REMEDIAL ACTION WORK PLAN

for

4650 BROADWAY
New York, New York
Block 2175, Lot 1
NYSDEC BCP Site No. C231123

Prepared For:

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Langan Project No. 170505501

CERTIFICATION

I, Jason Hayes, PE, certify that I am currently a New York State (NYS) registered professional engineer and that this Remedial Action Work Plan was prepared in accordance with applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

I certify that all information and statements in this certification are true. I understand that a false statement made herein is punishable as Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law.

Jason J. Hayes P.E.

NYS Professional Engineer #089491 Date Signature

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

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LIST OF ACRONYMS

Acronym	Definition
1,2-DCA	1,2-Dichloroethane
ACM	Asbestos-Containing Material
AOC	Area of Concern
ASP	Analytical Services Protocol
AST	Aboveground Storage Tank
ASTM	ASTM International
BCP	Brownfield Cleanup Program
Bgs	below grade surface
C&D	Construction and Demolition
CAMP	Community Air Monitoring Plan
CFR	Code of Federal Regulations
CEQR	City Environmental Quality Review
COC	Contaminant of Concern
CQAP	Construction Quality Assurance Plan
CSM	Conceptual Site Model
CVOC	Chlorinated Volatile Organic Compound
DER	Division of Environmental Remediation
DMM	Division of Materials Management
DUSR	Data Usability Summary Report
EDD	Electronic Data Deliverable
El	Elevation
ELAP	Environmental Laboratory Approval Program
ESA	Environmental Site Assessment
ESI	Environmental Site Investigation
eV	electron volt
FEMA	Federal Emergency Management Agency
FWRIA	Fish and Wildlife Resources Impact Analysis
HASP	Health and Safety Plan
HVAC	Heating, Ventilation, and Air Conditioning
L/min	liters per minute
LBP	Lead-Based Paint
IRM	Interim Remedial Measures
ISCO	In-Situ Chemical Oxidation
NAVD88	North American Vertical Datum of 1988
NYC	New York City

Acronym	Definition
NYCDEP	New York City Department of Environmental Protection
NYCDOB	New York City Department of Buildings
NYCDOT	New York City Department of Transportation
NYCRR	New York Codes, Rules, and Regulations
NYCTA	New York City Transit Authority
NYS	New York State
NYSDOH	New York State Department of Health
NYSDEC	New York State Department of Environmental Conservation
O&M	Operations and Maintenance
OSHA	Occupational Safety and Health Administration
PBS	Petroleum Bulk Storage
PCB	Polychlorinated Biphenyl
PCE	Tetrachloroethene
PFC	Perfluorinated Chemical
PFOA	perfluorooctanoic acid
PID	Photoionization Detector
PPE	Personal Protective Equipment
Ppm	parts per million
PVC	Polyvinyl Chloride
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
RAO	Remedial Action Objective
RAWP	Remedial Action Work Plan
RCA	Recycled Concrete Aggregate
RCNY	Rules of the City of New York
RE	Remediation Engineer
REC	Recognized Environmental Condition
RI	Remedial Investigation
RIR	Remedial Investigation Report
RU	Restricted Use - Residential
RURR	Restricted Use – Restricted Residential
SCG	Standards, Criteria, and Guidance
SCO	Soil Cleanup Objective
SEQRA	State Environmental Quality Review Act
SGV	Standards and Guidance Values
SMMP	Soil/Materials Management Plan
SPDES	State Pollutant Discharge Elimination System

Acronym	Definition
SVOC	Semivolatile Organic Compound
SWPPP	Stormwater Pollution Prevention Plan
TAL	Target Analyte List
TCE	Trichloroethene
TCL	Target Compound List
TOC	Total Organic Carbon
TOGS	Technical and Operational Guidance Series
TPH	Total Petroleum Hydrocarbons
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UST	Underground Storage Tank
UU	Unrestricted Use
VOC	Volatile Organic Compound

EXECUTIVE SUMMARY

This Remedial Action Work Plan (RAWP) was prepared on behalf of AQOZFI Inwood LLC (the Volunteer) for the property located at 4650 Broadway in the Inwood neighborhood of New York, New York (the site). The Volunteer entered into a Brownfield Cleanup Agreement (BCA) with the New York State Department of Environmental Conservation (NYSDEC) on December 18, 2018 and Brownfield Cleanup Program (BCP) Site No. C231123 was assigned. The Volunteer proposes to remediate the site for residential and commercial use.

This RAWP summarizes the nature and extent of contamination as determined from data gathered between April 2018 and August 2019 and summarized in the November 4, 2020 Remedial Investigation Report. The RAWP also describes the implementation of the Interim Remedial Measures Work Plan (IRMWP) between April and August 2019 and subsequent groundwater monitoring and soil sampling to document the effectiveness of the IRM.

This RAWP evaluates applicable remedial action alternatives, their associated costs, and the recommended and preferred Track 4 remedy. The remedy described in this document is consistent with the procedures defined in NYSDEC Division of Environmental Remediation (DER) Program Policy: Technical Guidance for Site Investigation and Remediation (DER-10) and complies with applicable federal, state, and local laws, regulations, and requirements.

SITE DESCRIPTION/PHYSICAL SETTING/SITE HISTORY

The site is located at 4650 Broadway in the Inwood neighborhood of New York, New York, and is identified on the Manhattan Borough Tax Map as Block 2175, Lot 1. The 47,175-square foot lot is located at the southwestern corner of the city block bound by Dongan Place to the north, Arden Street to the east, Sherman Avenue to the south, and Broadway to the west and is improved with a two-story vacant parking garage with a full cellar (7 to 12 feet below sidewalk grade) and partial sub-cellar (about 4 feet below cellar grade). The southern part of the building was most recently operated by Park-it Pilot Parking LLC as a commercial parking garage, and the northern part of the building was most recently used to store antique cars and construction materials.

The site was an undeveloped vacant lot until at least 1928. By 1928 the existing two-story building was constructed across the entire footprint and was occupied by an automotive garage and service facility. By 1968, the northern part of the building was occupied by offices with an elevator in the northwestern corner, and the southern part of the building remained as an automotive garage and service facility. Two gasoline tanks were shown in the southwestern corner of the building in historical Sanborn maps from 1977 through 1994. According to NYSDEC Petroleum Bulk Storage (PBS) database records, three 550-gallon gasoline underground storage

tanks (USTs) were removed from the site in August 2009. Additionally, two No.2 fuel oil USTs (one 5,000-gallon and one 2,500-gallon) and one 5,000-gallon No. 4 fuel oil above ground storage tank (AST) were removed from the site in 1998. The site is listed under NYSDEC PBS Facility ID 2-077666.

Petroleum-impacts to soil and groundwater were documented during subsurface investigations performed in 2004 and 2009. In May 2009, four groundwater monitoring wells were installed near three 550-gallon gasoline USTs and groundwater samples were collected and analyzed for volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs). Based on the investigation findings, a spill was reported and NYSDEC Spill No. 0902240 was assigned. The USTs and petroleum-impacted soil were subsequently removed from the site; however, petroleum contamination persisted in groundwater and soil.

Following enrollment in the BCP, a Remedial Investigation (RI) was completed to define the nature and extent of contamination in soil, groundwater and soil vapor. The RI identified the following environmental concerns: 1) The presence of petroleum impacts in soil and groundwater in the south central part of the site from about 6 to 12 feet below cellar grade and 2) the presence of historic fill material extending from cellar grade to depths of up to 7.5 feet below cellar grade. A draft Remedial Investigation Report (RIR) was prepared and submitted to NYSDEC in 2018. Following completion of emerging contaminants sampling in August 2019 and further review by NYSDEC the RIR was finalized in November 2020 and approved by NYSDEC in December 2020.

Groundwater treatment consisting of PersulfOx®, RegenOx®, PlumeStop®, and Petrofix® injections was implemented from April to August 2019 pursuant to an NYSDEC-approved IRM Work Plan (IRMWP) and seven quarters of post-remedial groundwater sampling have been completed to date. In addition, a supplemental soil investigation was completed in March 2021 to determine the effectiveness of groundwater treatment in saturated soil.

SUMMARY OF THE REMEDIAL INVESTIGATION FINDINGS

The RI findings summarized herein are based on qualitative data (field observations and instrumental readings) and laboratory analytical soil, groundwater, and soil vapor sampling results.

1. Stratigraphy: Historic fill predominantly consisting of brown, fine- to medium-grained sand with varying amounts of silt, gravel, and concrete was encountered across the site from below the cellar slab to depths ranging from about 2 to 7.5 feet below cellar grade (9 to 19.5 feet below grade surface [bgs]). Native soil encountered below historic fill predominantly consists of fine- to medium-grained sand with varying amounts of gravel and silt. Bedrock was encountered during a geotechnical investigation performed by Langan in April and May 2018 and consists of gneiss, mica schist, and marble. The top

of bedrock varies from about 30 to 88 feet below cellar grade. The bedrock surface is irregular and generally slopes down to the west and to the north. Boring data indicates bedrock is shallowest within the southeastern part of the site.

2. Hydrogeology: Synoptic groundwater measurements were collected on May 9, 2018 from nine of the monitoring wells installed during the April 2018 RI. Groundwater elevations (el)[1] range between el 20.62 to el 21.6 feet, which corresponds to depths of about 4.4 to 5.3 feet below cellar grade (about 11.4 to 17.38 feet bgs). Groundwater flow is to the northeast. Underground utilities and other subsurface structures may locally influence the direction of groundwater flow.

3. Petroleum Impacts in Soil, Groundwater and Soil Vapor: Petroleum impacts were identified across an area of roughly 12,500 square feet within the southern part of the site, occupying about 25% of the site. Petroleum-related volatile organic compounds (VOCs) were detected above the UU and/or Restricted Use-Restricted Residential (RURR) Soil Cleanup Objectives (SCOs) in soil samples collected between 6 and 10 feet below cellar grade (about 13 to 22 feet bgs) within this area. Photoionization detector (PID) headspace readings of up to 875 parts per million (ppm), petroleum-like odors, and petroleum-related VOCs above the NYSDEC Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards and Guidance Values for Drinking Water (class GA) (collectively referred to as the Standards and Guidance Values [SGVs]) were detected at monitoring well locations within the petroleum-impacted area. Petroleum-related contamination was localized to the southern-central part of the site, which formerly contained three, 550-gallon gasoline USTs and a petroleum tank room. Petroleum-related VOCs in soil and groundwater are related to the historical petroleum bulk storage at the site.

4. Historic Fill: Laboratory analytical results indicate that the historic fill contains SVOCs, metals, and polychlorinated biphenyls (PCBs) at concentrations above the UU and/or RURR SCOs. The deepest samples exceeding the SCOs were found between 7 and 8 feet below cellar grade (14 to 20 feet bgs). Per- and poly-fluoroalkyl substances (PFAS) were detected in historic fill samples.

5. Native Soil: Mercury and seven PAHs were detected above UU and/or RURR SCOs in a native soil sample collected between 7 to 8 feet below cellar grade (14 to 20 feet bgs) in

[1] Elevations are referenced to the North American Vertical Datum of 1988 (NAVD88) unless otherwise noted.

soil boring RSB07; however, these detections are likely a result of infiltration of historic fill material into the borehole during sample collection. Manganese and acetone were also detected above the UU SCOs; however, manganese is a naturally occurring metal, and acetone is a common laboratory contaminant.

6. Soil Vapor: The soil vapor samples contained chlorinated volatile organic compound (CVOC) concentrations which were not detected in the indoor air sample. The tetrachloroehtylene (PCE) and trichloroethylene (TCE) concentrations detected in soil vapor may be indicative of a chemical release associated with historical site use, or may be related to the historical use of the southern-adjoining property as a dry cleaning facility. The petroleum-related VOCs detected in the sub-slab soil vapor are likely related to the open petroleum spill in the south-central part of the site. The petroleum-related VOCs detected in indoor air may be related to either the open on-site spill in the south central portion of the site, or to automotive emissions from the former use as a parking garage.

QUALITATIVE HUMAN HEALTH EXPOSURE ASSESSMENT

Based on the conceptual site model and review of environmental data, complete on-site exposure pathways appear to be present in current, construction-phase, and future conditions. The complete exposure pathways indicate there is a risk of exposure to humans from site contaminants via exposure to soil, groundwater, and soil vapor if appropriate measures, including engineering controls (ECs) and institutional controls (ICs) as necessary, are not implemented. A qualitative human health exposure assessment was performed to evaluate the exposure pathways, and the following conclusions were developed:

1. Human exposure to site contaminants is limited under current conditions due to the surface cover, and access is limited to investigation workers. The primary exposure pathways are dermal contact, ingestion, and inhalation of soil, groundwater, or soil vapor by site investigation workers and, to a lesser extent, the nearby public. The exposure risks can be avoided or minimized by following the appropriate Health and Safety Plan (HASP) and vapor and dust suppression measures, and by implementing a community air monitoring plan (CAMP) during investigation activities.
2. In the absence of mitigation and controls, there is potential for exposure during the construction-phase activities. The primary exposure pathways are:
    a. Dermal contact, ingestion, and inhalation of contaminated soil, groundwater, or soil vapor by construction workers.
    b. Dermal contact, ingestion, and inhalation of soil (dust) and inhalation of soil vapor by the community in the vicinity of the site.

c. These can be avoided or minimized by implementing CAMP and by following the appropriate HASP, vapor and dust suppression, site security measures, and following this NYSDEC-approved RAWP.

