4 Storm-Water Pollution Prevention	33
3.5 Deviations From The Remedial Action Work Plan	34
4.0 REMEDIAL PROGRAM	37
4.1 Project Organization	37
4.2 Site Controls	37
4.3 Materials Excavation And Removal Action	40
4.4 Materials Disposal	46
4.5 Backfill Import	47
4.6 Demaraction	48
5.0 ENGINEERING CONTROLS	49

6.0	INSTITUTIONAL CONTROLS	51
7.0	SITE MANAGEMENT PLAN.....	52
8.0	SUSTAINABILITY REPORT	71

FIGURES

Figure 1: Site Location Map

Figure 2: Site Boundary Map

Figure 3: Site Development Plan

Figure 4: Map of Soil Excavation

Figure 5: Map of Endpoint Sampling Locations

Figure 6: Map of Backfill Placement

Figure 7: Map of Composite Cover

Figure 8: Map of Vapor Barrier system

Figure 9: Map of Sub-Slab Depressurization system

Figure 10: Outbound Truck Transport Routes

TABLES

Table 1: Truck Transport, Material Disposal Quantities and Disposal Facilities

Table 2: Post-USTs Excavation End Point Soil Samples Analytical Results

Table 3: Post-Excavation End Point Soil Samples Analytical Results

Table 4: Remedial Investigation Soil Samples Analytical Results

Table 5: Backfill Quantities and Sources

APPENDICES

1. Remedial Investigation Report
2. Remedial Action Work Plan and Stipulation lists
3. Community Air Monitoring Documentation
4. Correspondences with OER for Deviations from RAWP
5. Daily, Weekly and Monthly Reports
6. Digital Photographs of the Remedial Action
7. Free Product Disposal Manifests
8. Liquid Disposal Manifest
9. FDNY Tank Removal Affidavits and Tank Registration
10. Laboratory Reports for Post-USTs Excavation End-Point Samples
11. Correspondences with NYSDEC for spill closure
12. Laboratory Reports for Post-Soil Excavation End-Point Samples
13. Correspondences with Disposal Facility and Disposal Facilities Letters
14. Soil Waste Disposal Manifests and C&D Disposal Tickets
15. Backfill Information
16. As-Built Drawings of Composite Cover, Vapor Barrier and SSDS
17. Manufacturers Specifications of Vapor Barrier

LIST OF ACRONYMS

Acronym	Definition
CAMP	Community Air Monitoring Plan
DER-10	NYS DEC Division of Environmental Remediation Technical Guidance Manual 10
EC	Engineering Control
HASP	Health and Safety Plan
IC	Institutional Control
NYC VCP	New York City Voluntary Cleanup Program
NYC DEP	New York City Department of Environmental Protection
NYC DOHMH	New York City Department of Health and Mental Hygiene
NYC OER	New York City Office of Environmental Remediation
ORC	Oxygen Release Compound
PID	Photoionization Detector
QA/QC	Quality Assurance/Quality Control
QEP	Qualified Environmental Professional
RAR	Remedial Action Report
RAWP	Remedial Action Work Plan
SCG	Standards, Criteria and Guidance
SCO	Soil Cleanup Objective
SMMP	Soil/Materials Management Plan
SMP	Site Management Plan
SVOCs	Semi-Volatile Organic Compounds
UST	Underground Storage Tank
VOCs	Volatile Organic Compounds

CERTIFICATION

The original Professional Engineer, who certified the RAP, Mr. Shaik Saad, a registered professional engineer licensed by the State of New York, performed professional engineering services and had primary direct responsibility for implementation of the remedial program for the 150 Union Avenue Site (Block 2238 and Lot 49), site number 15CVCP058K. Mr. Saad is no longer available to stamp this RAR. Since the fieldwork was completed under HydroTech supervision, I, Tarek Z. Khouri, certify the following:

- I am Professional Engineer licensed by the State of New York and the Principal Engineer at HydroTech.
- I have reviewed this document, to which my signature and seal are affixed.
- I have discussed this project with the HydroTech Project Manager.
- Engineering Controls developed for this remedial action included in approved RAWP were designed by a HydroTech Engineer to achieve the goals established in the Remedial Action Work Plan for this site.
- Engineering Controls constructed during this remedial action were professionally observed by a HydroTech Engineer and have been reviewed by me 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 January 22, 2015 and Stipulations in a letter dated February 2, 2015 were implemented by HydroTech personnel and that all requirements in those documents have been substantively complied with. I certify that I have reviewed documentation that contaminated soil, fill, liquid or other material from the property was taken to facilities licensed to accept this material in full compliance with applicable laws and regulations.

Name Tarek Z. Khouri

PE License Number 086611

Signature

Date 11-08-2018



I, Mark E. Robbins, certify the following:

- I am a Qualified Environmental Professional. I had primary direct responsibility for implementation of the remedial program for the 150 Union Avenue site, site number 15CVCP058K.
- The OER-approved Remedial Action Work Plan dated January 22, 2015 and Stipulations in a letter dated February 2, 2015 were implemented and that all requirements in those documents have been substantively complied with. I certify that contaminated soil, fill, liquid or other material from the property was taken to facilities licensed to accept this material in full compliance with applicable laws and regulations.

QEP Name

QEP Signature

Date

EXECUTIVE SUMMARY

120 Union Avenue LLC has enrolled in the New York City Voluntary Cleanup Program (NYC VCP) to investigate and remediate a property located at 150 Union Avenue (aka 150-150 Union Avenue, 238 Lynch Street; 195-211 Middleton Street) in the Broadway Triangle section of Brooklyn, New York. A Remedial Investigation (RI) was performed to compile and evaluate data and information necessary to develop a Remedial Action Work Plan (RAWP). A remedial action was performed pursuant to the OER-approved RAWP in a manner that has rendered the Site protective of public health and the environment consistent with the proposed use of the property. This RAR describes the remedial action performed under the RAWP. 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.

Site Location and Background

The Site is located at 150 Union Avenue (aka 150-150 Union Avenue, 238 Lynch Street; 195-211 Middleton Street) in the Broadway Triangle section of Brooklyn, New York and is identified as Block 2238 and Lot 49 on the New York City Tax Map. The Site is 26,025-square feet and is bounded by Lynch Street to the north, Middleton Street to the south, two multi-story apartment buildings to the east and Union Avenue to the west. Prior to development, the Site was occupied by Knights Collision and Towing and contained a 2-story office building with a partial cellar in the southern portion and a 1-story building used for automobile repairs and body works in the northern portion. The remaining eastern portion consisted of an auto salvage yard.

Summary of Redevelopment Plan

The new development at the Site consists of a new 7-story mixed use commercial and residential building with a slab on-grade. The building footprint is 16,025 square feet. The first floor of the building consists of a commercial mercantile space of 1,850 square feet, a residential lobby and mechanical rooms of approximately 6,635 square feet and open asphalt-paved parking space of approximately 7,421 square feet. The remaining portions of the site is undeveloped consist of an open recreation area of 2,442 square feet in the southwestern portion at the corner of Middleton Street and Union Avenue and an open asphalt parking space of 7,421 square feet in the eastern portion. The second to seventh floors consist of residential dwellings.

The building foundations consisted of pile caps that required localized excavations to 4 feet and 3 inches below grade surface. The excavation for the slab on-grade of the building required excavations to 2 feet below grade surface. The asphalt parking area required excavation to 1 foot below grade surface. The open recreation area was not excavated. Additional excavations to eight feet below grade surface occurred beneath the elevator pit, for the removal of contaminated soil around an abandoned UST and also for the installation of three 7-foot diameter drywells installed in the parking area and one 10-foot diameter drywell installed in the recreation area. The excavation schedules in the parking area, in the recreation area and for the drywells are considered a deviation from the development plan noted in the RAWP.

The entire building is capped with a 10-inch thick slab poured on top of 6-inch of backfill consisting of $\frac{3}{4}$ inch bluestone in the area of a sub-slab depressurization system and 4 to 8 feet of backfill consisting of $\frac{3}{4}$ inch recycled stone aggregates (RCA) in the areas of removed USTs and lead hot spot at the Site. The parking lot was paved with 5 inches of asphalt on top of a 4-inch thick RCA. The recreation area was capped with 4-inch thick concrete slab.

The new development at the Site is consistent with the NYC zoning designation R6A with a commercial overlay of C2-4.

Summary of Description of Surrounding Property

Within a 500 feet radius of the Site, there are a variety of land uses including: residential (multi-story residential apartments), commercial, parking, industrial, institutions and vacant properties. Properties located within a 1/4-mile radius of the Site are zoned R6, R6B, R7A, R7-1 (general residential districts), C1-3, C2-1 C2-2 (general commercial districts) and M1-3 and M3-1 (light manufacturing districts). Within 500 feet radius of the Site, one sensitive receptor, a day care at congregation ahavas shulem d'nadverna, was found to be 369 ft away from the site. The land uses include residential buildings, industrial uses, institutions and vacant lots.

Summary of Past Site Uses and Areas of Concern

Based upon the review of the Fire Insurance Maps and Regulatory Agency documents from the Phase I Environmental Site Assessment (ESA) Reports prepared by HydroTech Environmental Corp. in January 2014 a Site history was established. The Site was occupied by religious, residential and office buildings and an iron workshop between 1887 and 1918 and by an individual residential dwelling between 1935 and 1950. The Site was also utilized for used auto sales in 1950 and auto repairs with a 1-story building in the southern portion and adjacent parking areas between 1965 until 2015.

The AOCs identified for this site included:

- The presence of open NYSDEC Spill number #14-10116 which was called prior the RI due to presence of free product
- The presence of a closed NYSDEC spill#09-09352
- The historical use of the property for iron works, auto repairs and a gasoline station
- The presence of a NYSDEC active spill at a north-adjacent BP gasoline station
- The presence of inactive underground hydraulic lifts

Summary of the Work Performed under the Remedial Investigation

HydroTech performed the following scope of work at the site in April 2014:

1. Conducted a Site inspection to identify AOCs and physical obstructions (i.e. structures, buildings, etc.);
2. Performed a Ground Penetrating Radar (GPR) survey over approximately 55% of the Site;
3. Installed nine (9) soil borings across the entire project Site, and collected eighteen (18) soil samples for chemical analysis from the soil borings to evaluate soil quality;
4. Installed three (3) groundwater monitoring wells throughout the Site, which were gauged along with three (3) existing wells to establish groundwater flow and collected five (5) groundwater samples from the installed three (3) wells and two (2) existing wells (previously installed under the authority of NYSDEC Spills for Spill number 14-10116) for chemical analysis to evaluate groundwater quality. One (1) of the existing monitoring wells (MW-1) indicated free petroleum product;
5. Installed one (1) sub-slab vapor probe and four (4) soil vapor probes and collected five (5) samples for chemical analysis;
6. One (1) outdoor air sample was collected for chemical analysis.

Summary of Findings of Remedial Investigation

1. Elevation of the property is 16 feet.
2. One anomaly indicative of an abandoned UST was identified in the western portion of the Site during the GPR survey.
3. Depth to groundwater ranges from 5.94 feet to 7.99 feet below sidewalk grade at the Site.
4. Groundwater flow is generally from north-northeast to south-southwest beneath the Site.