3. The existence of a complete exposure pathway for site contaminants to human receptors during proposed future conditions is unlikely, as contaminated soil will be excavated and transported to an off-site disposal facility, groundwater will be remediated, and residual soil will be capped, if required, with an impermeable cover or 2 feet of clean soil. Regional groundwater is not used as a potable water source in New York City. The potential pathway for soil vapor intrusion into the building would be addressed by removal of any source material, though none was identified during the RI.
4. It is possible that a complete exposure pathway exists for the migration of site contaminants to off-site human receptors during current, construction-phase, and future conditions. Monitoring and control measures have been and will continue to be used during investigation and construction to prevent completion of this pathway. Under future conditions, the site will be remediated and ECs and ICs will be implemented, if necessary, to prevent completion of this pathway.

SUMMARY OF THE REMEDY

In preparation for site remediation and in accordance with the approved IRMWP, the existing building will undergo abatement of hazardous materials, including asbestos-containing materials (ACM), lead based paint (LBP), PCB-containing building materials, and any other identified universal and miscellaneous hazardous waste articles. Following abatement of hazardous materials, the building will be demolished to facilitate site remediation.

The selected Track 4 remedy will include the following:

- Development and implementation of a HASP and CAMP for the protection of on-site workers, the community, and the environment during the remediation phase of development
- Excavation of all soils in the upper 2 feet and any soil above the groundwater table which exceeds the PGW SCOs for contaminants of concern in groundwater (about 3,500 cubic yards). The site will be further excavated to about 5 feet below cellar grade as part of site development. Following soil removal, an engineered composite cover system will be installed.
- Removal of encountered USTs and/or associated appurtenances (e.g., fill lines, vent line, and electrical conduit) and decommissioning and off-site disposal during redevelopment in accordance with DER-10, 6 NYCRR Part 613.9, NYSDEC CP-51, and other applicable NYSDEC UST closure requirements

- Continue quarterly post-injection groundwater sampling for a minimum of two years from the first event (March 2020) per the NYSDEC-approved March 2019 In-Situ Treatment Remedial Design Plan.
- Collection and analysis of documentation soil samples at the excavation bottom (about 5 feet below cellar grade)
- Installation of an engineered composite cover system (i.e., reinforced concrete building foundation) underlain by a minimum 20-mil vapor barrier/waterproofing membrane of a building foundation
- Establishment of use restrictions (institutional controls [IC]) including prohibitions on the use of groundwater from the site and prohibitions on sensitive site uses, such as farming or vegetable gardening, to eliminate future exposure pathways
- Establishment of an approved Site Management Plan to ensure long-term management of ECs and ICs, including the performance of periodic inspections and certification that the controls are performing as they were intended
- Recording of an Environmental Easement (EE) to memorialize the remedial action and the ECs and ICs to ensure that future owners of the site continue to maintain these controls as required

Additionally, to incorporate green remediation principles and techniques to the extent feasible in the future development at this site, the future on-site building will include, at a minimum, a 20-mil vapor barrier/waterproofing membrane on the foundation to improve energy efficiency as an element of construction.

Remedial activities will be performed in accordance with this RAWP and the Department-issued Decision Document. Deviations from the RAWP and/or Decision Document will be promptly reported to the NYSDEC for approval and fully explained in the Final Engineering Report (FER).

1.0 INTRODUCTION

This Remedial Action Work Plan (RAWP) was prepared on behalf of AQOZFI Inwood LLC (the Volunteer) for the property located at 4650 Broadway in the Inwood neighborhood of New York, New York (the site). The Volunteer entered into a Brownfield Cleanup Agreement (BCA) with the New York State Department of Environmental Conservation (NYSDEC) on December 18, 2018 and Brownfield Cleanup Program (BCP) Site No. C231123 was assigned. The Volunteer proposes to remediate the site for residential and commercial use.

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1.1 Site Location and Description

The site is located at 4650 Broadway in the Inwood neighborhood of New York, New York, and is identified on the Manhattan Borough Tax Map as Block 2175, Lot 1. The 47,175-square foot lot is located at the southwestern corner of the city block bound by Dongan Place to the north, Arden Street to the east, Sherman Avenue to the south, and Broadway to the west and is improved with a two-story vacant parking garage with a full cellar (7 to 12 feet below sidewalk grade) and partial sub-cellar (about 4 additional feet below cellar grade). The southern part of the building was most recently operated by Park-it Pilot Parking LLC as a commercial parking garage, and the northern part of the building was most recently used to store antique cars and construction materials.

A Site Location Map, which includes a United States Geological Survey (USGS) topographical quadrangle map, is included as Figure 1. The site boundaries are indicated on the Boundary Survey included in Appendix A.

1.2 Redevelopment Plan

The remedy proposed in this RAWP is intended to make the site protective of human health and the environment consistent with the contemplated residential and commercial end use. The proposed redevelopment plan and end use are described here to provide the basis for this assessment; however, the remedial action contemplated under this RAWP may be implemented independent of the proposed redevelopment plan.

The proposed redevelopment project is still in design development and is subject to change. Current plans call for the development to include demolition of the existing building and construction of a 20-story structure with a cellar level. The new building footprint will span the entire 47,175-square-foot lot, and is anticipated to include parking, residential units and amenities, an elementary and middle school, and community space. The existing cellar grade is at about elevation (el)[1] 26, corresponding to between about 7 to 12 feet below sidewalk grade, which ranges from el 32.9 to 38.6 around the site perimeter. The current plans show the top of the proposed cellar slab at about el 24.0, corresponding to between about 9 and 14 feet below sidewalk grade. The site will be excavated up to five feet below current cellar grade to accommodate the construction of a new cellar level and foundation elements. Proposed redevelopment plans are included in Appendix B.

1.3 Description of Surrounding Property

The site is located in an urban area characterized by multiple-story commercial, residential, and institutional buildings and a municipal park. The table on the following page is a summary of surrounding property usage:

[1] Elevations are referenced to the North American Vertical Datum of 1988 (NAVD88) unless otherwise noted.

Direction	Adjoining Properties			Surrounding Properties
	Block No.	Lot No.	Description	
North	2175	10	Five-story residential/commercial building (4672 Broadway)	Multiple-story residential and commercial buildings and Fort Tryon Park
East	2175	100	Six-story residential/commercial building (20 Sherman Avenue)	Multiple-story commercial and residential buildings and a private school
	2175	113	Six-story residential building (19 Dongan Place)	
South	Sherman Avenue followed by:			
	2174	1	Five-story residential/commercial building (1 Sherman Avenue)	Multiple-story commercial and residential buildings
	2174	8	Six-story residential/commercial building (9 Sherman Avenue)	
West	Broadway followed by:			
	2179	625	Fort Tryon Park	Henry Hudson Parkway and Fort Washington Park

Land use within a half mile of the site is primarily commercial and residential, but also includes public parks, day care centers, and schools. A New York City Transit Authority (NYCTA) subway tunnel for the "A" line is located about 300 feet northwest of the site beneath Fort Tryon Park. Sensitive receptors, as defined in NYSDEC DER-10, located within a half mile of the site are listed in the following table:

Number	Name (approximate distance from site)	Address
1	Our Lady Queen of Martyrs School (350 feet northeast)	71 Arden Street New York, New York 10040
2	New York Child Resource Center (370 feet south)	4624 Broadway New York, New York 10040
3	Middle School 322 (400 feet south)	4600 Broadway New York, New York 10040
4	Middle School 322/I.S. 218 Salome Urena (415 feet south)	4600 Broadway New York, New York 10040
5	P.S 152M (450 feet southeast)	93 Nagle Avenue New York, New York 10040
6	Cecelia Garcia Family Day Care (600 feet south)	61 Ellwood Street New York, New York 10040
7	The Y Nursery School (790 feet south)	54 Nagle Avenue New York, New York 10040
8	GR Family Daycare (850 feet southeast)	2 Thayer Street New York, New York 10040
9	High School for Excellence and Innovation (1,300 feet northeast)	650 Academy Street New York, New York 10034

Number	Name (approximate distance from site)	Address
10	The Learning Clubhouse Day Care (1,200 feet southwest)	10 Hillside Avenue New York, New York 10040
11	Treehouse Daycare (1,350 feet northeast)	11 Seaman Avenue New York, New York 10034
12	Payson Playground (1,400 feet north)	285-287 Dyckman Street New York, New York 10034
13	Little Red Daycare (1,250 feet southeast)	176 Nagle Avenue New York, New York 10034
14	Inwood Early College for Health and Information Technology (1,500 feet northeast)	650 Academy Street New York, NY 10034
15	B & J Wonderland Daycare #4 (1,670 feet south)	4500 Broadway New York, New York 10040
16	Aura's Bright Children Daycare (1,450 feet northeast)	13-19 Cumming Street New York, New York 10034
17	Amistad Dual Language School/ Muscota New School (1,725 feet northeast)	4862 Broadway New York, New York 10034
18	Professor Juan Bosch Public School/P.S 178M (1,775 feet southeast)	12 Ellwood Street New York, New York 10040
19	My Little Dream Daycare (1,830 feet northeast)	71 Vermilyea Avenue New York, New York 10034
20	George Washington Educational Campus (1,970 feet southeast)	549 Audubon Avenue New York, New York 10040
21	The Equity Project Charter School (1,700 feet northeast)	153 Sherman Avenue New York, New York 10034
22	Monsignor Kett Playground (2,045 feet east)	500 West 204th Street New York, New York 10034
23	New City Housing Authority's Dyckman Day Care Center (2,000 feet southeast)	3732 10th Avenue New York, New York 10034
24	Muscota New School (1,900 feet northeast)	4862 Broadway New York, New York 10034
25	Nicholas Cardell Day Care Center (1,950 feet northeast)	84 Vermilyea Avenue New York, New York 10034
26	Washington Heights Academy (2,150 feet northeast)	202 Sherman Avenue New York, New York 10034
27	Bellgan Group Family Daycare (2,000 feet south)	82 Wadsworth Terrace New York, New York 10040
28	Little Daydreamers 2 Day Care (2,100 feet northeast)	81 Seaman Avenue New York, New York 10034
29	Success Academy Washington Heights (2,265 feet southwest)	701 Fort Washington Avenue New York, New York 10040
30	Little Daydreamers Early Learning Center (2,300 feet northeast)	103 Seaman Avenue New York, New York 10034

Number	Name (approximate distance from site)	Address
31	God Is Love Reaching the Heights Inc. (2,000 feet northeast)	650 W 204th Street New York, New York 10034
32	Public School 5 Ellen Lurie (2,200 feet southeast)	3703 10th Avenue New York, New York 10034
33	Inwood Academy for Leadership (2,420 feet east)	433 West 204th Street New York, New York 10034
34	Little Jewel Childcare, Inc. (2,600 feet northeast)	4915 Broadway New York, New York 10034
35	Bright Moon Group Family Day Care (2,300 feet southwest)	195 Bennett Avenue New York, New York 10040
36	Smart Start Learning Center WeeCare (2,600 feet northeast)	125 Seaman Avenue New York, New York 10034
37	Peek A Boo Day Care (2,400 feet east)	436 W 204th Street New York, New York 10034
38	Happy Shiny Faces Daycare (2,630 feet northeast)	136 Seaman Avenue New York, New York 10034
39	Growing Happy Group Family Day Care (2,500 feet south	330 Wadsworth Avenue New York, New York 10040
40	Dreams of Kids Group Family Day Care (2,500 feet south)	607 W 190th Street New York, New York 10040

2.0 DESCRIPTION OF REMEDIAL INVESTIGATION FINDINGS

The RI was completed to characterize the nature and extent of contamination at the site, in accordance with Title 6 of the New York Codes, Rules, and Regulations (6 NYCRR) Part 375, DER-10, and the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006 and subsequent updates), between April 9 and September 13, 2018. Emerging contaminant sampling was completed in August 2019. The RI Report (RIR) was approved by the NYSDEC and NYSDOH on December 11, 2020.

2.1 Remedial Investigation

The RI consisted of the following:

- Advancement of 39 soil borings, from which 79 grab soil samples (including four duplicate samples) were collected
- Advancement of 8 soil borings from which 17 grab soil samples were collected for emerging contaminant analysis (including one duplicate sample)
- Installation of fifteen groundwater monitoring wells and collection of seventeen groundwater samples (including two duplicate samples)
- Surveying and synoptic gauging of nine groundwater monitoring wells (RMW01 through RMW09) to determine local groundwater flow direction
- Installation of eight soil vapor points and collection of eight soil vapor samples

2.1.1 Soil Investigation

A Langan field engineer documented the advancement of 39 RI soil borings by Eastern Environmental Solutions, Inc. (Eastern) of Manorville, New York. Boring locations were selected to investigate the potential areas of concern (AOCs). The borings were advanced using a direct-push Geoprobe® 6610DT track-mounted drill rig. Borings located in the cellar were advanced to depths ranging from about 9 to 16 feet below cellar grade (between 16 and 28 feet below grade surface [bgs]). Two sidewalk borings were advanced to 20 and 28 feet bgs.

Soil was recovered continuously from the surface to the completion depth of each boring. Samples were collected into 3- or 4-foot long acetate liners using a 2-inch diameter Macro-Core® or DualTube® sampler. The soil was screened for visual, olfactory, and instrumental evidence of a chemical or petroleum release, and was visually classified for soil type, grain size, texture, and moisture content. Instrument screening for the presence of organic vapors was performed using a photoionization detector (PID) equipped with a 10.6 electron volt (eV) lamp. Following sample

collection, borings were backfilled with soil cuttings that did not display evidence of environmental impacts, and patched with concrete; or borings were converted to groundwater monitoring wells.

Concentrations of semivolatile organic compounds (SVOCs) above the Part 375 6 NYCRR Unrestricted Use (UU) Soil Cleanup Objectives (SCOs) were detected at borings RSB07 and RSB13 between 7 to 8 feet below cellar grade. To further define the extent of SVOC impacts in these locations, a supplemental investigation was completed. During the supplemental investigation, a boring was advanced adjacent to the original RSB07 and RSB13 boring locations (RSB07_R and RSB13_R). Three soil borings were advanced in three cardinal directions around the re-drilled boring at the original boring location, and a sample was collected from 7 to 8 feet below cellar grade to delineate the extent of SVOC-impacted soil.

2.1.2 Groundwater Investigation

A Langan field engineer documented conversion of fifteen soil borings into permanent groundwater monitoring wells by Eastern. One groundwater sample was collected from each monitoring well to characterize groundwater conditions and to investigate potential groundwater impacts associated with the AOCs. Two duplicate groundwater samples were also collected.

Soil borings were converted into groundwater monitoring wells by inserting 10 feet of 1- or 2-inch diameter, schedule 40, 0.01-inch slotted polyvinyl chloride (PVC) screen at the base of the well, and attached PVC riser to grade. The annulus of each groundwater monitoring well was filled with No. 2 sand to a depth of about 2 feet above the top of the screen followed by a bentonite seal to grade surface. Following installation, the groundwater monitoring wells were developed using a peristaltic pump until the water ran clear. Purged groundwater was containerized in labeled 55-gallon drums awaiting disposal at a permitted facility.

The top of casing elevations of monitoring wells RMW01 through RMW09, were surveyed by Langan on April 16, 2018. Synoptic groundwater levels were measured using a Solinst 122 oil/water interface probe on May 9, 2018. Remaining monitoring wells did not need to be surveyed to develop a representative groundwater contour of the site.

2.1.3 Soil Vapor Investigation

A Langan field engineer documented installation of eight soil vapor probes by Eastern. The soil vapor probes were installed about 2 feet above the water table (2.5 to 3 feet below cellar grade). Eastern used a direct push Geoprobe® 6610DT track-mounted drill rig or an electric hand drill to install the soil vapor probes.

Soil vapor probes were installed in accordance with the 2006 NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York and were comprised of polyethylene implants (1/2-inch diameter and 1-7/8-inch long) threaded into 3/16-inch-diameter polyethylene tubing. The annulus of each probe was filled with No. 2 sand to a depth of about 4 inches above top of screen followed by a hydrated bentonite seal to surface grade.

Soil boring, monitoring well, and soil vapor probe locations are shown on Figure 2.

2.1.4 Samples Collected

A total of 96 soil samples, including 5 duplicate samples, were collected for laboratory analysis. Soil samples from borings RSB01 through RSB15 were generally collected at the 0- to 2-foot depth interval (i.e., shallow fill), the groundwater interface, or, when encountered, the greatest degree of petroleum-impacts. Samples from sixteen soil borings were collected and analyzed for VOCs and SVOCs to delineate the extents of the petroleum plume in the south-central part of the site. Samples from these borings were collected from the interval of greatest observed petroleum impacts and the interval below observed impacts, or if impacts were not encountered, samples were only collected from the groundwater interface. At the request of the NYSDEC, samples from eight borings were collected for emerging contaminant sampling and analyzed for per- and poly-fluoroalkyl substances (PFAS) and 1,4-dioxane. One sample from RSB09A was collected and analyzed for PFAS via Total Oxidizable Precursor (TOP) Assay.

Fifteen groundwater samples and two duplicate samples were collected at least one week following well development. Samples were collected in accordance with the United States Environmental Protection Agency's (USEPA) low-flow groundwater sampling procedure ("Low Stress [low-flow] Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells", dated July 30, 1996 and revised January 19, 2010) to allow for collection of representative samples.

Eight soil vapor samples were collected into laboratory-supplied, batch-certified, 2.7-Liter Summa® canisters that were calibrated for a sampling rate of about 0.05 liters per minute (L/min) over about 120 minutes of sampling. For quality assurance/ quality control (QA/QC) purposes, one indoor ambient air sample was collected in the stairwell in the southeast corner of the cellar site.

Soil, groundwater, and soil vapor samples were submitted for laboratory analysis to Alpha Analytical Inc., an NYSDOH Environmental Laboratory Approval Program (ELAP)-certified laboratory located in Westborough, Massachusetts.

2.1.5 Chemical Analysis

The laboratory analyses performed on the soil, groundwater, soil vapor, and indoor air samples are summarized below by media.

Soil samples collected from borings RSB01 through RSB15 were analyzed for the following parameters:

- Part 375-listed volatile organic compounds (VOCs) via USEPA Method 8260C
- Part 375-listed SVOCs via USEPA Method 8270D
- Polychlorinated biphenyls (PCBs) via USEPA Method 8082A
- Part 375-listed pesticides via USEPA Method 8081B
- Part 375-listed herbicides via USEPA Method 8151A
- Part 375-listed metals including hexavalent and trivalent chromium via USEPA Methods 6010C, 7471B, and 7196A
- Total cyanide via USEPA Method 9010C/9012B

Soil samples collected from borings RSB16 through RSB22 and RSB25 through RSB33 were analyzed for the following parameters:

- Part 375-listed VOCs via USEPA Method 8260C
- Part 375-listed SVOCs via USEPA Method 8270D

Soil samples collected from delineation borings surrounding RSB07 and RSB17 were analyzed for Part 375-listed SVOCs via USEPA Method 8270D. Additional soil samples were collected from borings RSB16 and RSB20 to support the identification and evaluation of remediation alternatives. Two grab samples were collected and analyzed for soil parameters including grain size, total organic carbon (TOC), and/or total petroleum hydrocarbons (TPH).

Soil samples collected from RSB03A, RSB05A, RSB06A, RSB07A, RSB08A, RSB09A, RSB14A and RSB15A were analyzed for PFAS and 1,4-dioxane via USEPA Method 537 and 8270D-SIM. One sample from RSB09A was analyzed for PFAS via TOP Assay.

Groundwater samples collected from RMW01 through RMW09 were analyzed for the following parameters:

- Target Compound List (TCL) VOCs and 1,4-dioxane via USEPA Method 8260C
- TCL SVOCs via USEPA Method 8270D

- PCBs via USEPA Method 8082A
- Pesticides via USEPA Method 8081B
- Herbicides via USEPA Method 8151A
- Target Analyte List (TAL) metals (total and dissolved) via USEPA Methods 6020A and 7470A
- PFAS via USEPA Method 537

Groundwater samples collected from monitoring wells RMW16, RMW18, RMW28, RMW30, MW32, and MW33 were analyzed for the following parameters:

- TCL VOCs via USEPA Method 8260C
- TCL SVOCs via USEPA Method 8270D

The groundwater sample collected from RMW16 was also analyzed for TOC.

Soil vapor and indoor air samples were analyzed for VOCs via USEPA Method TO-15.

2.1.6 Remedial Investigation Findings Summary

The findings summarized herein are based on qualitative data (field observations and instrumental readings) and laboratory analytical soil, groundwater, and soil vapor sample results. Cross-sectional diagrams showing inferred soil profiles are included as Figures 3a and 3b. Soil sample results are summarized on Figure 4a and 4b, groundwater sample results are summarized on Figure 5, and soil vapor sample results are summarized on Figure 6.

1. Stratigraphy: Historic fill predominantly consisting of brown, fine- to medium-grained sand with varying amounts of silt, gravel, and concrete was encountered across the site from below the cellar slab to depths ranging from about 2 to 7.5 feet below cellar grade (9 to 19.5 feet bgs). Native soil encountered below historic fill predominantly consists of fine- to medium-grained sand with varying amounts of gravel and silt. Bedrock was encountered during a geotechnical investigation performed by Langan in April and May 2018 and consists of gneiss, mica schist, and marble. The top of bedrock varies from about 30 to 88 feet below cellar grade. The bedrock surface is irregular and generally slopes down to the west and to the north. Boring data indicates bedrock is shallowest within the southeastern part of the site.

2. Hydrogeology: Synoptic groundwater measurements were collected on May 9, 2018 from nine of the monitoring wells installed during the April 2018 RI. Groundwater elevations range between el 20.62 to el 21.6 feet, which corresponds to depths of about

4.4 to 5.3 feet below cellar grade (about 11.4 to 17.38 feet bgs). Groundwater flow is to the northeast. Underground utilities and other subsurface structures may locally influence the direction of groundwater flow.

3. Petroleum Impacts in Soil, Groundwater and Soil Vapor: Petroleum impacts were identified across an area of roughly 12,500 square feet within the southern part of the site, occupying about 25% of the site. Petroleum-related VOCs were detected above the UU and/or Restricted Use-Restricted Residential (RURR) SCOs in soil samples collected between 6 and 10 feet below cellar grade (about 13 to 22 feet bgs) within this area. PID headspace readings of up to 875 ppm, petroleum-like odors, and petroleum-related VOCs above the SGVs were detected at monitoring well locations within the petroleum-impacted area. Petroleum-related contamination was localized to the south-central part of the site, which formerly contained three, 550-gallon gasoline underground storage tanks (USTs) and a petroleum tank room. Petroleum-related VOCs in soil and groundwater are related to the historical petroleum bulk storage at the site, but may also be related to the historical use of the site as an automotive service facility.

4. Historic Fill: Laboratory analytical results indicate that the historic fill contains SVOCs, metals, and PCBs at concentrations above the UU and/or RURR SCOs. The deepest samples exceeding the SCOs were found between 7 and 8 feet below cellar grade (14 to 20 feet bgs). PFAS were detected in historic fill samples.

5. Native Soil: Mercury and seven polyaromatic hydrocarbons (PAHs) were detected above UU and/or RURR SCOs in a native soil sample collected between 7 to 8 feet below cellar grade (14 to 20 feet bgs) in soil boring RSB07; however, these detections are likely a result of infiltration of historic fill material into the borehole during sample collection. Manganese and acetone were also detected above the UU SCOs; however, manganese is a naturally occurring metal, and acetone is a common laboratory contaminant.

6. Soil Vapor: The soil vapor samples contained chlorinated volatile organic compound (CVOC) concentrations which were not detected in the indoor air sample. The tetrachloroethylene (PCE) and trichloroethylene (TCE) concentrations detected in soil vapor may be indicative of a chemical release associated with historical site use, or may be related to the historical use of the southern-adjoining property as a dry cleaning facility. The petroleum-related VOCs detected in the sub-slab soil vapor are likely related to the open petroleum spill in the south-central part of the site. The petroleum-related VOCs detected in indoor air may be related to either the open on-site spill in the south-central part of the site, or to automotive emissions from the former use as a parking garage.

2.2 Significant Threat

The RI Report (RIR) was approved by the NYSDEC and NYSDOH on December 11, 2020. The NYSDEC and NYSDOH has determined that this site does not pose a significant threat to human health and the environment.

2.3 Site History

2.3.1 Past Uses and Ownership

The site was an undeveloped vacant lot until at least 1928. By 1928 the existing two-story building was constructed across the entire footprint of the site and was occupied by an automotive garage and service facility. By 1968, the northern part of the building was occupied by offices with an elevator in the northwestern corner, and the southern part of the building remained as an automotive garage and service facility. Two gasoline tanks are shown in the southwestern corner of the building in Sanborn maps from 1977 through 1994. According to NYSDEC Petroleum Bulk Storage (PBS) database records, three 550-gallon gasoline underground storage tanks (USTs) were removed from the site in August 2009. Additionally, two No.2 fuel oil USTs (one 5,000-gallon and one 2,500-gallon) and one 5,000-gallon No. 4 fuel oil above ground storage tank (AST) were removed from the site in 1998. The site is listed under NYSDEC PBS Facility ID 2-077666.

2.3.2 Previous Environmental Reports

Previous environmental reports were reviewed as part of this RAWP and are summarized in chronological order below. The environmental reports are included in Appendix C.

Phase I Environmental Site Assessment, dated February 21, 2003, prepared by Soil Mechanics Environmental Services (SMES)

SMES prepared a Phase I Environmental Site Assessment (ESA) on behalf of Acadia Realty Trust in accordance with the previous ASTM E-1527-00 standards. The northern part of the first and second floors of the site was formerly occupied by offices for the NYC Human Resources Administration, and the cellar and southern part of the first and second floors contained a parking garage. SMES did not specify Recognized Environmental Conditions (RECs); however, the following potential environmental concerns were discussed:

- Automotive sales and service activity at the site between 1928 and the 1950's
- Petroleum bulk storage, including one active 5,000-gallon fuel oil AST, a closed and removed 5,000-gallon fuel oil UST), a closed and removed 2,500-gallon fuel oil UST, and three closed-in-place 550-gallon gasoline USTs;

- Waste oil drums, oil-like staining on the floor slab, and oil discharge into a floor drain inside the sub-cellar; and
- A dry-cleaning facility (Henry's Cleaners) located at a southern adjoining property.

SMES recommended the following actions:

- Phase II investigation to identify potential subsurface impacts from historical automotive service activity and petroleum storage
- Trace dye analysis of interior floor drains to confirm discharge points
- Registration and decommissioning of the former petroleum storage tanks in accordance with New York State regulations
- Improvement of housekeeping for the storage of used oil drums, active fuel oil tank, and compressed gas cylinders, and containment of potential discharges from parked cars. SMES concluded that nearby off-site petroleum storage facilities and commercial businesses were not environmental concerns, based on their relative locations and the absence of reported spills.

Asbestos Survey Report, dated January 21, 2005, prepared by CNS Management Corp. (CNS)

CNS performed a site-wide asbestos survey on behalf of Acadia Realty Trust in January 2005. CNS identified asbestos containing material (ACM) on the roof, in the cellar, and in the northern part of the building, which was occupied by NYC Human Resources Administration offices. ACM was identified in floor tile, floor tile mastic, pipe insulation, spray-on fireproofing, roofing materials, duct tar, and roof mounted cooling towers. CNS recommended that the ACM be properly removed prior to renovations, or managed in-place with an Operations and Management (O&M) Plan.