5. The stratigraphy of the site, from the surface down, consists of historic fill with variable thickness ranging between zero and 8 feet (brown, coarse-grained sand with varying amounts of bricks and pebbles).
6. Soil/fill samples collected during the remedial investigation were compared to the 6NYCRR Part 375 Track 1 Unrestricted Use Soil Cleanup Objectives (SCOs) as well as to Track 2 Restricted Residential Use SCOs. RI results show only one VOC, Acetone (0.071 ppm) at concentrations above Track 1 Unrestricted Use SCOs. Acetone is a common laboratory contaminant and was also detected in laboratory blanks. Tetrachloroethylene (PCE) (0.027 ppm), trans-1,2-Dichloroethylene (trans-1,2-DCE) (0.0026 ppm) and methylene chloride (0.0039 ppm) were also detected in 3 shallow soil samples, but at levels below Unrestricted Use SCOs. SVOCs consisting of polycyclic aromatic hydrocarbons (PAHs) were detected in 2 shallow and 1 deep samples in excess of Track 1 Unrestricted Use SCOs and Track 2 Restricted Residential Use SCOs. These PAHs included benzo(a)anthracene (max. 3.07 ppm), benzo(a)pyrene (4.43 ppm), benzo(b)fluoranthene (2.52 ppm) and indeno(1,2,3-cd)Pyrene (0.68 ppm). Pesticides including 4,4-DDD (max 0.057 ppm), 4,4-DDE (max 0.2 ppm) and 4,4-DDT (max 1.61 ppm) were detected in 2 shallow and 1 deep soil samples at concentrations exceeding Track 1 SCOs, but below Restricted Residential Use SCOs. Metals including arsenic (max 23.10 ppm), barium (max 4,070 ppm), cadmium (max 3.13 ppm), copper (max 183 ppm), lead (max 876 ppm), nickel (max 31.5 ppm), silver (max 14.5 ppm) and zinc (max 1,180 ppm) were detected in 8 shallow soil 4 deep samples at concentrations exceeding Track 1 SCOs. Among these, arsenic, barium and lead also exceed the Track 2 Residential SCOs in 2 shallow and 1 deep soil samples.
7. Groundwater samples collected during the RI showed one VOC methyl tert-butyl ether (17 µg/L) in a groundwater sample in excess of the New York State 6NYCRR Part 703.5 Groundwater Quality Standard (GQS).

One groundwater monitoring wells (MW-1) was found to contain free petroleum product and therefore a groundwater sample was not collected. Chlorinated VOCs were not detected in groundwater. No PCBs or pesticides were detected in any groundwater sample. Several PAHs were detected in the groundwater samples at concentrations exceeding GQS and include benzo(a)anthracene (max. 1.32 µg/L), benzo(a)pyrene (max. 0.86 µg/L), benzo(b)fluoranthene (0.26 µg/L), benzo(k)fluoranthene (0.52 µg/L), bis(2-ethylhexyl)phthalate (29 µg/L), indeno(1,2,3-cd)pyrene (0.40 µg/L) and chrysene (0.1 µg/L). Dissolved magnesium, manganese and sodium were also detected at concentrations exceeding GQS.

8. Soil vapor results collected during the RI were compared to the monitoring/mitigation ranges established in the vapor intrusion matrices in the New York State Department of Health (NYSDOH) Final Guidance for Evaluating Soil Vapor Intrusion dated October 2006. Soil vapor samples show petroleum related compounds and associated derivatives in the 5 soil vapor samples collected at this Site. The concentrations of benzene, toluene ethylbenzene and xylenes (BTEX) compounds range from 45.80 µg/m³ to 311 µg/m³. Chlorinated hydrocarbons were detected at low concentrations. Tetrachloroethylene (PCE) was detected in all soil vapor samples at a maximum concentration of 26 µg/m³, which is well below the NYSDOH guidance. The chlorinated hydrocarbons 1,1,1-trichloroethane, trichloroethene, and carbon tetrachloride were not detected in any sample. Methylene chloride (max. 6.9 µg/m³) and chloroform (max. 1 µg/m³) were also detected in soil vapor samples. BTEX and associated compounds were detected in the outdoor air sample at 29 µg/m³.

Summary of the Remedial Action

The Remedial Action achieved protection of public health and the environment for the intended use of the property. The Remedial Action achieved all of the Remedial Action Objectives established for the project; addressed applicable standards, criteria, and guidance; reduced mobility, toxicity and volume of contaminants; was cost effective and implementable; and used standard methods that are well established in the industry. The remedial action is effective in the short-term and long-term.

A summary of the milestones achieved in the Remedial Action is as follows: A Pre-Application Meeting was held in June 2014. A Remedial Investigation (RI) was performed from April 17 to April 23, 2014. A RI Report was prepared to evaluate data and information necessary to develop a Remedial Action Work Plan (RAWP). A Site Contact List was established. A draft RAWP was prepared and released with a Fact Sheet on January 15, 2015 for a 30-day public comment period. The RAWP and Stipulation List dated February 6, 2015 was approved by the New York City Office of Environmental Remediation (OER) on February 19, 2015. Site briefings was conducted with New York State Department of Environmental Conservation (NYSDEC) on January 22, 2015. A Pre-Construction meeting was held on June 3, 2015. A Fact Sheet providing notice of the start of the remedial action was issued on June 6, 2015. The remedial action was begun on March 14, 2015 and completed on June 14, 2018.

The remedial action consisted of the following tasks:

1. Prepared a Community Protection Statement and implemented a Citizen Participation Plan.
2. Mobilized site security and equipment (March 2015); completed utility mark outs; and marked and staked excavation areas.
3. Performed Waste Characterization Study prior to excavation activities. Four waste characterization soil samples were collected April 24, 2015 and June 22, 2015. Waste characterization samples were collected at a frequency dictated by disposal facility(s).
4. Performed a Community Air Monitoring Program for particulates and volatile organic carbon compounds.

5. Established Track 4 Site Specific Soil Cleanup Objectives (SCOs). The following Track 4 SCOs were utilized: total SVOC (250 ppm); lead: 1,000 ppm; arsenic: 24 ppm, barium: 750 ppm and mercury: 2.5 ppm.
6. The following excavations were performed. Soil was removed:
 - a. to a depth of 2 feet from grade beneath the entire building footprint;
 - b. to a depth of 1 foot from grade beneath the asphalt parking area in the eastern portion;
 - c. to a depth of 4 feet 3 inches from grade for localized pile caps beneath the building; and
 - d. to a depth of 8 feet from grade in the area of the lead hotspot and elevator pit in the southern portion of the building, within the limits of four 7-foot diameter drywells installed in the parking area and the recreation area.
7. Transported and disposed all soil/fill material at permitted facilities in accordance with all applicable laws and regulations for handling, transporting, and disposing, and the RAWP.
8. A total of 5,580.46 tons of non-hazardous soil/fill were transported to former NJ Zinc-West Plant site located at 1120 Mauch Chunk Road in Palmerton, PA. In addition, 3 trucks of C&D were disposed at Faztec Industries located at 200 Bloomfield Avenue in Staten Island, NY.
9. Screened excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID.
10. Conducted materials management of excavated materials including temporarily stockpiling and segregating in accordance with defined material types and to prevent co-mingling of contaminated material and non-contaminated materials. Appropriately segregated excavated media onsite prior to disposal.
11. Collected and analyzed five (5) post-excavation confirmation samples to determine attainment of SCOs. Track 4 Site-Specific SCOs were achieved.

12. Under NYSDEC oversight, performed eight weekly Enhanced-Fluid Recovery (EFR) on existing monitoring wells in accordance to NYSDEC requirements to remediate NYSDC Spill number 14-10116. A total of 501 gallons of water mixed with free product was removed and disposed of properly at Rapid Waste Disposal, Inc. located at 444 Tiffany Avenue in Bronx, NY and were transported to a permitted facility during the EFR events.
13. Removed four USTs located in three separate tank fields in compliance with applicable laws and regulations. These included one (1) individual 3000-gallon number 2 fuel oil UST, one (1) 550-gallon waste oil UST and two interconnected 200-gallon hydraulic oils USTs. In addition, one (1) 250-gallon waste oil AST and twenty-seven (27) underground hydraulic lifts were also removed from the Site. A total of 100.22 gallons of product was removed from the USTs and the hydraulic lifts by a Vacuum Truck and disposed of at a licensed facility Rapid Waste Disposal, Inc. located at 444 Tiffany Avenue in Bronx, New York. The tanks were registered with the NYSDEC under PBS number 2-608507 and a FDNY tank removal affidavit was obtained.
14. After the removal of the USTs, end-point soil samples were collected from each of the three tank fields including four sidewalls and two bottom soil samples in the vicinity of the 3000-gallon number 2 fuel oil UST, one bottom sample in the vicinity of the 550-gallon waste oil UST and one endpoint sample under each of the two interconnected 200-gallon hydraulic oils USTs. The endpoint samples indicated the total concentrations of detected VOCs did not exceed the Track 4 SCOs. SVOCs such as polycyclic aromatic hydrocarbons were detected exceeding the Track 4 SCOs. These end point samples were in addition to site wide post-excavation confirmation samples.
15. Imported backfill materials for the following purposes:
 - i. 1,168.27 tons of processed 2 ½ -inch recycling stone aggregates (RCA) was used to backfill beneath the building slab and areas around the USTs and lead hot spot excavations. This RCA and the bluestones were provided from Impact Environmental located at 1000 Page Avenue in Lyndhurst, New Jersey.

- ii. 188 cubic yards of processed $\frac{3}{4}$ -inch RCA to backfill beneath asphalt paving of the parking space in the eastern portion of the Site. This RCA was provided from NYC Concrete Materials located at 5700 47th Street in Maspeth, New York.
 - iii. 176.06 tons of masonry sand was used beneath and above the installed vapor barrier. This sand material was provided from Impact Environmental located at 1000 Page Avenue in Lyndhurst, New Jersey and also from Ranco Sand and Stone located at 151 South Street in Manorville, New York.
 - iv. 344.74 tons of $\frac{3}{4}$ -inch bluestone was used as a porous substrate beneath the building slab in compliance with a sub-slab vapor mitigation plan in the RAWP and accordance with applicable laws and regulations. The blue stone was provided from Tilcon Mount Hope Quarry by Evergreen Recycling located at 127-50 Northern Boulevard in Flushing, New York and Impact Environmental located at 1000 Page Avenue in Lyndhurst, New Jersey.
16. Constructed an engineered Composite Cover System consisting of 10 inches of concrete slab in the building area underlain by 6 inches of RCA beneath the parking space in the building and 6 inches of $\frac{3}{4}$ -inch bluestone beneath the occupied areas and; 6 inches of asphalt pavement underlain by minimum of 4 inches of RCA in parking areas and 4-inch thick concrete slab in the recreation area. The contractor for the cover construction of engineering controls was Northwoods Construction & Excavation, Inc., located at 3 Browns Lane in Hawthorne, NY.
17. Installed a Vapor Barrier System that consisted of 30-mil GSE HDPE membrane beneath building slab across the footprint of the occupied portion of the building. The vapor barrier around the elevator pits consisted of 59-mil Grace Bithutene 3000 on the outside walls of the pit and 60-mil Grace Procor membrane on the inside of the pit. All penetrations through the slab for utility lines were sealed utilizing GSE approved tape. The contractor for the Vapor Barrier System construction was Northwoods Construction & Excavation, Inc.