Limited Phase II Subsurface Investigation, dated April 21, 2005, prepared by CNS

In January 2004, CNS was retained by Acadia Realty Trust to complete a subsurface investigation that included five soil borings in the cellar around the perimeter of the sub-cellar. Borings west of the sub-cellar terminated at 2 and 8 feet below the cellar slab. Borings east of the sub-cellar were terminated within a clay layer at 15 and 18 feet below the cellar slab. Subsurface soil was described as brown fine loamy sand above clay or bedrock. Groundwater was encountered in two borings east of the sub-cellar at a depth of about 6 feet below the cellar slab. Petroleum staining, odors, and PID measurements between 56 parts per million (ppm) and 356 ppm were

observed in one boring located east of the sub-cellar. Staining, odors, or other indications of petroleum impacts were not identified in the other borings.

Five soil samples and one groundwater sample were collected and analyzed for VOCs and SVOCs. The analytical results were compared to NYSDEC Technical Administrative Guidance Memorandum (TAGM) #4046 Allowable Soil Concentrations, Recommended Soil Cleanup Objectives (RSCOs), and Groundwater Standards, which were the applicable standards in 2005. Soil collected from the 4- to 7-foot and 15- to 18-foot depth intervals in one boring east of the sub-cellar contained the petroleum-related VOCs at concentrations above the TAGM RSCOs. Acetone, a common laboratory artifact, was the only compound detected in the groundwater sample above the New York State Groundwater Standards.

The report concluded that the source of the VOC impacts may be the closed-in-place, 550-gallon gasoline USTs. The report recommended a geophysical survey to locate and evaluate the closed USTs as a contaminant source.

Petroleum Bulk Storage Registration letter, dated September 28, 2005, prepared by CNS

In response to an August 2005 filing violation issued by the New York City Fire Department (FDNY), CNS updated the ownership information for the existing 5,000-gallon fuel oil AST and provided supporting documentation for the removal of two historical fuel oil ASTs. According to the registration application, the AST contained No. 4 fuel oil and was installed on an impervious surface.

Asbestos Operations and Maintenance Manual, dated October 1, 2005, prepared by CNS

Following the recommendations of the January 2005 Asbestos Survey Report, CNS completed an Asbestos O&M Manual to establish guidelines mitigating ACM exposure for occupants of the building.

Asbestos Abatement Specifications, dated July 30, 2007 and November 2, 2007, prepared by CNS

On behalf of Acadia P/A Sherman Avenue LLC, CNS solicited bids to remove the ACM identified in the January 2005 Asbestos Survey Report.

Air Monitoring Compliance Report, dated May 14, 2009, prepared by CNS

On behalf of Acadia P/A Sherman Avenue LLC, CNS monitored the abatement of asbestos identified in the January 2005 Asbestos Survey Report. Delta Environmental conducted the abatement between April 28, 2008 and April 2, 2009. A total of 534 cubic yards of ACM waste

was removed and transported off-site for disposal. Following abatement, final air monitoring and visual inspections were performed. Sampling results indicated that all airborne asbestos fiber levels were below the regulatory limit for re-occupation of 0.01 fibers per cubic centimeter.

Lead-Based Paint Survey Report, dated May 25, 2009, prepared by CNS

CNS was retained by Acadia Realty Trust to conduct a site-wide survey for lead-based paint (LBP) in April 2009. CNS identified LBP on the interior perimeter walls of the parking garage (southern part of the site) and on the walls of the vehicle ramps from the cellar to the second floor. CNS concluded that the LBP surfaces were in good condition and could remain in place for management under an O&M Program if unaffected by renovation. CNS recommended lead abatement prior to renovation or demolition of the LBP containing surfaces.

Remedial Action Plan, dated June 12, 2009, prepared by CNS

On behalf of Acadia P/A Sherman Avenue LLC, CNS prepared a Remedial Action Plan (RAP) to address petroleum impacts associated with former USTs at the site. The RAP describes an investigation conducted between March 30 and April 1, 2009, which included excavation of 11 test pits on the southern part of the property, east of the boiler room at cellar grade. The test pits were excavated to expose three closed, 550-gallon gasoline USTs and delineate petroleum contamination in soil and groundwater.

Soil observed in the test pits consisted of sandy loam extending about 10 feet below the cellar slab and underlain by clay to about 12 feet below the slab. Soil in the test pits exhibited petroleum odors and organic vapor readings up to 1,153 ppm. Groundwater was encountered between 5 and 10 feet below the cellar slab. Eighteen soil samples were collected from the test pits and analyzed for VOCs and SVOCs. Petroleum-related VOCs were detected above the TAGM RSCOs in soil samples collected from five test pits. SVOCs were not detected at concentrations above the TAGM RSCOs.

In May 2009, CNS installed four groundwater monitoring wells near the USTs and collected groundwater samples for VOC and SVOC analysis. The analytical results indicated that the following petroleum-related VOCs were detected in each sample at concentrations above the NYSDEC groundwater standards, which were misidentified in the RAP as "TAGM #4046 Groundwater Standards": 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, ethylbenzene, isopropylbenzene, naphthalene, n-butylbenzene, n-proplbenzene, p-isopropyltoluene, and xylenes.

Based on the investigation findings, NYSDEC was notified and subsequently assigned Spill No. 0902240 to the spill. CNS concluded that the contaminants were delineated and proposed (i)

the removal of the three 550-gallon gasoline USTs, (ii) excavation and removal of surrounding petroleum-impacted soil, and (iii) injections of chemical oxidizers to remediate groundwater.

New York City Department of Environmental Protection (NYCDEP) Groundwater Discharge letter, dated July 8, 2009, prepared by CNS

CNS installed two observation wells (OW-A and OW-B) in the northern part of the cellar in May 2009. CNS collected groundwater samples from each well for analysis of parameters required NYCDEP sewer discharge permitting. VOCs, PCBs, and petroleum-related SVOCs were not detected in the groundwater samples.

Remediation Report, dated October 22, 2009, prepared by CNS

On behalf of Acadia P/A Sherman Avenue LLC, CNS implemented the spill remediation as proposed in the June 2009 RAP. From August 5 to 16, 2009, the three closed 550-gallon gasoline USTs were removed along with 1,610 gallons of liquid product waste. The surrounding impacted soil was excavated to about 6 feet below the floor slab and transported off site for disposal. Analytical results from five confirmation sidewall and bottom soil samples indicated that petroleum-related VOCs and SVOCs were below the state regulatory guidelines. Following the removal of the USTs and surrounding petroleum impacted soil, CNS injected 300 pounds of RegenOx®, a chemical oxidant, into three of the existing monitoring wells. Post injection groundwater samples contained petroleum-related VOCs and SVOCs at concentrations above state regulatory standards.

CNS requested that no further action be required for soil and recommended continued quarterly groundwater monitoring through 2009.

Groundwater Monitoring Reports, dated December 2009 through January 2016, prepared by CNS

CNS prepared 18 quarterly groundwater monitoring reports from December 2009 through January 2016. The reports summarize the collection of groundwater samples from four on-site wells for analysis of petroleum-related VOCs and SVOCs. A fifth well was installed in the cellar down-gradient of the remediation area, and was sampled during quarterly events between

October 2014 and January 2016. As of the most recent January 2016 report, VOCs and SVOCs were detected above applicable state standards.

Phase I Environmental Site Assessment, dated May 2014, prepared by Langan

Langan prepared a Phase I ESA in accordance with the ASTM E-1527-13 standards. The report was prepared for Washington Square Partners, Inc., a consultant for Acadia P/A Sherman Avenue LLC. The following RECs were identified:

- The site was formerly identified as a garage and service station and contained a 2,500-gallon fuel oil UST, a 5,000-gallon fuel oil UST, a 5,000-gallon AST, and three 550-gallon gasoline USTs. During removal of the 550-gallon USTs, impacted soil and groundwater were observed, and NYSDEC Spill No 0902240 was assigned. Following injection of RegenOx®, and continued groundwater monitoring, elevated concentrations of petroleum-related VOCs and SVOCs were detected above regulatory standards, and the spill remained open.
- A gasoline filling station, and manufacturing facility were located proximate to the site, at 4706 Broadway, and 1 Sherman Avenue, respectively. NYSDEC Spill No. 0809967 was assigned to 1 Sherman Avenue, and administratively closed in 2013. However, records indicate that impacted soil and groundwater remain at the site.

Aboveground Storage Tank Removal Report, dated February 17, 2016, prepared by CNS

CNS performed the removal of a 5,000-gallon fuel oil AST, on behalf of Acadia P/A Sherman Avenue LLC. The report indicates that the former AST rested on a competent concrete slab in the cellar, and no staining was observed. The tank was emptied prior to the removal. Field activities included the removal of the cinderblock vault containment, steel tank and all piping components. An affidavit was filed with the NYC FDNY documenting the tank removal.

Phase I Environmental Site Assessment, dated March 2018, prepared by Langan

Langan prepared a Phase I ESA for the site in accordance with the ASTM E-1527-13 standards. The report was prepared for FBE Limited LLC. The following RECs were identified:

- Petroleum-impacted soil and groundwater were documented near three historical gasoline USTs and a former petroleum tank room in the southern part of the cellar in 2004 and 2009. NYSDEC Spill No. 0902240 was reported, and the USTs and petroleum-impacted soil were subsequently removed. Endpoint sampling results indicate that soil impacts were remediated; however, quarterly monitoring performed through January

2016 indicates that petroleum contamination persists in groundwater and may impact soil vapor.

- Vehicle repair was conducted at the site between about 1928 and at least 1950. Undocumented releases of petroleum, solvents, and/or other hazardous substances may have adversely impacted soil, groundwater, and/or soil vapor.
- A former petroleum spill and historical dry cleaning facility were located on the southern adjoining property at 107 Ellwood Street/7 Sherman Avenue. NYSDEC Spill No. 0809967 was associated with soil and groundwater contamination originating from a petroleum tank release in 2008. Although the spill was closed in 2013, endpoint groundwater sampling was not documented. A commercial dry cleaning facility was also located at the site between 2001 and 2008. Residual petroleum impacts from the former spill and undocumented releases of chlorinated solvents from the drycleaner may have adversely impacted soil vapor and groundwater at the site.

Phase II Environmental Site Investigation Report, dated March 2018, prepared by Langan

The Phase II Environmental Site Investigation (ESI) was conducted to further investigate the RECs identified in the March 2018 Phase I ESA. The Phase II ESI included a geophysical survey, advancement of eight soil borings, installation of four groundwater monitoring wells and four soil vapor probes, and collection of soil, groundwater, and soil vapor samples for laboratory analysis. The following observations were made during the March 2018 Phase II ESI:

- The geophysical survey did not identify subsurface anomalies indicative of a UST.
- Fill material, generally consisting of brown, medium-grained sand with varying amounts of fine sand, silt, and gravel was identified from surface grade to depths of up to 4 feet below the cellar slab across the site footprint. Native soil, typically consisting of brown, fine-grained sand with varying amounts of silt and clay, was identified across the site footprint beneath the fill layer to depths ranging from 4 to 12 feet below cellar grade. Groundwater was encountered at depths ranging from about 4 to 7 feet below cellar grade.
- Petroleum impacts were identified at the groundwater interface in soil and groundwater samples in sample location SB02. Concentrations of several VOCs were detected above the 6 NYCRR UU and/or RURR SCO and NYSDEC Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards and Guidance Values for Drinking Water (class GA) (collectively referred to as the Standards and Guidance Values [SGVs]). These impacts are related to historical releases from the

three 550-gallon gasoline USTs formerly located in this area, documented as NYSDEC Spill No. 0902240. Monitoring of this open spill is ongoing.

- Lead was detected at a concentration above the UU SCO in soil sample SB05_1-2. This concentration is typical of historic fill material in New York City. Dissolved metals, including magnesium, manganese, mercury, and sodium, were detected at concentrations exceeding SGVs. Magnesium, manganese, and sodium are naturally occurring and are not indicative of a release. The groundwater sample containing dissolved mercury was collected within the fill material, which typically contains metals at concentrations exceeding SGVs.

The Phase II ESI soil boring, monitoring well, and soil vapor probe locations are shown on Figures 4A, 4B, 5, and 6, respectively. Soil, groundwater, and soil vapor laboratory analytical results are appended to the RIR.

2.4 Geology and Hydrogeology

Geologic and hydrogeologic observations are described below. Cross-sectional diagrams showing inferred soil profiles are included as Figures 3a and 3b. Soil boring logs, groundwater contour map, and groundwater monitoring well construction logs are appended to the RIR.

2.4.1 Historic Fill Material

Historic fill material was encountered beneath the surface cover and extended to a maximum depth of about 7.5 feet below cellar grade (between about 14.5 to 19.5 feet below sidewalk grade). The historic fill predominantly consists of brown, fine- to medium-grained sand with varying amounts of silt, gravel, and concrete.

2.4.2 Native Soil

Historic fill was underlain by glacial till that predominantly consists of fine- to medium-grained sand with varying amounts of gravel and silt. The glacial till extends to the termination depth at each RI boring.

2.4.3 Bedrock

Bedrock was not encountered during the April 2018 RI; however, bedrock was encountered during a Geotechnical Investigation performed by Langan in April and May 2018. Bedrock consists of gneiss, mica schist, and marble. The top of bedrock varies from about 30 to 88 feet below cellar grade. The bedrock surface is irregular and generally slopes down to the west and to the north. Boring data indicates bedrock is shallowest within the southeastern part of the site.

2.4.4 Hydrogeology

Synoptic groundwater measurements were collected on May 9, 2018 from nine groundwater monitoring wells (RMW01 through RMW09). Groundwater elevations range from el 20.62 to el 21.6 feet, which corresponds to depths of about 4.4 to 5.3 feet below cellar grade (about 11.4 to 17.38 feet bgs). Groundwater flows east towards the Harlem River. Underground utilities and other subsurface structures may locally influence the direction of groundwater flow.

2.5 Contaminant Conditions

2.5.1 Conceptual Site Model

A conceptual site model (CSM) has been developed based on the findings of the RI. The purpose of the CSM is to develop a simplified framework for understanding the distribution of impacted materials, potential migration pathways, and potentially complete exposure pathways.

Potential Sources of Contamination

Potential sources of contamination include historical petroleum bulk storage at the site, historic fill, the historical site use as an automotive service facility, a petroleum spill at an adjoining property, and the historical use of an adjoining property as a dry cleaning facility.

Historic fill material encountered beneath surface cover to depths ranging from about 2 to 7.5 feet below cellar grade (9 to 19.5 feet bgs) originated from unidentified source areas and was placed as backfill at an unknown time, prior to the development of the current on-site building. Total PCBs detected at a concentration above the UU SCO collected near the site's southern perimeter is likely related to the historic fill. SVOCs, specifically PAHs, detected at concentrations above the UU and/or RURR SCOs may be related to the nature of historic fill. Metals detected at concentrations above the Part 375 UU and/or RURR SCOs are related to the historic fill. PAHs and mercury were detected above UU and/or RURR SCOs in one native soil sample collected from the 7 to 8 foot interval below cellar grade in soil boring RSB07; however, these detections are likely a result of infiltration of historic fill material into the borehole during sample collection.

Evidence of petroleum-related contamination observed in the south-central part of the site is related to a historical release from three, 550-gallon gasoline tanks, which were removed in August 2009. Evidence of petroleum-related SVOCs in the groundwater may be related to the petroleum-spill at the southern adjoining property.

The perfluorooctanoic acid (PFOA) detection in groundwater may be related to the historical use of the site as an automotive service facility, or may be related to an off-site source.

PCE and TCE detections in soil vapor may be indicative of a chemical release associated with the historical use of the site as an automotive service facility, or may be related to the historical use of the southern adjoining property as a dry cleaning facility.

Exposure Media

The impacted media include soil, groundwater, and soil vapor. Petroleum-related VOCs and SVOCs in soil and groundwater were detected above standards in the southern-central part of the site. Historic fill-related metals were detected in soil across the site. PAHs were identified in historic fill material in the northeast corner of the site (RSB07 and RSB13), and total PCBs were identified in historic fill material near the southern site perimeter (RSB03). PCE and TCE were detected in four soil vapor samples collected throughout the site footprint.

Receptor Populations

The site is improved with a two-story parking garage with a full cellar and partial sub-cellar. Current receptor populations include investigation workers. During site development, human receptors will be limited to construction and remediation workers, authorized guests visiting the site, and the public and pedestrians adjacent to the site. Under future conditions, receptors will include the residential and commercial use occupants, employees, and the nearby community, including children.

2.5.2 Description of Areas of Concern (AOC)

Based on site observations, site development history, and the findings of the Phase I ESA, five AOCs were identified. This section discusses the results of the Phase II ESI and RI with respect to the AOCs. AOCs are shown on Figure 2.

2.5.2.1 AOC 1: On-Site Open Petroleum Spill

Petroleum-related contamination was observed in the south-central part of the site, which formerly contained three, 550-gallon gasoline USTs and a petroleum tank room. Based on field observations and laboratory analytical results, the petroleum-impacts within this area are limited to groundwater and soil from about 6 to 12 feet below cellar grade, with the exception of RSB02 and SB02, which identified impacts starting at top of cellar grade. The depth of petroleum impacts were delineated vertically (as evidenced by the absence of visual/olfactory observations, PID readings above background, and/or analytical data indicating petroleum-related VOCs or SVOCs) at RSB01, RSB02, RSB03A, RSB04, RSB09, RB12, RSB16, RSB17, RSB21, RSB22, RSB26, RSB27, and RSB29.

The horizontal extent of petroleum impacts from the former gasoline tanks in the southern-central part of the site was delineated to the southern site boundary, and extends to the following boring locations in which petroleum impacts were absent: SB/MW01, SB/MW03, SB06, SB07, RSB08/MW08, RSB09/RMW09, RSB13, RSB13_S2, RSB20, RSB28, RSB30, RS31, RSB32/MW32, and RSB33/MW33. Petroleum-related contamination is related to the historical petroleum bulk storage at the site.

Petroleum-related VOCs were detected in soil vapor and indoor air samples at the site. Petroleum-related VOCs in soil vapor samples are likely associated with the open on-site spill, and the petroleum-related VOCs in the indoor air may be related to either the open on-site spill in the south central portion of the site, or to automotive emissions from the former use as a parking garage.

2.5.2.2 AOC 2: Historic Fill

Historic fill, which is ubiquitous across the site footprint, was encountered to depths ranging from 2 to 7.5 feet below cellar grade (9 to 19.5 feet bgs). SVOCs, metals, and PCBs were detected at concentrations above the UU and/or RURR SCOs in samples of historic fill, with the deepest exceedances found between 7 and 8 feet below cellar grade (14 to 20 feet bgs). SVOCs and mercury were detected above UU and/or RURR SCOs in one native soil sample collected from the 7 to 8 foot interval below cellar grade in soil boring RSB07. Manganese and acetone were also detected in native soil above the UU SCOs; however, manganese is a naturally occurring metal, and acetone is a common laboratory contaminant. Antimony, arsenic, beryllium, chromium, copper, lead, nickel, and selenium were not detected in groundwater samples at dissolved concentrations; therefore, the detections in unfiltered samples are likely the result of suspended solids in groundwater derived from historic fill. Iron, magnesium, manganese, and sodium were detected in dissolved groundwater samples above SGVs and are characteristic of naturally-occurring groundwater conditions.

Based on the analytical data, it is not likely that the PAHs in historic fill within the northeast part of the site are the source of PAHs detected in groundwater within the south-central part of the site.

2.5.2.3 AOC 3: Historical Use of the Site

An automotive service facility was located at the site from approximately 1928 to 1968. Three, 550-gallon gasoline USTs associated with the automotive service facility were removed from the site in August 2009. Contaminants of concern (COCs) associated with AOC 3 include chlorinated solvents, and petroleum products. Petroleum impacts are addressed in AOC 1.

Dissolved metals (including iron, magnesium, manganese, and sodium) were detected at concentrations above the SGVs in groundwater samples collected throughout the site. PCE and TCE were detected at concentrations above indoor air concentrations in six soil vapor samples collected throughout the site. PFOA was detected in the groundwater sample collected from RMW03 at a concentration above the USEPA health advisory and the NYSDEC PFAS guidance value of 10 nanograms per liter (ng/L). Products frequently used in the automotive industry such as polishes, waxes, paints, varnishes, lubricants, and cleaning products may have contained PFOA.

Iron, magnesium, manganese, and sodium are naturally occurring and are not indicative of a release. CVOCs detected in soil vapor may be related to degreasing and cleaning operations performed during the historical use of the site as an automotive service facility. The PFOA detections in groundwater may be related to chemicals formerly handled during the historical site use as an automotive service facility.

2.5.2.4 AOC 4: Petroleum Spill at Adjoining Property

A former petroleum spill was located on the southern-adjoining property at 107 Ellwood Street/7 Sherman Avenue. NYSDEC Spill No. 0809967 was associated with soil and groundwater contamination originating from a petroleum tank release in 2008. Although the spill was closed in 2013, endpoint groundwater sampling was not documented. Petroleum-related SVOCs were detected at concentrations above the SGVs in groundwater samples collected from RMW04 and MW32.

Evidence of petroleum-related contamination associated with the on-site spill is localized in the south-central part of the site. Based on the southern-adjoining location of NYSDEC Spill No. 0809967 and the absence of SVOCs in soil samples collected from borings RSB04 and RSB32, the petroleum-related SVOCs detected above SGVs in groundwater, are likely associated with the closed petroleum spill at the adjoining property.

2.5.2.5 AOC 5: Historical Use of Adjoining Property

A dry cleaning facility was located on the southern-adjoining property at 107 Ellwood Street/7 Sherman Avenue between 2001 and 2008. COCs associated with AOC 5 include PCE and its daughter products (i.e., TCE, cis-1,2-dichloroethene, and vinyl chloride). PCE has the potential to infiltrate groundwater and can readily migrate to surrounding properties. PCE and TCE were detected in six soil vapor samples collected throughout the site during the April 2018 RI. PCE was also detected in three soil vapor samples collected from the southern part of the site during the March 2018 Phase II ESI. Cis-1,2-dichloroehtene and vinyl chloride were not detected in soil vapor samples. Soil vapor samples with PCE and TCE concentrations may be indicative of a

chemical release associated with historical use of the southern adjoining property as a dry cleaning facility.

2.5.3 Nature and Extent of Contamination

This section evaluates the nature and extent of soil, groundwater, and soil vapor contamination. The nature and extent of the contamination is derived from a combination of field observations and analytical data. Soil sample results are summarized on Figures 4A and 4B, groundwater sample results are summarized on Figure 5, and soil vapor sample results are summarized on Figure 6.

2.5.3.1 Soil Contamination

Historic fill predominantly consisting of brown, fine- to medium-grained sand with varying amounts of silt, gravel, and concrete was encountered across the site beneath the surface cover to depths ranging from about 2 to 7.5 feet below cellar grade (9 to 19.5 feet bgs). SVOCs detected at concentrations above the UU and/or RURR SCOs in the northeastern part of the site may be related to the nature of historic fill.

Petroleum-related contamination in the south-central part of the site was identified from about 6 to 12 feet below cellar grade, with the exception of RSB02 and SB02, which identified impacts starting at top of cellar grade. The depth of petroleum impacts were delineated vertically (as evidenced by the absence of visual/olfactory observations, PID readings above background, and/or analytical data indicating petroleum-related VOCs or SVOCs) in twelve soil borings.

The horizontal extent of the petroleum impacts in the southern-central part of the site was delineated to the southern site boundary, and is defined by petroleum impacts, or lack thereof, identified in soil and groundwater at various soil boring and/or groundwater monitoring well locations. The petroleum impacted area is roughly 12,500 square feet and occupies about 25% of the site. Petroleum-related contamination is related to the historical petroleum bulk storage at the site.

Metals, which were detected at concentrations above the UU and/or RURR SCOs in samples of historic fill, are likely related to the nature of historic fill material.

Total PCBs were detected at a concentration above the UU SCO in one sample and are likely related to the nature of the historic fill material.

PFAS were detected in twelve samples and are likely related to the nature of historic fill material. Based on the data collected during the RI there does not appear to be any soil contamination migrating off-site.

2.5.3.2 Groundwater Contamination

PID headspace readings of up to 41.7 ppm, petroleum-like odors, and petroleum-related VOCs and/or SVOCs above SGVs were observed at eight monitoring well locations. Petroleum impacts to groundwater were delineated horizontally by the absence of visual/olfactory observations, PID headspace readings above background, and/or petroleum-related VOCs above SGVs in seven monitoring wells surrounding the petroleum-impacted area. Petroleum-related VOCs were localized to the southern-central part of the site and are related to the historical petroleum bulk storage at the site.

1,2-Dichloroethane (1,2-DCA) was identified in groundwater in one location at the site above the SGV. A source of 1,2-DCA was not identified at the site and 1,2-DCA is not related to historic on-site operations.

Dissolved metals (including iron, magnesium, manganese, and sodium) were detected at concentrations above the SGVs in groundwater samples collected throughout the site. Iron, magnesium, manganese, and sodium are naturally occurring and are not indicative of a release.

Based on the data collected during the RI groundwater impacts appear to be isolated to an area in the southern part of the site. In addition, this area has been treated via chemical injection and is being monitored to assess the performance of the remedy.

2.5.3.3 Soil Vapor Contamination

The soil vapor samples contained PCE and TCE at concentrations in soil vapor that may be indicative of a chemical release associated with historical site use, or may be related to the historical use of the southern-adjoining property as a dry cleaning facility. The petroleum-related VOCs detected in the soil vapor are likely related to the open petroleum spill in the south-central part of the site. The petroleum-related VOCs in the indoor air may be related to either the open on-site petroleum spill or the automotive emissions from the former use of the site as a parking garage. Based on the RI data, detected concentrations do not indicate any potential for off-site soil vapor contamination. In addition, all soil above the groundwater (i.e., any potential soil vapor sources) will be removed as part of remedial and development excavation.

2.6 Environmental and Public Health Assessments

2.6.1 Qualitative Human Exposure Assessment

Human health exposure risk was evaluated for both current and future site and off-site conditions, in accordance with DER-10. The assessment includes an evaluation of potential sources and migration pathways of site contamination, potential receptors, exposure media, and receptor intake routes and exposure pathways.

2.6.1.1 Potential Exposure Pathways – On-Site

Current Conditions

The site is covered by an impervious surface (the concrete building slab). Human exposure to contaminated soil through dermal absorption, inhalation, and ingestion is minimal and controlled through the presence of the impervious surface. There is a potential exposure pathway through dermal absorption, inhalation, and ingestion during soil sampling and test pit excavations associated with site investigation, but it is controlled through implementation of the Health and Safety Plan (HASP).

As groundwater in this area of New York City is not used as a potable water source, a complete exposure pathway to groundwater under current site conditions is unlikely. There is a potential exposure pathway through dermal absorption and ingestion during groundwater sampling associated with site investigation, but it is controlled through implementation of the HASP. The indoor air sample collected in the former parking garage contained concentrations of petroleum-related VOCs that may be related to automotive emissions from the former use as a parking garage, or to vapors emanating through preferential pathways in the concrete foundation slab; therefore, there may be a potential exposure pathway to contaminated vapors in the indoor air through inhalation. Because the site is vacant, the inhalation of site-related contaminants due to soil vapor intrusion does not represent a current concern.

There is a potential exposure pathway to soil vapor through inhalation during soil, groundwater, and soil vapor sampling associated with site investigation. This pathway is controlled through implementation of the HASP.