18. Installed a passive Sub-Slab Depressurization System beneath the slab of occupied portions of the building. The passive SSDS consists of two closed loops utilizing fabric wrapped 4-inch Schedule 40 perforated PVC pipes aligned horizontally within a layer of ¾-inch bluestone and properly pitched to allow for adequate drainage. The underground piping in each loop is attached to 4-inch PVC riser aligned vertically through the interior the of the building that terminate with a wind turbine. The contractor for the passive Sub-Slab Depressurization System construction was Northwoods Construction & Excavation, Inc.
19. A demarcation layer consisting of orange snow fence was placed on the surface of residual soil/fill in the open parking area in order to provide an observable reference layer between existing soil and imported RCA was placed in this area.
20. Residual soil is present beneath the cover layer and will be subject to Site Management under this Remedial Action.
21. Performed all activities required for the Remedial Action, including permitting requirements and pretreatment requirements, in compliance with applicable laws and regulations.
22. Implemented storm-water pollution prevention measures in compliance with applicable laws and regulations.
23. Submitted daily, weekly and monthly progress reports during construction oversight activities. These progress reports were submitted from June 1, 2015 to June 14, 2018.
24. Submitted a Sustainability Report.
25. Submitted an RAR that describes the Remedial Action, certifies that the remedial requirements defined in the Remedial Action Work Plan have been achieved; defines the Site boundaries; describes all Engineering and Institutional Controls applicable to the Site; and describes any changes from the RAWP.

26. Submitted a Site Management Plan (SMP) for long-term management of residual soil, including plans for operation, maintenance, inspection and certification of the performance of Engineering Controls and Institutional Controls. Inspections will be performed annually. Inspection and Certification reports will be submitted by July 30, 2019 (for the reporting period calendar year 2018-2019), July 30, 2020 (for the reporting period calendar years 2019-2020) and every five years thereafter (for the reporting period consisting of the five prior calendar years). Inspection and Certification Reports will cover all calendar years since the prior reporting period.
27. The property will continue to be registered with an E-Designation by the NYC Department of Buildings. Engineering Controls and Institutional Controls will be managed in compliance with the SMP. Institutional Controls will include prohibition of the following: (1) prohibition of vegetable gardening and farming in residual soil; (2) prohibition of the use of groundwater beneath the site without treatment rendering it safe for the intended use; (3) prohibition of disturbance of residual soil material unless it is conducted in accordance with the SMP; and (4) prohibition of higher levels of land usage than the restricted residential uses addressed by this remedial action without prior notification and approval by OER.
28. Remediation of NYSDEC Petroleum Spill number 14-10116 was under the authority of the NYSDEC Spill program and this spill is considered closed on September 4, 2018.

REMEDIAL ACTION REPORT

1.0 SITE BACKGROUND

120 Union Avenue LLC has enrolled in the New York City Voluntary Cleanup Program (NYC VCP) to investigate and remediate a property located at 120 Union Avenue (aka 150-150 Union Avenue, 238 Lynch Street; 195-211 Middleton Street) in the Broadway Triangle section of Brooklyn, New York. The boundary of the property subject to this Remedial Action is shown in Figure 1 and includes, in its entirety, Brooklyn Block 2238 and Lot 49. The Remedial Action was performed pursuant to the OER-approved RAWP in a manner that has rendered the property protective of public health and the environment consistent with its intended use. This RAR describes the Remedial Action performed under the RAWP. 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 (SCGs) and applicable laws and regulations.

1.1 Site Location And Background

The Site is located at 150 Union Avenue (aka 150-150 Union Avenue, 238 Lynch Street; 195-211 Middleton Street) in the Broadway Triangle section of Brooklyn, New York and is identified as Block 2238 and Lot 49 on the New York City Tax Map. Figure 1 shows the Site location. The Site is 26,025-square feet and is bounded by Lynch Street to the north, Middleton Street to the south, two multi-story apartment buildings to the east and Union Avenue to the west. A map of the site boundary is shown in Figure 2. Prior to development, the Site was occupied by Knights Collision and Towing and contained a 2-story office building with a partial cellar in the southern portion and a 1-story building used for automobile repairs and body works in the northern portion. The remaining eastern portion consisted of an auto salvage yard.

1.2 Redevelopment Plan

The new development at the Site consists of a new 7-story mixed use commercial and residential building with a slab on-grade. The building footprint is 16,025 square feet. The first floor of the building consists of a commercial mercantile space of 1,850 square feet, a residential lobby and mechanical rooms of approximately 6,635 square feet and open asphalt-paved parking space of approximately 7,421 square feet. The remaining portions of the site is undeveloped consists of an open recreation area of 2,442 square feet in the southwestern portion at the corner of Middleton Street and Union Avenue and an open asphalt parking space of 7,421 square feet in the eastern portion. The second to seventh floors consist of residential dwellings. The building foundations consisted of pile caps that required localized excavations to 4 feet and 3 inches below grade surface. The excavation for the slab on-grade of the building required excavations to 2 feet below grade surface. The asphalt parking area required excavation to 1 foot below grade surface. The open recreation area was not excavated. Additional excavations to eight feet below grade surface occurred beneath the elevator pit, for the removal of contaminated soil around the abandoned UST and also for the installation of three 8-foot diameter drywells installed in the parking area and one 8-foot diameter drywell installed in the recreation area. The excavation schedules in the parking area, in the recreation area and for the drywells are considered a deviation from the development plan noted in the RAWP.

The entire building is capped with a 10-inch thick slab poured on top of 6-inch of backfill consisting of $\frac{3}{4}$ inch bluestone in the area of a sub-slab depressurization system and 4 to 8 feet of backfill consisting of $\frac{3}{4}$ inch recycled stone aggregates (RCA) in the areas of removed USTs and lead hot spot at the Site. The parking lot was paved with 2 inches of asphalt on top of a 3-inch coarse and a 4-inch thick RCA. The recreation area was capped with 4-inch thick concrete slab.

The new development at the Site is consistent with the NYC zoning designation R6A with a commercial overlay of C2-4. A map showing the building location, basement location and open space location is shown in the Development Plan in Figure 3.

1.3 Description of Surrounding Property

Within a 500 feet radius of the Site, there are a variety of land uses including: residential (multi-story residential apartments), commercial, parking, industrial, institutions and vacant properties. Properties located within a 1/4-mile radius of the Site are zoned R6, R6B, R7A, R7-1 (general residential districts), C1-3, C2-1 C2-2 (general commercial districts) and M1-3 and M3-1 (light manufacturing districts). Within 250 feet radius of the Site, no sensitive receptor is identified. The land uses include residential buildings, industrial uses, institutions and vacant lots.

1.4 Summary Of Past Site Uses And Areas Of Concern

Based upon the review of the Fire Insurance Maps and Regulatory Agency documents from the Phase I Environmental Site Assessment (ESA) Reports prepared by HydroTech Environmental Corp. in January 2014 a Site history was established. The Site was occupied by religious, residential and office buildings and an iron workshop between 1887 and 1918 and by an individual residential dwelling between 1935 and 1950. The Site was also utilized for used auto sales in 1950 and auto repairs with a 1-story building in the southern portion and adjacent parking areas between 1965 until 2015.

The AOCs identified for this site included:

- The presence of open NYSDEC Spill number #14-10116 which was called prior the RI due to presence of free product
- The presence of a closed NYSDEC spill#09-09352
- The historical use of the property for iron works, auto repairs and a gasoline station
- The presence of a NYSDEC active spill at a north-adjacent BP gasoline station
- The presence of monitoring wells
- The presence of inactive underground hydraulic lifts

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. Performed a Ground Penetrating Radar (GPR) survey over approximately 55% of the Site;
3. Installed nine (9) soil borings across the entire project Site, and collected eighteen (18) soil samples for chemical analysis from the soil borings to evaluate soil quality;
4. Installed three (3) groundwater monitoring wells throughout the Site, which were gauged along with three (3) existing wells to establish groundwater flow and collected five (5) groundwater samples from the installed three (3) wells and two (2) existing wells (previously installed under the authority of NYSDEC Spills for Spill number 14-10116) for chemical analysis to evaluate groundwater quality. One (1) of the existing monitoring wells (MW-1) indicated free petroleum product;
5. Installed one (1) sub-slab vapor probe and four (4) soil vapor probes and collected five (5) samples for chemical analysis;
6. One (1) outdoor air sample was collected for chemical analysis.

1.6 Summary Of Findings Of Remedial Investigation

1. Elevation of the property is 16 feet.
2. One anomaly indicative of an abandoned UST was identified in the western portion of the Site during the GPR survey.
3. Depth to groundwater ranges from 5.94 feet to 7.99 feet below sidewalk grade at the Site.
4. Groundwater flow is generally from north-northeast to south-southwest beneath the Site.

5. The stratigraphy of the site, from the surface down, consists of historic fill with variable thickness ranging between zero and 8 feet (brown coarse grained sand with varying amounts of bricks and pebbles).
6. Soil/fill samples collected during the remedial investigation were compared to the 6NYCRR Part 375 Track 1 Unrestricted Use Soil Cleanup Objectives (SCOs) as well as to Track 2 Restricted Residential Use SCOs. RI results show only one VOC, Acetone (0.071 ppm) at concentrations above Track 1 Unrestricted Use SCOs. Acetone is a common laboratory contaminant and was also detected in laboratory blanks. Tetrachloroethylene (PCE) (0.027 ppm), trans-1,2-Dichloroethylene (trans-1,2-DCE) (0.0026 ppm) and methylene chloride (0.0039 ppm) were also detected in 3 shallow soil samples, but at levels below Unrestricted Use SCOs. SVOCs consisting of polycyclic aromatic hydrocarbons (PAHs) were detected in 2 shallow and 1 deep samples in excess of Track 1 Unrestricted Use SCOs and Track 2 Restricted Residential Use SCOs. These PAHs included benzo(a)anthracene (max. 3.07 ppm), benzo(a)pyrene (4.43 ppm), benzo(b)fluoranthene (2.52 ppm) and indeno(1,2,3-cd) pyrene (0.68 ppm). Pesticides including 4,4-DDD (max 0.057 ppm), 4,4-DDE (max 0.2 ppm) and 4,4-DDT (max 1.61 ppm) were detected in 2 shallow and 1 deep soil samples at concentrations exceeding Track 1 SCOs, but below Restricted Residential Use SCOs. Metals including arsenic (max 23.10 ppm), barium (max 4,070 ppm), cadmium (max 3.13 ppm), copper (max 183 ppm), lead (max 876 ppm), nickel (max 31.5 ppm), silver (max 14.5 ppm) and zinc (max 1,180 ppm) were detected in 8 shallow soil 4 deep samples at concentrations exceeding Track 1 SCOs. Among these, arsenic, barium and lead also exceed the Track 2 Residential SCOs in 2 shallow and 1 deep soil samples.