Construction/Remediation Condition

Construction and remediation may result in potential exposures to site contaminants in the absence of a Health and Safety Plan (HASP) and a Community Air Monitoring Plan (CAMP). Construction and remedial activities include demolition, the excavation and off-site disposal of impacted soil and construction of foundation components. In the absence of a HASP and CAMP,

this scenario presents the potential for exposure of soil COCs to construction and remediation workers via dermal absorption, ingestion, and inhalation of vapors and particulate matter. This exposure pathway will be marginalized through the implementation of the HASP, CAMP, and vapor and dust suppression techniques.

Groundwater may be encountered during excavation by workers, and there is potential for exposure to groundwater COCs, in the absence of a HASP, to construction workers via dermal absorption or ingestion. This exposure pathway will be marginalized through the implementation of the HASP.

During site development, construction and remediation workers and the surrounding community could be exposed to soil vapor COCs and contaminated soil via inhalation. Exposure to soil vapor and dust will be limited through the implementation of a HASP, CAMP, and dust and vapor suppression techniques.

Proposed Future Conditions

The site will be developed with the use of institutional controls (ICs) and engineering controls (ECs), as necessary, to control exposure to future tenants, visitors and workers to residual contamination. The following ECs and ICs are planned for the proposed development:

1. If residual groundwater contamination is present after the remedy is implemented, the waterproofing/vapor barrier membrane system incorporated into the new building foundation under future build conditions will serve as an EC to mitigate exposure to residual soil vapor and contaminated groundwater.

2. Deed restrictions on use of groundwater, allowable uses of the site, and vegetable farming will be placed on the property as part of remediation.

3. There is no risk of ingesting groundwater COCs because the site and surrounding area will continue to obtain their drinking water supply from surface water reservoirs located upstate and not from groundwater.

2.6.1.2 Potential Exposure Pathways – Off-Site

Current Conditions

The site is covered with continuous impervious surface cover (concrete building slab), therefore exposure to dust emanating from site soil is unlikely. Contaminated soil vapor that may migrate through cracks would be expected to dissipate readily in ambient air and not present an exposure risk to off-site receptors. The groundwater impacts identified on-site could potentially migrate

off-site, but since groundwater in the surrounding area is not used as a potable water source, no complete exposure pathway exists.

Construction/Remediation Condition

Contaminated soil has the potential to be transported off-site by wind in the form of dust or by the tires of vehicles or equipment leaving the site during development, and create an exposure risk to the public adjacent to the site during construction. Contaminated soil vapor would be expected to dissipate readily in ambient air and not present an exposure risk to off-site receptors. Nonetheless, air monitoring will be conducted for particulates (i.e., dust) and VOCs during all intrusive activities as part of a CAMP. Dust and/or vapor suppression techniques will be employed to limit the potential for off-site migration of soil and vapors. Vehicle tires and undercarriages will be washed as necessary prior to leaving the site to prevent tracking material off-site. A soil erosion/sediment control plan will be implemented during construction to control off-site migration of soil. An in-situ groundwater remedy was implemented and has improved the overall water quality pre-construction. The groundwater impacts identified on-site could potentially migrate off-site during development, but since groundwater in the surrounding area is not used as a potable water source, no complete exposure pathway exists. If groundwater is removed during construction, groundwater will be pre-treated and discharged to the New York City sewer system, per NYCDEP permit requirements. Therefore, the potential for public exposure to groundwater on adjacent sites will be minimized.

2.6.1.3 Evaluation of Human Health Exposure

Based on the CSM and the review of environmental data, complete on-site exposure pathways appear to be present, in the absence of ECs, in current and construction-phase conditions. The complete exposure pathways indicate there is a risk of exposure to humans from site contaminants via exposure to soil, groundwater, and soil vapor if mitigation and controls are not implemented.

Complete exposure pathways have the following five elements: 1) a contaminant source; 2) a contaminant release and transport mechanism; 3) a point of exposure; 4) a route of exposure; and 5) a receptor population. A discussion of the five elements comprising a complete pathway as they pertain to the site is provided below.

Current Conditions

Contaminant sources include historic fill with varying concentrations of SVOCs, metals, PCBs and PFAS; petroleum-impacted soil and groundwater containing varying concentrations of VOCs and SVOCs; and soil vapor with CVOCs.

Contaminant release and transport mechanisms include potential release and transport during penetration of the site cover for soil, groundwater, and soil vapor sampling. The potential receptor is the on-site sampling personnel and the nearby public. Under current conditions, the likelihood of exposure to humans is limited due to the following:

- The site footprint is covered by a continuous concrete building slab, which prevents direct contact with soil, groundwater, and soil vapor.
- Sampling activities are completed in accordance with a HASP and CAMP that is designed to monitor and prevent exposure to soil, groundwater, and soil vapor contaminants.
- Groundwater at the site is not a potable water source.

Construction/Remediation Activities

During the excavation and foundation construction stage of redevelopment, which includes remediation, points of exposure include disturbed and exposed soil during excavation, dust and potential organic vapors generated during excavation, and contaminated groundwater encountered during excavation and/or dewatering operations. Routes of exposure include ingestion and dermal absorption of contaminated soil and groundwater, inhalation of potential organic vapors arising from contaminated soil vapor and groundwater, and inhalation of dust originating from contaminated soil. The receptor population includes construction and remediation workers and, to a lesser extent, the public adjacent to the site.

The potential for completed exposure pathways is present since all five elements exist; however, the risk can be avoided or minimized by applying appropriate health and safety measures during construction and remediation, such as monitoring the air for organic vapors and dust, using vapor and dust suppression measures, cleaning truck undercarriages and securing tarp covers before they leave the site to prevent off-site soil tracking, maintaining site security, and wearing the appropriate personal protective equipment (PPE).

A HASP, a RAWP, and a CAMP that include measures such as conducting an air-monitoring program, donning PPE, covering soil stockpiles, altering work sequencing, maintaining a secure construction entrance, proper housekeeping, and applying vapor and dust suppression measures to prevent off-site migration of contaminants during construction will be implemented. Such

measures will prevent completion of potential migration pathways for soil, groundwater, and soil vapor.

Proposed Future Conditions

For the proposed future conditions, residual contaminants may remain on-site. If residual impacts exist and ECs/ICs are not implemented, points of exposure could include potential cracks in the foundation of the proposed development, exposure during any future ground-intrusive work, or inhalation of vapors entering the building. The receptor population includes residential and commercial use occupants, employees, and the nearby community, including children. The possible routes of exposure can be avoided or mitigated by removal of contaminated soil or construction and maintenance of a site capping system (e.g., concrete building slab or at least 2 feet of clean soil), installation of a waterproofing/vapor barrier, and implementation of a Site Management Plan (SMP), if necessary depending on the remedy.

Human Health Exposure Assessment Conclusions

1. Human exposure to site contaminants is limited under current conditions due to the surface cover, and access is limited to investigation workers. The primary exposure pathways are dermal contact, ingestion, and inhalation of soil, groundwater, or soil vapor by site investigation workers and, to a lesser extent, the nearby public. The exposure risks can be avoided or minimized by following the appropriate HASP and vapor and dust suppression measures, and by implementing a CAMP during investigation activities.
2. In the absence of mitigation and controls, there is potential for exposure during the construction-phase activities. The primary exposure pathways are:
    a. Dermal contact, ingestion, and inhalation of contaminated soil, groundwater, or soil vapor by construction workers.
    b. Dermal contact, ingestion, and inhalation of soil (dust) and inhalation of soil vapor by the community in the vicinity of the site.

    These can be avoided or minimized by implementing CAMP and by following the appropriate HASP, vapor and dust suppression, site security measures, and following a NYSDEC-approved RAWP.
3. The existence of a complete exposure pathway for site contaminants to human receptors during proposed future conditions is unlikely, as contaminated soil will be excavated and transported to an off-site disposal facility, groundwater will be remediated, and residual soil will be capped, if required, with an impermeable cover or 2 feet of clean soil. Regional groundwater is not used as a potable water source in New York City. The potential pathway for soil vapor intrusion into the building would be addressed by installation of a waterproofing/vapor barrier, which will minimize soil vapor infiltration. A sub-membrane

depressurization system cannot be installed since the foundation will be beneath the water table.

4. It is possible that a complete exposure pathway exists for the migration of site contaminants to off-site human receptors during current, construction-phase, and future conditions. Monitoring and control measures have been and will continue to be used during investigation and construction to prevent completion of this pathway. Under future conditions, the site will be remediated and ECs/ICs will be implemented, if necessary, to prevent completion of this pathway.

2.6.2 Fish and Wildlife Remedial Impact Analysis

In addition to the human health exposure assessment, DER-10 requires an on-site and off-site Fish and Wildlife Resources Impact Analysis (FWRIA) if certain criteria are met. Based on the requirements stipulated in Section 3.10 and Appendix 3C of DER-10, there was no need to prepare an FWRIA for the site. The same qualitative human health exposure assessment for the site is also presented in the RIR.

2.7 Interim Remedial Measures

An in-situ chemical oxidation (ISCO) program was implemented between April and August 2019 in accordance with the March 4, 2019 Interim Remedial Measures Work Plan (IRMWP). The purpose of the program was to treat groundwater impacted with petroleum-related VOCs.

VOC-impacted groundwater was treated via direct push injection points located in a rough grid pattern to spread chemicals evenly across the treatment area. Summit Drilling Company of Bridgewater, New Jersey, and Regenesis of San Clemente, California, implemented the IRMWP under the observation of Langan. Injection points were advanced using a Geoprobe® direct-push drilling rig over a 12,500 square foot petroleum plume. Injection point locations were divided into two groups, Area A (source area) and Area B (residual petroleum impacted area). The chemicals were injected at a rate of 10 to 35 pounds per square inch (psi) through a 1.5-inch-diameter steel rod equipped with either a 2-foot- or 3-foot-long slotted screen. At each injection point, the steel rod was advanced to about 12 feet below cellar grade and injections were made using a "bottom-up" approach, beginning at the deepest 2-foot or 3-foot interval, and raised in 2-foot or 3-foot intervals to roughly 4 to 5 feet below cellar grade (roughly the groundwater surface).

The treatment program began with an initial round of injections of a PersulfOx® and RegenOx® mixture to Areas A and B between April 8 and April 18, 2019. After about 1 month, the second round of injection of the PersulfOx® and RegenOx® mixture was completed in Area A only between May 13 and May 17, 2019. On August 5, 2019, a groundwater sample was collected from RMW04 to evaluate the efficacy of the first two rounds of injections.

A third round of injections was completed between August 5 and August 29, 2019 and included injections of PlumeStop® (a liquid activated carbon substrate) and ORC-Advanced® ([ORC-A] an oxygen release compound). In addition, based on the groundwater observations at RMW04, 17 Petrofix® injections were added to the scope of the third round of injections treatment program in Area A only. Petrofix® is a water-based activated carbon solution that is designed to sorb petroleum hydrocarbons in groundwater while enhancing natural biodegradation of the sorbed contaminants. The NYSDEC was notified of the change in an email dated May 29, 2019.

Performance monitoring consists of baseline and post-injection monitoring. The baseline sampling was conducted prior to injections during the 2018 RI. Baseline samples were collected from five on-site monitoring wells and one off-site monitoring well. Quarterly post-injection sampling began in March 2020 at the selected post-injection monitoring wells (RMW01, RWM02, RWM03, RWM04, RMW16 and MW32) and seven (Q1-Q7) quarterly sampling events have been performed to date. Monitoring will continue for a minimum of two years per the NYSDEC-approved March 2019 In-Situ Treatment Remedial Design Plan.

When compared to groundwater concentrations observed during the RI, petroleum-related VOCs have generally decreased by one order of magnitude. Petroleum-related VOCs were not detected above the SGVs in RMW04, RMW16, and off-site monitoring well MW32 during the Q1 through Q7 sampling events. VOC concentrations gradually decreased in RWM03 between Q1 through Q5, and no VOCs were detected above the SGVs during Q6. Rebound concentrations above the SGVs for three VOCs were observed in RWM03 during Q7, however, the concentrations decreased by up to 98% when compared to the baseline results. Generally, significant reduction (up to 92%) in targeted petroleum-related VOCs has been observed in RMW01 and RWM02. Review of geochemical parameters recorded during the quarterly sampling events, including ORP and DO, indicate that subsurface conditions are favorable for breakdown of petroleum-related compounds, and some further degradation is anticipated. The building was recently demolished and access for the collection of additional groundwater samples will be limited until site excavation occurs. An eighth round of groundwater sampling will be completed prior to installation of the site cap and an assessment of whether further monitoring will be required will be completed at that time. The post-injection monitoring wells are presented in Figure 7, and analytical results are presented in Table 1. Previous quarterly groundwater monitoring reports are included in Appendix C.

2.8 Supplemental Soil Investigation within IRM Treatment Zone

A supplemental soil investigation was performed between March 22 and 25, 2021 in accordance with the NYSDEC-approved March 11, 2021 Supplemental Soil Investigation Work Plan. The purpose of the investigation was to determine the effectiveness of the 2019 IRM on reduction

of petroleum-related VOC concentrations in soil within the 12,500-square-foot petroleum-impacted area.

A Langan field engineer documented the advancement of 14 soil boings by AARCO Environmental Services Corporation (AARCO) of Lindenhurst, New York. Boring locations were selected to provide sufficient coverage within the petroleum-impacted area, at a frequency of about one boring per every 900 square feet. The borings were advanced using a direct-push Geoprobe® 6610DT track-mounted drill rig to depths ranging between 8 and 12 feet below cellar grade (between 15 and 24 feet bgs).

Samples were collected into 4-foot-long acetate liners using a 2-inch diameter Macro-Core® sampler. The soil was screened for staining, odors, and VOCs using a PID. Following sample collection, borings were backfilled with soil cuttings that did not display evidence of environmental impacts, and patched with concrete. Observations of petroleum-like odors, staining, and/or elevated PID readings are listed below:

Soil Boring	Depth Interval (feet below cellar grade)	Maximum PID (ppm)	Observations	Depth Interval of Collected Samples (feet below cellar grade)
TZ02	5 to 6	0	Odors and staining present	5 to 6 and 8 to 9
TZ03	5 to 6	0.8	Odors and staining present	5 to 6 and 8 to 9
TZ08	7 to 9	57.9	Odors Present	8 to 9
TZ11	5.5 to 12	4,143	Odors and staining present	8 to 9
TZ12	3 to 9	4,908	Odors and staining present	8 to 9
TZ13	4.5 to 10	3,370	Odors and staining present	8 to 9
TZ14	5 to 7.5	173	Odors and staining present	8 to 9

A total of 16 soil samples were collected, submitted to Alpha, and analyzed for VOCs. Soil samples were collected from the center of the vertical groundwater treatment zone (about 3 feet below the groundwater table) within the 7.5- to 9-foot depth interval in each sample. Two soil samples were also collected from soil borings TZ02 and TZ03 within the 5- to 6-foot depth interval, where petroleum-like staining and/or odors were observed.

Concentrations of acetone exceeded the UU and Protection of Groundwater (PGW) SCOs in two samples (TZ02_5-6 and TZ03_5-6), and total xylenes exceeded the UU and PGW SCOs in one sample (TZ08_8-9). Acetone was not previously detected above the UU, PGW, and/or RURR

SCOs in soil within the petroleum-impacted area during the RI and is likely related to laboratory contamination. Supplemental soil boring locations are shown in Figure 8 and analytical results are presented in Table 2. Boring logs, category B laboratory reports, and a Data Usability Summary Report (DUSR) are included as Appendix D.

2.9 Remedial Action Objectives

Based on the results of the RI and emerging contaminant sampling, the following Remedial Action Objectives (RAOs) have been identified for this site.

2.9.1 Soil

Remedial Action Objectives (RAOs) for Public Health Protection:

- Prevent ingestion/direct contact with contaminated soil
- Prevent inhalation of or exposure from contaminants volatilizing from contaminated soil or contaminated soil in particulate form

RAOs for Environmental Protection:

- Prevent migration of contaminants that would result in groundwater or surface water contamination

2.9.2 Groundwater

RAOs for Public Health Protection:

- Prevent ingestion of groundwater with contamination levels exceeding drinking water standards
- Prevent contact with, or inhalation of, volatiles from contaminated groundwater

RAOs for Environmental Protection:

- Restore the groundwater aquifer, to the extent practicable, to pre-disposal/pre-release conditions
- Remove the source of ground or surface water contamination

2.9.3 Soil Vapor

RAOs for Public Health Protection:

- Mitigate impacts to public health resulting from existing, or the potential for, soil vapor intrusion into building(s) at the site

3.0 SUMMARY OF REMEDIAL ACTION PLAN

This Section presents an analysis of two remedial action alternatives that can potentially be achieved under the BCP. The proposed SCOs will be the UU SCOs for Alternative I and the lower of the PGW and RURR SCOs for Alternative II. The remediation extents for Alternatives I and II are shown on Figures 9 and 10, respectively.

In preparation for site remediation, the existing building will undergo abatement of hazardous materials, including ACM, LBP, PCB-containing building materials, and any other identified universal and miscellaneous hazardous waste articles. Following abatement of hazardous materials, the building will be demolished to facilitate site remediation.

Additionally, to incorporate green remediation principles and techniques to the extent feasible in the future development at this site, the future on-site building will include, at a minimum, a 20-mil vapor barrier/waterproofing membrane on the foundation to improve energy efficiency as an element of construction. This will apply to both proposed cleanup alternatives.

3.1 Alternative I – Technical Description

Alternative I, a Track 1 remedy, will include the following tasks:

- Development and implementation of a HASP and CAMP for the protection of on-site workers, the community, and the environment during the remediation phase of development
- Support of excavation (SOE) installation as necessary to facilitate removal of soil exceeding the UU SCOs and/or soil with petroleum-related nuisance conditions
- Excavation, stockpiling, off-site transport, and disposal of all soil exceeding the UU SCOs, which is estimated to be about 6,700 cubic yards from four hotspot locations and the petroleum-impacted area in the northern and southern parts of the site, respectively.
- Dewatering and treatment as necessary to facilitate removal of soil exceeding the UU SCOs
- Removal of encountered USTs and/or associated appurtenances (e.g., fill lines, vent line, and electrical conduit) and decommissioning and off-site disposal during redevelopment in accordance with DER-10, 6 NYCRR Part 613.9, NYSDEC Commissioner's Policy (CP)-51, and other applicable NYSDEC UST closure requirements
- Continue quarterly post-injection groundwater sampling for a minimum of two years from the first event (March 2020) per the NYSDEC-approved March 2019 In-Situ Treatment Remedial Design Plan within the petroleum-impacted area

- Collection and analysis of confirmation soil samples to verify UU SCOs have been achieved
- Backfilling of remediated areas to development sub-grade with certified-clean material (i.e., material meeting UU SCOs), virgin stone, or recycled concrete aggregate (RCA). If RCA is used to backfill remediated areas, it must be in accordance with a beneficial use determination (BUD).

The Alternative I remediation extent is shown on Figure 9 and is based on data presented in the RIR, and from the findings of the supplemental soil investigation. The requirements for each of the Alternative I tasks are described below.

On-Site Worker, Public Health, and Environmental Protection

A site-specific HASP will be enforced during excavation and foundation construction to protect on-site workers from accidents and acute and chronic exposures to the identified contaminated media. Public health will be protected by implementing and enforcing dust, odor, and organic vapor control and monitoring procedures included in the CAMP. The CAMP will include continuous perimeter monitoring of dust and organic vapor using DustTrak aerosol monitors and PIDs, respectively. Both instruments shall be capable of recording data and calculating 15-minute averages. A field engineer, scientist, or geologist will monitor site perimeters for visible dust and odors. The environment will be protected by implementing and enforcing the appropriate soil erosion prevention measures.

Excavation, SOE, and Fill and Soil Removal

VOCs, SVOCs, metals, PCBs, and petroleum-related nuisance conditions were detected in historic fill at concentrations that exceed the UU SCOs. To achieve Track 1, soil removal and disposal will extend from surface grade to depths ranging from about 2 feet below cellar grade to about 9 feet below cellar grade (about 9 to 21 feet below sidewalk grade) within four hotspots located in the northern part of the site, and to about 12 feet below cellar grade (about 19 to 24 feet below sidewalk grade) within the petroleum-impacted area in the southern part of the site. The estimated volume of material requiring removal and off-site disposal for a Track 1 cleanup is about 6,700 cubic yards. This estimate is based on vertical excavation limits derived from the laboratory analytical results and field observations of nuisance petroleum conditions encountered during the RI and/or supplemental soil investigation. UU SCOs are included in Table 3. The excavation depth required to remove hotspots and the petroleum-impacted area will extend below the top of the regional water table and will require localized SOE and dewatering. Remedial excavation is not proposed within the sub-cellar footprint.

Excavation Dewatering and Treatment

Dewatering of groundwater will be required to accommodate excavation of soil to reach the proposed remedial subgrade depth and excavation of soil that exceeds UU SCOs and/or exhibits petroleum-related nuisance conditions. The Contractor will be responsible for dewatering in accordance with applicable NYCDEP and NYSDEC regulations. Treatment of dewatering fluids may be required to reduce contaminant concentrations below NYCDEP/NYSDEC effluent limitations prior to discharge. The dewatering and treatment system would be designed by the Contractor's NYS-licensed Professional Engineer.

Tank Removal

Two 40-gallon, 1.5-foot-diameter by 3-foot-long USTs were identified along the northern property boundary during a geotechnical test pit investigation performed in January/February 2021. These USTs, and any other USTs and/or associated appurtenances (e.g., fill lines, vent line, and electrical conduit) encountered during site excavation will be decommissioned and disposed of off-site in accordance with DER-10, 6 NYCRR Part 613.9, NYSDEC CP-51, and other applicable NYSDEC UST closure requirements. Any impacted soil will be excavated, stockpiled separately, characterized, and disposed of off-site at a permitted facility. Following removal of any drums and USTs and associated grossly-impacted soil, confirmation soil samples will be collected from the base and sidewalls of the excavation in accordance with DER-10. If the excavation is enlarged horizontally beyond the dimensions of the tank, additional confirmation soil samples will be collected as required. Following removal of encountered USTs, the NYSDEC PBS registration will be updated. Closure documentation, such as contractor affidavits, bills of lading for sludge disposal, and tank disposal receipts, will be provided as appendices in the Final Engineering Report (FER).

Post-Injection Groundwater Monitoring

Seven quarterly post-injection groundwater monitoring sampling events have been performed since completion of the in-situ injection program to assess treatment effectiveness and remaining groundwater contamination within the petroleum-impacted area. Six performance monitoring wells installed during the RI (RMW01, RMW02, RMW03, RMW04, RMW16, and MW32) were sampled during each of the monitoring events performed between March 2020 and August 2021, with the exception of RMW03 which was inaccessible during the Q1 and Q2 quarterly sampling events. Quarterly post-injection groundwater sampling will continue for a minimum of two years from the first event (March 2020) per the NYSDEC-approved March 2019 In-Situ Treatment Remedial Design Plan. Groundwater monitoring will be performed, as determined by the NYSDOH and NYSDEC, until residual groundwater contaminations are found

to be below NYSDEC standards or have become asymptotic over an extended period of time. Quarterly post-injection groundwater sampling analytical results are discussed further in Section 2.7.

Confirmation Soil Sampling

Per NYSDEC DER-10, confirmation soil samples will be collected at a frequency of one bottom sample per 900 square feet of excavation base and one sidewall sample per 30 linear feet of internal sidewall. Sidewall samples will not be collected along the site perimeter because the excavation will extend across the site footprint and the foundation walls will preclude access to perimeter sidewalls. An estimated 53 base-of-excavation and 28 sidewall confirmation soil samples around hotspot areas, plus QA/QC samples, would be collected to confirm remedial performance and will be analyzed for the Part 375 list of VOCs, SVOCs, PCBs, pesticides, cyanide, metals including hexavalent and trivalent chromium, and per- and PFAS and 1,4-dioxane.

Excavation Backfill

Areas of the site requiring over-excavation to achieve UU SCOs will be backfilled to the grade required for the foundation. An estimated 3,700 cubic yards of material will be required to raise the excavated hotspots to development grade upon completion of the Track 1 remediation. Excavation backfill will comply with 6 NYCRR Part 375-6.7(d) and NYSDEC DER-10 Section 5.4(e), Table 5.4(e)10, and Appendix 5.

Material will consist of on-site soil and/or imported clean fill that meets UU SCOs, or other acceptable fill material such as virgin stone from a quarry or RCA. If RCA is imported to the site, it will come from a NYSDEC-registered facility in compliance with 6 NYCRR Part 360 registration and permitting requirements for the period of RCA acquisition. RCA imported from compliant facilities will not require chemical testing, unless required by NYSDEC under its terms for operation of the facility. Imported RCA must be derived from recognizable and uncontaminated concrete (less than 10% by weight passing through a No. 80 sieve). RCA is not acceptable for, and would not be used as, site cover or drainage material and will not be used to backfill areas that were over excavated to reach Track 1.

3.2 Alternative II – Technical Description

Alternative II, a Track 4 remedy, will include the following tasks:

- Development and implementation of a HASP and CAMP for the protection of on-site workers, the community, and the environment during the remediation phase of development

- Excavation of all soils in the upper 2 feet and any soil above the groundwater table which exceeds the PGW SCOs for contaminants of concern in groundwater (about 3,500 cubic yards). The site will be further excavated to about 5 feet below cellar grade as part of site development. Following soil removal, an engineered composite cover system will be installed.
- Removal of encountered USTs and/or associated appurtenances (e.g., fill lines, vent line, and electrical conduit) and decommissioning and off-site disposal during redevelopment in accordance with DER-10, 6 NYCRR Part 613.9, NYSDEC CP-51, and other applicable NYSDEC UST closure requirements
- Continue quarterly post-injection groundwater sampling for a minimum of two years from the first event (March 2020) per the NYSDEC-approved March 2019 In-Situ Treatment Remedial Design Plan.
- Collection and analysis of documentation soil samples at the excavation bottom for re-development (about 5 feet below cellar grade)
- Installation of an engineered composite cover system (i.e., reinforced concrete building foundation) underlain by a minimum 20-mil vapor barrier/waterproofing membrane of a building foundation
- Establishment of use restrictions (institutional controls [IC]) including prohibitions on the use of groundwater from the site and prohibitions on sensitive site uses, such as farming or vegetable gardening, to eliminate future exposure pathways
- Establishment of an approved Site Management Plan to ensure long-term management of ECs and ICs, including the performance of periodic inspections and certification that the controls are performing as they were intended
- Recording of an Environmental Easement (EE) to memorialize the remedial action and the ECs and ICs to ensure that future owners of the site continue to maintain these controls as required

The Alternative II extent is shown on Figure 10 and is based on data presented in the RIR and the proposed development plans. The requirements for each of the Alternative II tasks are described below.

<u>On-Site Worker, Public Health, and Environmental Protection</u>

A site-specific HASP (Appendix E) will be enforced during excavation and foundation construction to protect on-site workers from accidents and acute and chronic exposures to the identified contaminated media. Public health will be protected by implementing and enforcing dust, odor,

and organic vapor control and monitoring procedures included in the CAMP. The CAMP will include continuous perimeter monitoring of dust and organic vapor using DustTrak aerosol monitors and PIDs, respectively. The CAMP meters will be capable of recording data and calculating 15-minute averages. A field engineer, scientist, or geologist will monitor site perimeters for visible dust and odors. The environment will be protected by implementing and enforcing the appropriate soil erosion prevention measures.