7. Groundwater samples collected during the RI showed one VOC methyl tert-butyl ether (17 µg/L) in a groundwater sample in excess of the New York State 6NYCRR Part 703.5 Groundwater Quality Standard (GQS). One groundwater monitoring wells (MW-1) was found to contain free petroleum product and therefore a groundwater sample was not collected. Chlorinated VOCs were not detected in groundwater. No PCBs or pesticides were detected in any groundwater sample. Several PAHs were detected in the groundwater samples at concentrations exceeding GQS and include benzo(a)anthracene (max. 1.32 µg/L), benzo(a)pyrene (max. 0.86 µg/L), benzo(b)fluoranthene (0.26 µg/L), benzo(k)fluoranthene (0.52 µg/L), bis(2-ethylhexyl) phthalate (29 µg/L), indeno(1,2,3-cd) pyrene (0.40 µg/L) and chrysene (0.1 µg/L). Dissolved magnesium, manganese and sodium were also detected at concentrations exceeding GQS.
8. Soil vapor results collected during the RI were compared to the monitoring/mitigation ranges established in the vapor intrusion matrices in the New York State Department of Health (NYSDOH) Final Guidance for Evaluating Soil Vapor Intrusion dated October 2006. Soil vapor samples show petroleum related compounds and associated derivatives in the 5 soil vapor samples collected at this Site. The concentrations of benzene, toluene ethylbenzene and xylenes (BTEX) compounds range from 45.80 µg/m³ to 311 µg/m³. Chlorinated hydrocarbons were detected at low concentrations. Tetrachloroethylene (PCE) was detected in all soil vapor samples at a maximum concentration of 26 µg/m³, which is well below the NYSDOH guidance. The chlorinated hydrocarbons 1,1,1-trichloroethane, trichloroethene, and carbon tetrachloride were not detected in any sample. Methylene chloride (max. 6.9 µg/m³) and chloroform (max. 1 µg/m³) were also detected in soil vapor samples. BTEX and associated compounds were detected in the outdoor air sample at 29 µg/m³.

Appendix 1 includes the RIR.

2.0 DESCRIPTION OF REMEDIAL ACTIONS

The Remedial Action was performed in accordance with an OER-approved Remedial Action Work Plan and achieved the Remedial Action Objectives established for the project. The Remedial Action was evaluated in an alternatives analysis and was determined to be protective of human health and the environment, compliant with standards, criteria, and guidelines (SCGs), effective in the short-term, effective in the long-term, capable of attaining appropriate levels of reduction of toxicity, mobility, or volume of contaminated material, implementable, cost effective, acceptable to the community, consistent with land uses, and sustainable.

A summary of the milestones achieved in the Remedial Action is as follows: A Pre-Application Meeting was held in April, 2014. A Remedial Investigation (RI) was performed from April 17 to April 23, 2014. A RI Report was prepared to evaluate data and information necessary to develop a Remedial Action Work Plan (RAWP). A Site Contact List was established. A RAWP was prepared and released with a Fact Sheet on January 15, 2015 for a 30-day public comment period. The RAWP and Stipulation List dated February 6, 2015 was approved by the New York City Office of Environmental Remediation (OER) on February 19, 2015. Site briefings was conducted with New York State Department of Environmental Conservation (NYSDEC) on January, 22nd, 2015. A Pre-Construction meeting was held on June 2, 2015. A Fact Sheet providing notice of the start of the remedial action was issued on June 6, 2015. The remedial action was begun on March 14, 2015 and completed on June 14, 2018. Appendix 2 includes the RAWP.

The remedial action consisted of the following tasks:

1. Prepared a Community Protection Statement and implemented a Citizen Participation Plan.
2. Mobilized site security and equipment (March 2015); completed utility mark outs; and marked and staked excavation areas.
3. Performed Waste Characterization Study prior to excavation activities. Four waste characterization soil samples were collected April 24, 2015 and June 22, 2015. Waste characterization samples were collected at a frequency dictated by disposal facility(s).

4. Performed a Community Air Monitoring Program for particulates and volatile organic carbon compounds.
5. Established Track 4 Site Specific Soil Cleanup Objectives (SCOs). The following Track 4 SCOs were utilized: total SVOC (250 ppm); lead: 1,000 ppm; arsenic: 24 ppm, barium (750 ppm) and mercury: 2.5 ppm.
6. The following excavations were performed: soil was removed
 - a) to a depth of 2 from grade beneath the entire building footprints;
 - b) to a depth of 1 from grade beneath the asphalt parking area in the eastern portion;
 - c) to a depth of 4 feet 3 inches from grade for localized pile caps beneath the building; and
 - d) to a depth of 8 feet from grade in the area of the lead hotspot and elevator pit in the southern portion of the building, within the limits of four 7-foot diameter drywells installed in the parking area and the recreation area.
7. Transported and disposed all soil/fill material at permitted facilities in accordance with all applicable laws and regulations for handling, transporting, and disposing, and the RAWP. A total of 5,580.46 tons of non-hazardous soil/fill were transported to former NJ Zinc site located at 1120 Mauch Chunk Road in Palmerton, PA. In addition, 3 loads of C&D were disposed at Faztec Industries located at 200 Bloomfield Avenue in Staten Island, NY.
8. Screened excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID.
9. Conducted materials management of excavated materials including temporarily stockpiling and segregating in accordance with defined material types and to prevent co-mingling of contaminated material and non-contaminated materials.
10. Appropriately segregated excavated media onsite prior to disposal. Transported and disposed all soil/fill material at permitted facilities in accordance with all applicable laws and regulations for handling, transporting, and disposing, and the RAWP.

11. Collected and analyzed five (5) end-point samples to determine attainment of SCOs. Track 4 SCOs were achieved.
12. Under NYSDEC oversight, performed eight weekly Enhanced-Fluid Recovery (EFR) on existing monitoring wells in accordance to NYSDEC requirements to remediate NYSDC Spill number 14-10116. A total of 501 gallons of water mixed with free product was removed and disposed of properly during the EFR events.
13. Under NYSDEC oversight, removed four USTs located in three separate tank fields in compliance with applicable laws and regulations. These included one (1) individual 3000-gallon number 2 fuel oil UST, one (1) 550-gallon waste oil UST and two interconnected 200-gallon hydraulic oils USTs. In addition, one (1) 250-gallon waste oil AST and twenty-seven (27) underground hydraulic lifts were also removed from the Site. A total of 100.22 gallons of product was removed from the USTs and the hydraulic lifts by a Vacuum Truck and disposed of at a licensed facility Rapid Waste Disposal, Inc. located at 444 Tiffany Avenue in Bronx, New York. The tanks were registered with the NYSDEC under PBS number 2-608507 and a FDNY tank removal affidavit was obtained.
14. After the removal of the USTs, end-point soil samples were collected from each of the three tank fields including four sidewall and two bottom soil samples in the vicinity of the 3000-gallon number 2 fuel oil UST, one bottom sample in the vicinity of the 550-gallon waste oil UST and one endpoint sample under each of the two interconnected 200-gallon hydraulic oils USTs. The endpoint samples indicated the total concentrations of detected SVOCs did not exceed the Track 4 SCOs. These end point samples were in addition to site wide end point samples.

15. Imported different types of backfill materials for different purposes:
- i. 1,168.27 tons of processed 2 ½ -inch recycling stone aggregates (RCA) was used to backfill beneath the building slab and areas around the USTs and lead hot spot excavations. This RCA and the bluestones were provided from Impact Environmental located at 1000 Page Avenue in Lyndhurst, New Jersey.
 - ii. 188 cubic yards of processed ¾-inch RCA to backfill beneath asphalt paving of the parking space in the eastern portion of the Site. This RCA was provided from NYC Concrete Materials located at 5700 47th Street in Maspeth, New York.
 - iii. 176.06 tons of masonry sand was used beneath and above the installed vapor barrier. This sand material was provided from Impact Environmental located at 1000 Page Avenue in Lyndhurst, New Jersey and also from Ranco Sand and Stone located at 151 South Street in Manorville, New York.
 - iv. 344.74 tons of ¾-inch bluestone was used as a porous substrate beneath the building slab in compliance with a sub-slab vapor mitigation plan in the RAWP and accordance with applicable laws and regulations. The blue stone was provided from Tilcon Mount Hope Quarry by Evergreen Recycling located at 127-50 Northern Boulevard in Flushing, New York and Impact Environmental located at 1000 Page Avenue in Lyndhurst, New Jersey.
16. Constructed an engineered Composite Cover System consisting of 10 inches of concrete slab in the build area underlain by RCA of variable thicknesses beneath the parking space and 6 inches of ¾-inch bluestone beneath the occupied areas and; 6 inches of asphalt pavement underlain by minimum of 4 inches of RCA in parking areas and 4-inch thick concrete slab in the recreation area. The contractor for the cover construction of engineering controls was Northwoods Construction & Excavation, Inc., located at 3 Browns Lane in Hawthorne, NY.

17. Installed a Vapor Barrier System that consisted of 30-mil GSE HDPE membrane beneath building slab across the footprint of the building. The vapor barrier around the elevator pits consisted of 59-mil Grace Bithutene 3000 on the outside walls of the pit and 60-mil Grace Procor membrane on the inside of the pit. All penetrations through the slab for utility lines were sealed utilizing GSE approved tape. The contractor for the Vapor Barrier System construction was Northwoods Construction & Excavation, Inc.
18. Installed a passive Sub-Slab Depressurization System beneath the slab of occupied portions of the building. The passive SSDS consists of two closed loops utilizing fabric wrapped 4-inch Schedule 40 perforated PVC pipes aligned horizontally within a layer of ¾-inch bluestone and properly pitched to allow for adequate drainage. The underground piping in each loop is attached to 4-inch PVC riser aligned vertically through the interior the of the building that terminate with a wind turbine. The contractor for the passive Sub-Slab Depressurization System construction was Northwoods Construction & Excavation, Inc.
19. A demarcation layer consisting of orange snow fence was placed on the surface of residual soil/fill in the open parking area in order to provide an observable reference layer between existing soil and imported RCA was placed in this area.
20. Residual soil is present beneath the cover layer and will be subject to Site Management under this Remedial Action.
21. Performed all activities required for the Remedial Action, including permitting requirements and pretreatment requirements, in compliance with applicable laws and regulations.
22. Implemented storm-water pollution prevention measures in compliance with applicable laws and regulations.
23. Submitted daily, weekly and monthly progress reports during construction oversight activities. These progress reports were submitted from June 1, 2015 to June 14, 2018.
24. Submitted a Sustainability Report.

25. Submitted an RAR that describes the Remedial Action, certifies that the remedial requirements defined in the Remedial Action Work Plan have been achieved; defines the Site boundaries; describes all Engineering and Institutional Controls applicable to the Site; and describes any changes from the RAWP.
26. Submitted a Site Management Plan (SMP) for long-term management of residual soil, including plans for operation, maintenance, inspection and certification of the performance of Engineering Controls and Institutional Controls. Inspections will be performed annually. Inspection and Certification reports will be submitted by July 30, 2019 (for the reporting period calendar year 2018-2019), July 30, 2020 (for the reporting period calendar years 2019-2020) and every five years thereafter (for the reporting period consisting of the five prior calendar years). Inspection and Certification Reports will cover all calendar years since the prior reporting period.
27. The property will continue to be registered with an E-Designation by the NYC Department of Buildings. Engineering Controls and Institutional Controls will be managed in compliance with the SMP. Institutional Controls will include prohibition of the following: (1) prohibition of vegetable gardening and farming in residual soil; (2) prohibition of the use of groundwater beneath the site without treatment rendering it safe for the intended use; (3) prohibition of disturbance of residual soil material unless it is conducted in accordance with the SMP; and (4) prohibition of higher levels of land usage than the restricted residential uses addressed by this remedial action without prior notification and approval by OER.
28. Remediation of NYSDEC Petroleum Spill number 14-10116 was under the authority of the NYSDEC Spill program and this spill is considered closed on September 4, 2018.

3.0 COMPLIANCE WITH REMEDIAL ACTION WORK PLAN

3.1 Construction Health & Safety Plan

The remedial construction activities performed under this program were in compliance with the Construction Health and Safety Plan and applicable laws and regulations. The Site Safety Coordinators were Paul I. Matli and Matt Dabney.

3.2 Community Air Monitoring Plan

The Community Air Monitoring Plan provided for the collection and analysis of air samples during remedial construction activities to ensure proper protections were employed to protect workers and the neighboring community. Monitoring was performed from June 11, 2015 to November 2, 2016 in compliance with the Community Air Monitoring Plan in the approved RAWP. The results of Community Air Monitoring are shown in Appendix 3.

3.3 Soil/Materials Management Plan

The Soil/Materials Management Plan provided detailed plans for managing all soil/materials that were disturbed at the Site, including excavation, handling, storage, transport and disposal. It also included a series of controls to assure effective, nuisance-free remedial activity in compliance with applicable laws and regulations. Remedial construction activities performed under this program were in compliance with the SMMP in the approved RAWP.

3.4 Storm-Water Pollution Prevention

Storm water pollution prevention included physical methods and processes to control and/or divert surface water flows and to limit the potential for erosion and migration of Site soils, via wind or water. Remedial construction activities performed under this program were in full compliance with methods and processes defined in the RAWP for storm water prevention and applicable laws and regulations.

3.5 Deviations From The Remedial Action Work Plan

1. The original passive SSDS design provided in the Stipulation Letter, covered the entire new building area. The passive SSDS design was then reduced to two isolated loops installed beneath the occupied spaces of the first floor of the building. It was determined the system would not be necessary beneath the areas of the indoor parking garages. This deviation was coordinated with both OER and NYSDEC on September 21, 2015.
2. A Track 4 Site-Specific SCO of 2.5 ppm for mercury was established in consultation with OER. This SCO was this established after samples were collected and showed exceedances of Track 2. Mercury was detected in three post-excavation confirmation soil samples at concentrations exceeding the Restricted Residential SCO. The correspondence confirming the new SCO establishment dated July 25, 2018.
3. The present recreation area in the southern portion of the Site was designated in the RAWP to be a landscaped area that required an excavation to at least 2 feet for the placement of a 2-foot clean soil cover. This area was not excavated and was entirely capped with a 4-inch thick concrete slab on existing soil. This area was backfilled during the time of demolition of the former building. There was no backfilling prior placement of the slab. Therefore, the post-excavation confirmation soil sample proposed in this area was not collected. This deviation was approved by OER on February 5, 2018.
4. The total quantity of soil/fill proposed in the RAWP to be excavated and disposed of off-Site was estimated at 2,870 tons. A total of 5,580.46 tons of soil/fill was excavated and disposed of the property due to the change in development and excavation plans.
5. Three drywells were installed in the southern portion of the outdoor parking area and one drywell was installed in the central portion of the recreation area at the Site. The four drywells were not documented in the RAWP. The excavation of each of these drywells was performed within a 7-foot diameter to the depth of 8 feet. An approximately 34.2 cubic yards of soil was excavated for the three dry

- wells. The excavation of the three drywells in the parking area was coordinated with OER during site remedial construction. The design of the dry well in the recreation area was shown on the final building plans of the new development. The excavation of this fourth drywell was not communicated with OER for approval. An approximately 11.4 cubic yards soil was generated from this minor excavation and this soil was reused on-site for grading activities in recreation area. This material was reused in the outdoor area only and beneath the composite cover. This material is likely C&D from the demolition of the former building, thus there were no tests available. HydroTech was not informed during this excavation activity by the contractor. Thus, no CAMP was performed. This is discussed further in the section.
6. A 30-mil GSE HDPE vapor barrier was proposed to be installed horizontally beneath the building slab on-grade throughout the full building area including the elevator pit. Since the elevator pit was designed as part of a pile cap system, the vapor barrier could not be installed under this structure. A 59-mil Grace Bithutene 3000 membrane was installed on the sides of the pile cap system of the elevator pit and 60-mil Grace Procor membrane was installed on the inside. This deviation was approved by OER dated March 16, 2016.
 7. The non-hazardous waste disposal manifests of the 501 gallons of water mixed with free product removed from the closed USTs (in Appendix 9) should be properly signed by the receiving facility. This liquid waste was removed from the Site by Rapid Waste Disposal, Inc. located at 444 Tiffany Avenue in Bronx, New York and were transported to a permitted waste disposal facility. Rapid Waste Disposal, Inc. did not provide the signed copies of these manifests by the receiving facility and could not be reached by phone to provide an affidavit of proper disposal as this transporter was no longer in business.

Appendix 4 provides correspondences with OER regarding approved deviations.

8. The first day of disposal of the soil/fill material was July 2, 2015. The daily status report submitted starting 07/02/2015 indicated a typo of 16 loads in the table. The total number of loads shipped on that day for off-site disposal was 10, which is verified by the manifests provided by the facility. There were few other days including 7/6/2015, 7/7/2015, 9/23/2016 where there was a typo of number of loads mentioned. Thus, there is a discrepancy in the total number of loads on the DSR and the actual loads shipped. A total of 189 loads were shipped off-site for the disposal purpose.

4.0 REMEDIAL PROGRAM

4.1 Project Organization

Principal personnel who participated in the remedial action included Paul I. Matli, Project Geologist. The Professional Engineer (PE) and Qualified Environmental Professionals (QEP) for this project are Shaik Saad (Mr. Saad was involved in the design and implementation but is no longer available to certify the work) and Mark E. Robbins, respectively. The General Contractor who oversaw all phases of Site remedial excavation and construction was Dyna Cebus Construction, LLC. located at 111 John Street, Suite 220 in Manhattan, NY. The developer was 120 Union Avenue, LLC located at 850 Third Avenue, Suite 13-D, New York, NY

Remedial activities at the Site were overseen by NYCOER under the VCP in accordance with the January 2015 RAWP and RAWP stipulations dated February 2015 addressing the HAZMAT E-designation (E-238; CEQR 09DCP413ZMK) (NYC VCP Project Number 15CVCP058K and E-Designation Project Number 14EH-A462K).

4.2 Site Controls

Site Preparation

Prior to and throughout the different phases of remedial activities, all necessary construction permits were acquired and maintained on-site as per as per the New York City Department of Buildings (NYCDOB) rules and regulations. No site clearing and site grubbing of organic matter (wood, roots, stumps, etc.) or other solid waste were required prior to all remedial work.

Prior to the start of remedial activities, a pre-construction meeting was held with all contractors on June 2, 2015. Fencing around the site perimeter was performed following acquisition of necessary NYCDOB permits during February 2015. An OER Project Notice was erected at the project entrance and was in place during all phases of the Remedial Action.

Soil Screening

All excavated soil was examined for visual/olfactory evidence of petroleum contamination and for organic vapors utilizing a Photoionization Detector (PID). The soil screening was performed on soil samples collected randomly from the excavator bucket during live loading or stockpiling of excavated material. No organic vapors (<0.1 ppm) or visual/olfactory evidence of contamination were identified in the excavated soil at the Site.

Stockpile Management

Soil excavated during remedial Site development was either live-loaded directly into trucks and transported off-site or temporarily stockpiled in the vicinity of open excavations until it was then loaded into trucks for off-site disposal. Soil stockpiles were placed directly on 6-mil poly-sheeting and covered at all times with appropriately anchored plastic tarps. This task was completed in accordance with the Soil Material Management Plan in the RAWP

Truck Inspection

Truck inspection and cleaning was performed for all trucks prior to exiting the site. A trucking pad consisting of minimum 3/4 inches of RCA aggregates was laid at the entrance to the Site from Middleton Street to the south. Trucks hauling contaminated soil/fill material were inspected prior to leaving the Site for any debris adhering to their surface. Trucks also went through cleaning including brushing and rinsing their tires with water, when necessary, in order to prevent any tracking of soil/fill into surrounding community. Hauling trucks were also covered in order to control the generation of fugitive dust and leakage of contaminated material during transport.

Site Security

Site security was maintained with a locked fence in accordance with the NYCDOB code.

Nuisance Controls

All necessary means were employed to prevent dust, odor and vapor nuisances during the remedial excavation and disposal of soil/fill material and the closure and removal of USTs. Such measures included shrouding stockpiled material with plastic tarp and a supply of water from the nearest fire hydrant to apply sprinkled water over dry surfaces to reduce dust generation. Provisions for mist applications of odor chemical solutions to suppress potential odor and vapors were made available.

No odors, dust or vapors were generated or identified during remedial work.

Reporting

Daily reports providing a general summary of invasive and other remedial activities were provided to the OER Project Manager for each day of active remedial work by Paul I. Matli. The daily report frequency was reduced to a weekly reports to document 8 events of Enhanced Fluid Recovery (EFR) from monitoring wells, removal of hydraulic lifts, removal and closure of UST that took place during the first 3 weeks of June 2015 and the installation of vapor barrier during the second week of September 2016. Daily reports were only prepared during periods of invasive or other remedial work for a number of days during July and December 2015, January, March, September and November 2018 and June 2018 and excluded periods of no invasive activities.

All daily, weekly and monthly reports are included in Appendix 5. Digital photographs of the Remedial Action are included in Appendix 6.

4.3 Materials Excavation And Removal Action

Recovery of Free Phase Product

In accordance to the NYSDEC requirements associated with the remediation of Spill number 14-10116, the free phase product encountered in one existing monitoring wells (MW-1) during the remedial investigation was addressed via Enhanced-Fluid Recovery (EFR). Eight weekly EFR events were performed at the Site by HydroTech between March 4 and April 13, 2015 prior to the start of invasive soil excavation activities. The EFR was performed utilizing a vacuum truck. A total of 501 gallons of water mixed with free product was removed and disposed of properly during the EFR events.

Copy of waste manifests associated with the EFR events are provided in Appendix 7.

Soil/Fill Excavation and Removal

Soil removed during remediation was done utilizing a Deere 130G and Caterpillar 315C hydraulic excavators. The soil at the Site was excavated to the variable depths; to 4 feet and 3 inches below grade surface for the pile caps for the new building foundations, to 2 feet below grade surface across the new building footprint, 1 foot below grade surface in the asphalt parking area.

Additional excavations to eight feet below grade surface occurred beneath the elevator pit, for the removal of contaminated soil around the abandoned UST and also for the installation of three 8-foot diameter drywells installed in the parking area and one 8-foot diameter drywell installed in the recreation area.

Additional excavations occurred to a depth of 8 feet below grade surface within the limits of three 8-foot diameter drywells installed in the parking area and one 8-foot diameter drywell installed in the recreation area and also in the area of elevator pit and a lead hot spot in the central portion of the Site. Excavation was required to remove three UST fields identified during remediation work; these areas were excavated to 8 feet below grade surface at the location of the 3000-gallon UST and between 5 and 7 feet below grade surface at the location of the 200-gallon hydraulic oil USTs and the 550-gallon waste oil UST. All excavation activities except for the removal of USTs and lead hot spot were done for development purposes. A total of 6,498 tons of soil/fill impacted with SVOCs and metals were excavated and removed from the property during the Removal Action. The Removal Action was performed under the oversight of Shaik Saad P.E., and Mark E. Robbins.

The Site excavation proceeded by first excavating soil in the northern portion of the Site and the removal of twenty seven (27) hydraulic lifts on June 12, 2015, one (1) 550-gallon waste oil UST and two (2) 200 gallon USTs on June 7, 2015. The excavation then continued in the central portion during which, one (1) 3000-gallon fuel oil UST was removed on June 22, 2015. After this tank removal, the excavation then continued into the area of the lead hot spot and adjacent elevator pit and also the three drywells in the open parking area during January 2016. A localized excavation also occurred in the areas of drywell in the recreation area on June 14, 2018. The drywell excavation in the open recreation area generated minor volume of soil that was re-used for grading activities in the same area. Groundwater was encountered during the soil excavation at 8 feet. End points samples were collected over 24 hours after completing the excavation.

A map showing the approximate locations where excavations were performed and approximate depth of excavated material is shown in Figure 4.

UST and Underground Hydraulic Lifts Removal

One (1) 3000-gallon number 2 fuel oil UST (tank field 3000-gal fuel oil UST) was closed and removed from the west-central portion of the Site on June 22, 2015. One (1) 550-gallon waste oil UST (tank field 550-gal waste oil UST) and two interconnected 200-gallon hydraulic oil USTs (tank field 400-gal hydraulic oil UST) were closed and removed from the northwestern portion of the Site on June 7, 2015. In addition, twenty seven (27) underground hydraulic lifts were removed from the northern portion of the Site on June 12, 2015. All UST and hydraulic lifts removal were closed by HydroTech Environmental, Corp. during remedial soil excavation activities. All encountered tanks were buried at 2-3 feet bgs. Following the exposure of the tanks, their interior was inspected through their fill ports. Tank located in the 3000-gal fuel oil UST was previously closed in place and was found filled with slurry, which was removed and stockpiled for disposal prior to tank excavation. All liquid was removed from the USTs through their fill ports utilizing a Vacuum Truck. Following content removal, the tanks were excavated utilizing the bucket excavator and placed on poly sheeting and securely covered until disposal. No visible evidence of holes associated with corrosion was noted on the tanks. Evidence of petroleum contamination was identified in the immediate vicinity of the during the removal of the 3000-gallon number fuel oil UST. The tanks carcasses were disposed of as scrap metal at TNT Scrap Metal located at 340 Maspeth Avenue in Brooklyn, New York.

At the conclusion of the UST closure activity, four (4) sidewall and two (2) bottom end-point soil samples were collected in the tank field 3000-gal fuel oil UST in accordance with DER-10. Since the tank excavation in tank field 400-gal hydraulic oil UST and tank field 550-gal waste oil UST coincided with the excavations for pile caps, only one (1) bottom end-pint soil sample was collected in each of these two fields. The end-point samples were analyzed for VOCs by EPA Method 8260 and SVOCs by EPA Method 8270. Four SVOCs identified as PAHs were detected in one sidewall and one bottom end-point samples from tank field 3000-gal fuel oil UST at concentrations exceeding Track 1 UUSCOs. None of the total VOCs from any end-point soil samples exceeded the Track 4 SCO.

A combined total of 100.22 gallons of liquid was removed from the USTs by a Vacuum Truck and disposed at a licensed facility Rapid Waste Disposal, Inc. located at 444 Tiffany Avenue in Bronx, New York.

The four closed and removed USTs during Site remedial activities were properly registered with the NYSDEC Petroleum Bulk Storage (PBS) unit as closed - removed under PBS # 2-608507. In addition, one (1) 275-gallon AST that previously removed by prior the Site occupant, was also added to this PBS registration as closed and removed.

The approximate location of the USTs is shown in Figure 4. Copies of the liquid disposal manifests are provided in Appendix 8. FDNY tank removal affidavits and PBS registration of the tanks are included in Appendix 9. A tabular summary of UST end-point sampling results is included in Table 2. Laboratory report of the UST end-point samples is provided in Appendix 10.

Onsite Reuse.

Onsite soil excavated during this remedial action was temporarily reused in the area of the removed 3000-gallon fuel oil UST. This material was from the area around the UST. This reused material was then excavated and disposed of properly as part of the remedial activity. The excavated material from the unreported dry well installation was reused in the outdoor area to south. This material is likely to be the C&D from the demolition activity of former building. No other occurrence of onsite reuse of excavated material took place during Site remedial construction.

NYSDEC Petroleum Spills.

Remediation of NYSDEC Petroleum Spill number 14-10116 is under the authority of the NYSDEC Spill program. As part of this spill remediation, NYSDEC only requested the installation of a passive sub-slab depressurization system beneath the occupied spaces of the build areas at the Site besides the other remedies described in the January 2015 RAWP. With the fulfillment and documentation of the requested remedies in this Remedial Action Report, NYSDEC closed the Spill number 14-10116 on September 4, 2018. Appendix 11 includes the correspondence from the NYSDEC for spill closure.

Dewatering.

Groundwater at the site is approximately from 5.94 feet to 7.99 feet below grade and the deepest excavation performed was to 4 feet and 8 feet in area of the 3000-gallon UST; therefore, no dewatering activities were necessary during this remedial action.

Soil Cleanup Objectives

The SCOs for this Site are listed included in 6 NYCRR Part 375, Table 6.8(b) as amended by the following Track 4 Site-Specific SCOs:

<u>Contaminant</u>	<u>Site-Specific SCOs</u>
Total SVOCs	250 ppm
Lead	1000 ppm
Barium	750 ppm
Mercury	2.5 ppm

Based on results of post-excavation samples, Track 4 Site-Specific SCOs were achieved.

Post-Excavation Confirmation Sample Results

Five (5) post excavation confirmation samples designated EP-1 to EP-5 were collected from the bottom of excavation in compliance with the January 2015 RAWP. A sixth end-point sample was proposed beneath the open recreation area in the southern portion of the Site. This sample was not collected since this designated area was not excavated except for the limited drywell excavation.

All five confirmation samples collected at the Site were analyzed for SVOCs by EPA Method 8270 and Target Analyte List metals TAL metals. SVOCs including PAHs were detected at concentrations below Track 4 Site-Specific SCOs. Metals such as barium (max. 461 mg/kg), lead (max. 476 mg/kg) and mercury (max. 2.42 mg/kg) were detected at concentration below Track 4 Site-Specific SCOs. Based upon the post excavation results, Track 4 Site-Specific SCOs were achieved.

The RI provided data for soil that remains onsite including nine (9) soil samples at depths between zero and 8 feet below site grade surface. Analytical results for all these samples were compared to the 6NYCRR Part 375, Table 6.8(b) Track 2 Restricted Residential Use SCOs amended with the Site-Specific Track 4 SCOs. The RI showed that soils that remain on-site with concentrations of SVOCs detected below UUSCOs and metals such as copper (max. 125 mg/kg), lead (max. 304 mg/kg) and zinc (max. 288 mg/kg) were detected at concentration exceeding UUSCOs. SVOCs and metals did not exceed the Track 4 Site-Specific SCOs.

A map of post-excavation confirmation sample locations is shown in Figure 5. A tabular summary of post-excavation samples results is provided in Table 3. The RI samples results compared to SCOs are included in Table 4. Full laboratory reports of post-excavation soil samples results are included in Appendix 12.

4.4 Materials Disposal

A total of 5,580.46 tons of non-hazardous soil/fill was excavated and transported to former NJ Zinc site located at 1120 Mauch Chunk Road in Palmerton, PA. A total of three (3) truckloads of former concrete footings were disposed of as construction and demolition (C&D) material at Faztec Industries located at 200 Bloomfield Avenue in Staten Island, New York.

Disposal Location/Address	Type of Material	Quantity
Former NJ Zinc site located at 1120 Mauch Chunk Road in Palmerton, PA	Non-Hazardous Soil	5,580.46 tons
Faztec Industries located at 200 Bloomfield Avenue in Staten Island, New York	Construction & Demolition Waste	3 loads

A total of 100.22 gallons of product was removed from the USTs and the hydraulic lifts by a Vacuum Truck and disposed of at a licensed facility Rapid Waste Disposal, Inc. located at 444 Tiffany Avenue in Bronx, New York.

Disposal Location/Address	Type of Material	Quantity
Rapid Waste Disposal, Inc. located at 444 Tiffany Avenue in Bronx, New York.	Petroleum mixed with water	100.22 gallon

Correspondence from 120 Union Avenue LLC via HydroTech to disposal facilities providing materials type, source, RI soil data and soil waste characterization data, and acceptance letters from disposal facilities stating it is approved to accept above materials are attached in Appendix 13. Soil disposal manifests and C&D Disposal Tickets are included in Appendix 14. A table of individual truck transport and material disposal quantities is included in Table 1.

4.5 Backfill Import

As part of remedial construction activities, backfill consisting of ¾ inch Recycling Stone Aggregate (RCA) was required to restore the Site elevation following excavation and removal of UST and the excavation and removal of the lad hot spot. Recycling Stone Aggregate (RCA) was also used beneath the asphalt pavement in the open parking area at grade level.

A total of 1,168.27 cubic yards of 2 ½ -inch recycling stone aggregates (RCA) were brought to the Site to backfill between beneath the building slab in the areas around the USTs and lead hot spot excavations. The recycling stone aggregates was provided from Impact Environmental located at 1000 Page Avenue in Lyndhurst, New Jersey

A total of 188 tons of processed ¾-inch RCA were brought to the Site to backfill beneath the asphalt paving of the parking space in the eastern portion of the Site. This RCA was provided from NYC Concrete Materials located at 5700 47th Street in Maspeth, New York.

A total of 176.06 tons of masonry sand was used beneath and above the installed vapor barrier. This sand material was provided from Impact Environmental located at 1000 Page Avenue in Lyndhurst, New Jersey and also from Ranco Sand and Stone located at 151 South Street in Manorville, New York.

A total of 344.74 tons of ¾-inch bluestone was brought to the Site to backfill to be used as a porous substrate beneath the building slab as part of a sub-slab depressurization system. The blue stone was provided by Impact Environmental located at 1000 Page Avenue in Lyndhurst, New Jersey and also by Evergreen Recycling located at 127-50 Northern Boulevard in Flushing, New York.

Table 5 provides backfill quantity and sources. Appendix 15 provides information on the import of recycling stone aggregates and RCA backfill. A map showing backfill placement locations at the Site is shown in Figure 6 and also in as-build plans in Appendix 15.

4.6 Demaraction

An orange snow fence was placed beneath the RCA material used in the open parking area. This was installed as the site achieved Track 4 SCOs.

Remaining soil at the Site is residual soil and will be addressed by Site Management under this Remedial Action.

5.0 ENGINEERING CONTROLS

Engineering Controls were employed in the Remedial Action to address residual soil, groundwater, and soil vapor remaining at the site. The Site has three primary Engineering Control Systems. These are:

1. Composite Cover System;
2. Vapor Barrier System;
3. Passive Sub-Slab Depressurization System.

Composite Cover System

Exposure to residual soil/fill is prevented by an engineered Composite Cover System that has been built on the Site. The Composite Cover System is comprised of a concrete building slab, which consists of a 10-inch thick slab on grade poured on top of a 6-inch of backfill consisting of $\frac{3}{4}$ inch bluestone in the area of a sub-slab depressurization system and 2-inch of sand over the geofabric and 4 to 8 feet of backfill consisting of $\frac{3}{4}$ inch recycled stone aggregates (RCA) in the areas of removed USTs. The parking lot was covered with a 2-inch thick asphalt pavement on top of 3-inch coarse and 4-inch thick RCA. The recreation area was capped with 4-inch thick concrete slab on top of existing soil. The contractor for the cover construction was Northwoods Construction & Excavation, Inc., located at 3 Browns Lane in Hawthorne, NY. The as-built design for each cover type used in the Composite Cover System on this Site is shown in Figure 6 and also in Appendix 16. Photographs of construction of the Composite Cover System are included in Appendix 6.

Vapor Barrier System

Exposure to soil vapor is prevented by a Vapor Barrier System that has been built on the Site. The Vapor Barrier System consists of a 30-mil GSE HDPE vapor barrier membrane beneath building slab across the footprint of the building. The vapor barrier around the elevator pits consisted of 59-mil Grace Bithutene 3000 on the outside walls of

the pit and 60-mil Grace Procor membrane on the inside. All penetrations through the slab for utility lines were sealed utilizing GSE approved tape. Grace Bithutene 3000 membrane and Grace Procor membrane were installation as a deviation from the vapor barrier design in the RAWP. The contractor for the Vapor Barrier System construction was Northwoods Construction & Excavation, Inc.

The as-built engineering diagram for the Vapor Barrier System used on this Site is shown in Figure 6 and also in Appendix 16. Photographs of installation of the Vapor Barrier System are included in Appendix 6. Manufacturers specification of Grace Bithutene 3000 membrane and Grace Procor membrane are provided in Appendix 17.

Passive Sub-Slab Depressurization System

Exposure to soil vapor is prevented by a passive Sub-Slab Depressurization System (SSDS) that has been built on the Site. This SSDS consists of two closed loops utilizing fabric wrapped 4-inch Schedule 40 perforated PVC pipes aligned horizontally within a layer of ¾-inch bluestone and attached to a common lateral and then vertical pipe that traverse the building slab. The sub-slab vapors from each loop are conveyed via a separate 4-inch PVC riser aligned vertically through the interior the of the building and vented above the roof of the building.

The design engineer for the passive SSDS is Shaik A. Saad. The contractor for construction of the passive SSDS was Northwoods Construction & Excavation, Inc. Figure 6 shows the as-built design for the SSDS installed in this Remedial Action and includes the location and layout of the SSDS under the building. Photographs showing the installation of the passive SSDS are shown in Appendix 6. The as-built engineering diagram for the SSDS with location of vent pipe provided in Appendix 16.

6.0 INSTITUTIONAL CONTROLS

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

Institutional Controls for this property are:

- (1) The property will continue to be registered with an E-Designation by the NYC Department of Buildings. Property owner and property owner's successors and assigns are required to comply with the approved SMP;
- (2) Compliance with an OER-approved Site Management Plan including procedures for appropriate operation, maintenance, inspection, and certification of performance of ECs and ICs. The property owner and property owner's successors and assigns will inspect ECs and ICs and submit to OER a written certification that evaluates their performance in a manner and at a frequency to be determined by OER;
- (3) Engineering Controls will not be discontinued without prior OER approval;
- (4) OER has the right to enter the Site upon notice for the purpose of evaluating the performance of ECs and ICs;
- (5) Vegetable gardens and farming in residual soil/fill on the Site are prohibited;
- (6) Use of groundwater underlying the Site without treatment rendering it safe for its intended use is prohibited;
- (7) All future activities on the Site that will disturb residual soil/fill must be conducted pursuant to the Soil/Materials Management provisions of the SMP, or otherwise approved by OER;
- (8) The Site is intended to be used for restricted residential use and will not be used for a higher level of use without prior approval by OER.

7.0 SITE MANAGEMENT PLAN

Site Management is the last phase of the remedial process and begins after the approval of the Remedial Action Report (RAR) and issuance of the Notice of Completion (NOC) by OER. It is the responsibility of the property owner to ensure that all Site Management responsibilities are performed. The penalty for failure to implement the SMP includes revocation of the Notice of Completion and all associated certifications and liability protections providing notice of the revocation to the NYC DOB.

Engineering Controls and Institutional Controls have been incorporated into this Remedial Action to ensure that the site remains protective of public health and the environment. Generally, ECs provide physical protective measures and ICs provide restrictions on Site usage and establish remedial operation, maintenance, inspection and certification measures. This Site Management Plan has been established to govern long-term performance of ECs and ICs for this property.

The SMP provides a detailed description of procedures required to manage residual material at the Site following the completion of remedial construction in accordance with the NYC Voluntary Cleanup Agreement with OER. This includes: (1) operation and maintenance of Engineering Controls; (2) inspection of ECs and ICs; and (3) certification of performance of ECs and ICs.

Engineering Controls

Engineering Controls were employed in the remedial action to address residual materials remaining at the site. The Site has three Engineering Control Systems.

Engineering Controls for this property are:

1. Composite Cover System;
2. Vapor Barrier System;
3. Passive Sub-Slab Depressurization System.

Operation and Maintenance of Composite Cover System

Chapter 5 describes the Composite Cover System utilized in this Remedial Action and provides as-built design details and the location of each cover type. The Composite Cover System is a permanent Engineering Control for the Site. The system will be inspected and its performance certified at specified intervals defined in this SMP. A Soil/Materials Management Plan is included in this Site Management Plan and outlines the procedures to be followed in the event that the composite cover system and underlying residual soil/material must be disturbed after the Remedial Action is complete.

The Composite Cover System does not require any special operation or maintenance activities. If the system is breached during future construction activities [or “normal wear and tear”], the system will be rebuilt by reconstructing the system according to the original design and tying newly constructed cover layers into existing cover layers to form a continuous layer(s).

Operation and Maintenance of Vapor Barrier System

Chapter 5 describes the Vapor Barrier System utilized in this Remedial Action and provides as-built design details and the system location. The Vapor Barrier System is a permanent Engineering Control for the Site. The system will be inspected and its performance certified at specified intervals defined in this SMP.

The Vapor Barrier System does not require any special operation or maintenance activities. If the system is breached during future construction activities, the system will be rebuilt by reconstructing the vapor barrier layers and sealing the newly constructed materials with existing barrier materials in accordance with manufacturer specifications.

Operation and Maintenance of passive Sub-Slab Depressurization System

Chapter 5 describes the passive Sub-Slab Depressurization System utilized in this Remedial Action and provides as-built design details and the system location. The SSDS is a permanent Engineering Control for the Site. The system will be inspected and its integrity certified at specified intervals defined in this SMP.

The passive SSDS does not require any special operation or maintenance activities. If the system is breached during future construction activities or as a result of normal wear and tear, the system will be maintained and if necessary, rebuilt by reconstructing the system according to the original design.

Institutional Controls

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

Institutional Controls are also designed to prevent future exposure to residual soil/materials by controlling disturbances in the subsurface, restricting higher uses of the property than those addressed by the Remedial Action and establishing restrictions on activities and site usage. Institutional Controls for this property are:

Institutional Controls for this property are:

1. The property will continue to be registered with an E-Designation by the NYC Department of Buildings. Property owner and property owner's successors and assigns are required to comply with the approved SMP;
2. Compliance with an OER-approved Site Management Plan including procedures for appropriate operation, maintenance, inspection, and certification of performance of ECs and ICs. The property owner and property owner's successors and assigns will inspect ECs and ICs and submit to OER a written certification that evaluates their performance in a manner and at a frequency to be determined by OER;
3. Engineering Controls will not be discontinued without prior OER approval;
4. OER has the right to enter the Site upon notice for the purpose of evaluating the performance of ECs and ICs;
5. Vegetable gardens and farming in residual soil/fill on the Site are prohibited;

6. Use of groundwater underlying the Site without treatment rendering it safe for its intended use is prohibited;
7. All future activities on the Site that will disturb residual soil/fill must be conducted pursuant to the Soil/Materials Management provisions of the SMP, or otherwise approved by OER;
8. The Site is intended to be used for restricted residential use and will not be used for a higher level of use without prior approval by OER.

Inspections

Engineering Controls and Institutional Controls will be inspected on a periodic basis at a frequency established in this plan. The inspections will evaluate the following:

- If Engineering Controls or Institutional Controls employed at the Site continue to perform as designed and continue to be protective of human health and the environment;
- If anything has occurred that impairs the ability of the Engineering Controls or Institutional Controls to protect public health and the environment;
- If changes are needed to the remedial systems or controls;
- If compliance with this SMP has been maintained;
- If site records are complete and up to date; and
- General Site conditions at the time of inspection.

In addition, if an emergency occurs, such as a natural disaster, or if an unforeseen failure of any of the Engineering Controls occurs, an inspection of the Site will be performed within 30 days to evaluate the Engineering Controls, and a letter report of findings will be submitted to OER.

Inspection of Composite Cover System

Composite cover inspection shall include observations of the conditions of the concrete building slab and the asphalt pavement in rear parking space. The composite covers will be inspected for cracks, holes or other openings. Any cracks, holes, openings or other alterations in the composite cover that are observed during the EC inspection will be recommended to be immediately filled and/or sealed as necessary.

Inspection of Vapor Barrier System

The Vapor Barrier System is completely enclosed and unless the concrete slab above the vapor barrier is removed, EC inspections of the vapor barrier cannot be made. Observations of the concrete slab will be made to determine if cracks and gaps are visible.

The seams and edges of exposed sections of vapor barrier, if any, shall be inspected in addition to the presence of holes in the vapor barrier. Additional vapor barrier tape or sealant will be recommended to repair holes in the vapor barrier or if there is missing sealant along the vapor barrier edges or seams. The concrete slab shall be replaced over the exposed sections of vapor barrier once necessary repairs have been made.

Depressurization System

The sub-grade loops of the passive SSDS are entirely enclosed and unless the concrete slab above the vapor barrier is removed, EC inspections of the loops cannot be made. Observations of the concrete slab will be made to determine if there is any evidence of breaching into the SSDS. The aboveground portion of the SSDS consists of two riser pipes that are each terminated with a wind turbine above the roof top. Assessment of the proper location and the self-rotation of the wind turbine shall be made during the inspection.

Site Use Prohibitions

Inspections to evaluate the status of site use prohibitions will include an evaluation of all of the ICs listed above, including:

- whether there is vegetable gardening or farming in residual soil/fill;
- whether groundwater underlying the site has been used without treatment rendering it safe for its intended use;

- whether activities that have disturbed site soil/fill have been conducted pursuant to the Soil/Material Management provisions of the SMP, or otherwise approved by OER; and
- whether the site has been used for a higher level of use other than the restricted residential use addressed by the Remedial Action.

Inspection And Certification Letter Report

Results of inspections performed during a reporting period and certification of performance of all Engineering Controls and Institutional Controls will be included in an Inspection and Certification Letter Report. Inspections will be performed in 2019 and every five years thereafter. Inspection and Certification Letter Reports will be submitted by July 30, 2019 (for the reporting period calendar years 2018-2019) and every five years thereafter (for the reporting period consisting of the number prior calendar years). Inspection and Certification Reports will cover all calendar years since the prior reporting period. Inspection and Certification Letter Reports will be submitted to OER in digital format. The letter report will utilize a form established by OER. This form includes, at a minimum:

- Date of inspections;
- Personnel conducting inspections;
- Description of the inspection activities performed;
- Observations, conclusions, or recommendations;
- Copy of any monthly inspection forms;
- Photographs; and
- Certification of the performance of Engineering Controls and Institutional Controls executed by the P.E. or QEP responsible for this Inspection and Certification Letter Report, as discussed below.

The certification of the performance of ECs and ICs will establish:

- If Engineering Controls and Institutional Controls employed at the Site continue to be in place, perform as designed and continue to be protective of human health and the environment;
- If anything has occurred that impairs the ability of Engineering Controls or Institutional Controls to protect public health and the environment;
- If changes are needed to the remedial systems or controls;
- If compliance with this Site Management Plan has been maintained;
- If vegetable gardening and farming in residual soils has been prevented;
- If groundwater underlying the Site is being utilized without treatment rendering it safe for the intended purpose has been prevented;
- If activities on the Site that have disturbed residual soil/fill material have been in accordance with the Soil/Materials Management Plan in this SMP;
- If the Site has been used for a higher level of use other than the restricted residential use addressed by the Remedial Action;
- If site records are complete and up to date;
- If the Site continues to be registered as an E-Designated property by the NYC Department of Buildings;

Notifications

Notifications will be submitted by the property owner to OER as described below:

- 60-day advance notice of any proposed changes in Site use, such as an upgrade from existing use to residential use that was not contemplated in the Remedial Action.
- Notice within 30 days of any emergency, such as a fire, flood, or earthquake that has the potential to reduce the effectiveness of Engineering Controls in place at the Site.

Soil/Materials Management Plan

Any future intrusive work that will disturb residual soil/fill beneath the property, including modifications or repairs to the existing composite cover system, will be performed in compliance with this Soil/Materials Management Plan (SMMP). Intrusive work will also be conducted in accordance with the procedures defined in the Community Air Monitoring Plan (CAMP) included in this chapter and a Construction Health and Safety Plan (HASP). The HASP is the responsibility of the property owner and should be in compliance with NYSDEC DER-10 Technical Guide and 29 CFR 1910 and 1926, and all other applicable Federal, State and City regulations. Intrusive construction work should be compliant with this SMMP and described in the next Inspection and Certification Letter Report.

Soil Screening Methods

Visual, olfactory and PID soil screening and assessment will be performed under the supervision of a Qualified Environmental Professional (QEP). Soil screening will be performed during any future intrusive work.

Stockpile Methods

If stockpiles are used to isolate excavated soil they 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 6-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.

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. Excavated soil will only be reused on-site with prior approval by OER.

Materials Excavation, Load-Out and Departure

The PE/QEP overseeing the remedial action will:

- Oversee intrusive 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 management plan;
- Ensure that Site maintenance activities and maintenance-related grading cuts will not interfere with, or otherwise impair or compromise the remedial measures established during the remediation construction phase;
- 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 permits or authorized notifications.;;
- Ensure that all loaded outbound trucks are inspected and cleaned if necessary before leaving the Site; and
- Ensure that all egress points for truck and equipment transport from the Site will be kept clean of Site-derived materials during Site intrusive work.

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.

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.

Outbound truck transport routes are shown on Figure 7. 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.

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) an OER Historical Fill Notification Form and letter from the PE/QEP or property owner 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.

Documentation associated with disposal of all material will include records and approvals for receipt of the material. 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 retained and included in the following Inspection and Certification Report. A manifest system for off-Site transportation of exported materials will be employed. Hazardous wastes derived from on-Site will be stored, transported, and disposed of in compliance with applicable laws and regulations.

Materials Reuse On-Site

All of the non-hazardous soil excavated during any future repair or construction purposes will be placed in the same excavation it was derived from or will be disposed of off-site unless otherwise approved by OER beforehand.

Repair of Remedial Systems

After completion of invasive work, any damage to the engineering controls (composite cover system, vapor barrier, etc.) will be restored to the original condition established during initial construction.

Import of Backfill Soil from Off-Site Sources

In the event that soil importation is needed for the backfilling purposes, this Section presents the requirements for imported fill materials. All imported soils will meet OER-approved backfill and cover soil quality objectives for this Site. The backfill and cover soil quality objectives include NYSDEC Part 375 Track 2 Residential SCOs and groundwater protections standards. 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; and
- Virgin quarried material or other materials with an approved Beneficial Use Determination (BUD) from NYSDEC for reuse as clean fill.

All materials received for import to the Site will be approved by a PE/QEP and will be in compliance with provisions in this SMP. The Inspection and Certification Letter 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.

Source Screening and 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 from the identified clean soil sources will be taken at a minimum frequency of one sample for every 500 cubic yards of material. One composite sample will be collected from each source of virgin quarried material or other material with an NYSDEC approved BUD, unless otherwise approved by OER. Once it is determined that the fill material meets imported backfill or cover soil chemical requirements, is non-hazardous, and lacks petroleum contamination, the material will be loaded onto trucks for delivery to the Site.

Recycled concrete aggregate (RCA) without fines may be imported from facilities permitted or registered by NYSDEC. 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 will not be used as cover material.

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. If discharge to the City sewer system is not feasible, the dewatering fluids will be managed by transportation and disposal at an off-Site treatment facility or some other means compliant with applicable laws and regulations. Discharge of water generated during remedial construction to surface waters (i.e. a stream or river) is prohibited without a SPDES permit issued by NYSDEC.

Storm-water Pollution Prevention

Applicable laws and regulations pertaining to storm-water pollution prevention will be addressed during the remedial program. All existing storm-water systems will be inspected to ensure proper operation.

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 be controlled by these means, 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. The odor control plan must be 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.

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 soil/fill stockpiles;
- Exercise extra care during dry and high-wind periods; and
- Use of asphalt millings, gravel or recycled concrete aggregate on egress and other roadways to provide a clean and dust-free road surface.

If nuisance dust emissions are identified, work will be halted and the source of dust 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/QEPs.

Noise

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

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 baling/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. Exceedences 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 shut down.

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 at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. 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 ($\mu\text{g}/\text{m}^3$) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques will be employed. Work will continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed $150 \mu\text{g}/\text{m}^3$ 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 $150 \mu\text{g}/\text{m}^3$ 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 $150 \mu\text{g}/\text{m}^3$ of the upwind level and in preventing visible dust migration.

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

Contingency Plan

This contingency plan is developed for the remedial construction or repair work 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. 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.

Emergency Telephone Numbers

In the event of any emergency condition pertaining to these remedial systems, the Owner's representative(s) should contact the appropriate parties from the contact list below. Prompt contact should also be made to Paul I. Matli. These emergency contact lists must be maintained in an easily accessible location at the Site.

Emergency Contact Numbers

Medical, Fire, and Police:	911
One Call Center: 3 day notice required for utility mark-out	(800) 272-4480
Poison Control Center:	(800) 222-1222
Pollution Toxic Chemical Oil Spills:	(800) 424-8802
NYSDEC Spills Hotline	(800) 457-7362

Contact Numbers

Paul Matli (HydroTech Environmental Engineering and Geology, DPC)	718-636-0800
Office of Environmental Remediation	(212) 788-8841; 311

8.0 SUSTAINABILITY REPORT

This Remedial Action provided for sustainable remediation and redevelopment through a variety of means that are defined in this Sustainability Report.

Reuse of Clean, Recyclable Materials and Conservation of Natural Resources. Reuse of clean, recyclable materials reduces consumption of non-renewable virgin resources and can provide energy savings and greenhouse gas reduction since these materials can be locally-derived.

Conservation of non-renewable resources was achieved by importing RCA. An estimate of the tonnage of recycled material reused on this project is approximately 1,365 cubic yards.

Conversion to Clean Fuels. Use of clean fuel improves NYC's air quality by reducing harmful emissions.

Natural gas is utilized as the principal fuel in the new building.

Recontamination Control. Recontamination after cleanup and redevelopment is completed undermines the value of work performed, may result in a property that is less protective of public health or the environment, and may necessitate additional cleanup work later that could impede future redevelopment. Recontamination can arise from future releases that occur within the property or by influx of contamination from off-Site.

The area of the Site that utilizes recontamination controls under this plan is 26,025-square feet.

Storm-water Retention. Storm-water retention improves water quality by lowering the rate of combined storm-water and sewer discharges to NYC's sewage treatment plants during periods of precipitation and reduces the volume of untreated influent to local surface waters.

An estimate of area of the property for which enhanced storm-water retention capability has been established for the redevelopment project is 26,025-square feet.

Paperless Brownfield Cleanup Program. 120 Union Avenue LLC participated in OER's paperless Voluntary Cleanup Program. Under this program, submission of electronic documents replaced submission of hard copies for the review of project documents, communications and milestone reports. A best estimate of the mass (pounds) of paper saved under this plan is 250 pounds.

Low-Energy Project Management Program. 120 Union Avenue LLC participated in OER's low-energy project management program. Under this program, whenever possible, meetings were held using remote communication technologies, such as videoconferencing and teleconferencing to reduce energy consumption and traffic congestion associated with personal transportation. A gross estimate of the number of miles of personal transportation that was conserved in this process is 190 miles.

Trees and Plantings. Trees and other plantings provide habitat and add to NYC's environmental quality in a wide variety of ways. Native plant species and native habitat provide optimal support to local fauna, promote local biodiversity, and require less maintenance. The number of trees planted as part of this redevelopment is 15 trees.