Fill and Soil Removal

All soils in the upper 2 feet (about 3,500 cubic yards) and any soil above the groundwater table which exceeds the PGW SCOs for contaminants of concern in groundwater will be excavated and transported off-site for disposal. The site will be further excavated to about 5 feet below cellar grade as part of site development. Following soil removal, an engineered composite cover system will be installed. Soil exceeding the PGW and/or RURR SCOs, and soil exhibiting petroleum-related nuisance conditions deeper than 5 feet below cellar grade will remain in place. The lower of the PGW and RURR SCOs are presented in Table 4. Remedial excavation is not proposed within the sub-cellar footprint.

Tank Removal

Two 40-gallon, 1.5-foot-diameter by 3-foot-long USTs were identified along the northern property boundary during a geotechnical test pit investigation performed in January/February 2021. These USTs, and any other USTs and/or associated appurtenances (e.g., fill lines, vent line, and electrical conduit) encountered during site excavation will be decommissioned and disposed of off-site in accordance with DER-10, 6 NYCRR Part 613.9, NYSDEC CP-51, and other applicable NYSDEC UST closure requirements. Any impacted soil will be excavated, stockpiled separately, characterized, and disposed of off-site at a permitted facility. Following removal of any drums and USTs and associated grossly-impacted soil, confirmation soil samples will be collected from the base and sidewalls of the excavation in accordance with DER-10. If the excavation is enlarged horizontally beyond the dimensions of the tank, additional confirmation soil samples will be collected as required. Following removal of encountered USTs, the NYSDEC PBS registration will be updated. Closure documentation, such as contractor affidavits, bills of lading for sludge disposal, and tank disposal receipts, will be provided as appendices in the FER.

Post-Injection Groundwater Monitoring

Seven quarterly post-injection groundwater monitoring sampling events have been performed since completion of the in-situ injection program to assess treatment effectiveness and remaining groundwater contamination within the petroleum-impacted area. Six performance monitoring wells installed during the RI (RMW01, RMW02, RMW03, RMW04, RMW16, and

MW32) were sampled during each of the monitoring events performed between March 2020 and August 2021, with the exception of RMW03 which was inaccessible during the Q1 and Q2 quarterly sampling events. Quarterly post-injection groundwater sampling will continue for a minimum of two years from the first event (March 2020) per the NYSDEC-approved March 2019 In-Situ Treatment Remedial Design Plan. Groundwater monitoring will be performed, as determined by the NYSDOH and NYSDEC, until residual groundwater contaminations are found to be below NYSDEC standards or have become asymptotic over an extended period of time. Quarterly post-injection groundwater analytical results to date are discussed further in Section 2.7.

Documentation Soil Sampling

Per NYSDEC DER-10, documentation soil samples will be collected at a frequency of one bottom sample per 900 square feet of excavation base. Sidewall samples will not be collected along the site perimeter because the excavation will extend across the site footprint and the foundation walls will preclude access to soil sidewalls. An estimated 53 base-of-excavation documentation soil samples, plus QA/QC samples, will be collected to confirm remedial performance and will be analyzed for the Part 375 list of VOCs, SVOCs, PCBs, pesticides, cyanide, metals including hexavalent and trivalent chromium, and per- and PFAS and 1,4-dioxane. Proposed documentation endpoint sample locations are shown on Figure 11.

ICs, ECs, and SMP

An EE will be recorded to impose the ICs and ECs that are part of the selected remedy and which will be binding upon all subsequent owners and occupants of the property. The ICs will restrict the site's use to restricted-residential use and include notice-of-use restrictions regarding excavation requirements related to site soil and groundwater monitoring. The ECs that will be included in the easement will include maintenance of the composite cover system, consisting of a building foundation installed at about 2 feet below existing cellar grade (el 24.0), and proper soil and groundwater management during excavation work. The SMP would identify all use restrictions and long-term monitoring and maintenance requirements to ensure the ICs and/or ECs remain in place and are effective.

3.3 Evaluation of Remedial Alternatives

The following is an evaluation of the proposed remedy based on the BCP remedy evaluation criteria listed below. The first two criteria are considered "threshold criteria" and the remaining criteria are "balancing criteria". A remedial alternative must meet the threshold criteria to be considered and evaluated further under the balancing criteria.

- Protection of human health and the environment
- Compliance with standards, criteria, and guidance (SCG)
- Short-term effectiveness and impacts
- Long-term effectiveness and permanence
- Reduction of toxicity, mobility, or volume of contaminated material
- Implementability
- Cost effectiveness
- Community acceptance
- Land use

3.3.1 Protection of Human Health and the Environment

Under each alternative, the IRM has treated the on-site petroleum-impacted source material and groundwater. Potential exposure pathways for any residual petroleum-impacted soil and groundwater will be eliminated through the installation/construction of a composite cover system.

Alternative I – The remedy will eliminate exposure pathways from on-site contaminated media. Remediating the site to Track 1 standards will result in the removal of all on-site soil that exceeds UU SCOs. Encountered tanks would be decommissioned, removed, and disposed of off-site. The RAOs for public health and environmental protection will be met through the removal of contaminated media, which will eliminate the possibility for ingestion, inhalation, or dermal contact. Since no ECs or ICs will be required for this remedy to maintain the site in the future, this remedy is the most protective of human health and the environment.

Alternative II – The Track 4 remedy will provide overall protection to public health and the environment. In the event that the PGW and/or RURR SCOs cannot be achieved after soil is removed for construction of the engineered composite cover system, the building foundation will serve as a cap to prevent exposure to any residual soil contamination. Exposure would be further limited by the establishment of ICs including an EE, governed by an SMP. The RAOs for public health and environmental protection would be met through the combination of contaminant removal, ECs including site capping, and ICs including an EE and SMP.

Public health will be protected during remediation under both remedial alternatives by implementing and enforcing dust, odor, and organic vapor control and monitoring procedures when needed. The environment will be protected by implementing and enforcing soil

management controls during future site excavation and any other ICs and ECs by implementation of the SMP and through enforcement of the EE.

3.3.2 Compliance with Standards, Criteria, and Guidance

Alternative I – Remediating the site to UU SCOs will comply with all applicable SCGs listed in Section 4.4.1 because of the removal of all impacted on-site soil and treatment of site groundwater. However, Alternative I will require excavation below the proposed re-development depth and groundwater table, which will result in additional time, costs and energy consumption related to SOE and dewatering design, installation and maintenance.

Alternative II – Under a Track 4 cleanup, remediation includes removal of site soil to facilitate installation of an engineered composite cover system, which will prevent exposure of future site occupants to residual contaminated soil that may not be removed as part of site development. Compliance with Track 4 will result in less time, materials and energy consumption.

Both remedial alternatives will be protective of human health and the environment by implementing and enforcing a site-specific HASP during implementation of the remedy. Occupational Safety and Health Administration (OSHA) requirements for on-site construction safety will be followed by any site contractors performing work under Alternative I or II. The future development will also be equally protective of future building occupants.

3.3.3 Short-Term Effectiveness and Impacts

Alternative I – The most significant short-term adverse impacts and risks to the community will be associated with soil removal to achieve Track 1. This will include additional SOE installation and dewatering which may impact surrounding structures and will result in additional energy consumption and carbon emissions, relative to the Track 4 alternative. Additionally, there may be noise associated with additional SOE installation. There will also be additional truck traffic, truck exhaust and operational noise levels associated with additional soil removal. The operation is estimated to require 268 25-cubic-yard capacity truck trips to haul soil for export.

Truck traffic will be routed on the most direct course using major thoroughfares where possible and flaggers will be used to protect pedestrians at site entrances and exits. Waiting times associated with analysis of confirmation sampling and resampling may delay construction, leaving soil exposed for a longer time resulting in a potential increase in dust, odors, and/or organic vapor from the excavation and construction-related noise. The effects of these potential adverse impacts to the community, workers, and the environment will be minimized by implementing the respective control plans.

Alternative II – Alternative II will result in similar short-term adverse impacts and risks to the community related to soil removal but for a shorter duration than Alternative I. The operation is estimated to require about 140 25-cubic-yard capacity truck trips to haul soil for export (approximately 48% fewer truck trips than Alternative I). Implementing Alternative II would require a shorter implementation period, resulting in fewer potential impacts to the community, such as a shorter period of truck traffic and less potential for exposure to contaminated media. Additionally, enhanced dewatering and SOE would not be required and less energy will be consumed, resulting in less carbon emissions.

Under both remedial alternatives, dust will be controlled by the on-site application of water spray as needed. Best management practices, such as slowing the pace of work, applying foam suppressant, and/or covering portions of the excavation will be used to minimize vapors and suppress odors when required. Work will be modified or stopped according to the action levels defined in the CAMP. There would be fewer short-term impacts for Alternative II than Alternative I.

3.3.4 Long-Term Effectiveness and Permanence

Alternative I – The Track 1 remedy will remove all soil exceeding UU SCOs. Petroleum-impacted groundwater was treated via the in-situ injection program under the IRMWP. Residual contaminated groundwater would be treated through monitored natural attenuation. In addition, groundwater in this area of New York City is not used for drinking water. Because an EE and SMP are not required as part of the Track 1 remedy, Article 141 of the NYSDOH code will be relied upon to prevent ingestion of groundwater, which prohibits potable use of groundwater without prior approval. Future site use will be unrestricted; therefore, the long-term effectiveness of this remedy will eliminate environmental risks and satisfy the objectives of this criterion.

Alternative II - Although contaminants in soil may remain present at concentrations above the PGW and/or RURR SCOs, exposure pathways will be eliminated with the installation of the building foundation. ECs and ICs, including an EE, will be implemented limiting site use to restricted-residential use and preventing exposure to residual soil and groundwater contamination, with an engineered composite cover system governed by an SMP. The long-term effectiveness of this remedy will eliminate risks and satisfy the objectives of this criterion.

3.3.5 Reduction of Toxicity, Mobility, or Volume of Contaminated Material

Petroleum-impacted groundwater was treated via the in-situ injection program under the IRMWP; thereby reducing the toxicity, mobility and volume of petroleum-impacted groundwater.

Alternative I – The Track 1 remedy will permanently and significantly reduce the toxicity, mobility, and volume of soil contamination through excavation and off-site disposal of all soil exceeding UU SCOs. Therefore, Alternative I provides the highest level of toxicity, mobility and volume reduction of contaminated material.

Alternative II – The Track 4 remedy will reduce the toxicity, mobility, and volume of contamination, through removal of soil for construction of the EC and implementation of ECs and ICs, including an EE and SMP. Soil exceeding the PGW and/or RURR SCOs, and soil exhibiting petroleum-related nuisance conditions may remain in place below the re-development depth (about 5 feet below cellar grade); however, exposure will be eliminated by installation of an engineered composite cover system.

3.3.6 Implementability

Implementing both alternatives is feasible, however, Alternative I will present logistical challenges because of required dewatering and construction requirements associated with support of excavation. In addition, Alternative I will require consumption of additional energy, resulting in greater carbon emissions than Alternative II. Conventional construction measures, including the use of standard bucket excavators, can be used to achieve the targeted depth of excavation for the Track 1 (up to 12 feet below cellar grade) and Track 4 (up to 2 feet below cellar grade) remedies. Contractors experienced in implementing both remedies are readily available in the area of the site.

The technical feasibility of implementing the Alternative II remedy is greater than that of Alternative I, as excavation would be significantly reduced and an enhanced SOE and dewatering system, which would result in additional carbon emissions, would not be required under a Track 4 cleanup.

3.3.7 Cost Effectiveness

Alternative I – Based on the assumptions detailed for Alternative I, the estimated remediation cost of a Track 1 cleanup is approximately $6.8 million. Because the site will be remediated to UU SCOs, there are no long-term operation, maintenance, or monitoring costs associated with the proposed remedy. This alternative is the most costly because of additional time and costs associated with handling and disposal of fill and soil above the UU SCOs, enhanced SOE design and installation, and increased dewatering volume and system operation. Table 5 details the individual cost components used to arrive at this cost estimate.

Alternative II – Based on the assumptions detailed for Alternative II, the estimated remediation cost to achieve a Track 4 cleanup is approximately $5.6 million. This alternative will cost $1.2

million less than an Alternative I cleanup, as the costs for additional soil excavation and disposal, SOE, and dewatering will not be incurred. Alternative II is the most cost effective alternative. Table 6 outlines the individual cost-components used to arrive at this cost estimate.

3.3.8 Community Acceptance

Both remedial alternatives should be acceptable to the community because the potential exposure pathways to on-site contamination will be addressed upon completion of the respective remedies and the site will be remediated to allow for a higher level use. The selected remedy will be subject to a 45-day public comment period in accordance with the Citizen Participation Plan (CPP), included as Appendix F. Any substantive public comments received will be addressed before the remedy is approved.

3.3.9 Land Use

The current, intended, and reasonably anticipated future mixed residential and commercial land use of the site and its surroundings are compatible with both remedial alternatives. The site is located within the R7-2 residential district for medium-density apartment buildings, and the southern portion of the site (within 100 feet of Sherman Avenue) is situated within a C2-4 commercial district. The proposed development will include construction of a mixed-use institutional and residential building with one cellar level. The surrounding area is primarily residential and commercial, but also includes public parks, day care centers, and schools.

3.4 Selection of the Preferred Remedy

Both alternatives will be protective of human health and the environment and meet the remedy selection criteria. Alternative II would achieve all of the remedial action goals established for the re-development project, and would be more effective in the short-term. Alternative I further reduces contaminant mobility in the elimination of contaminant toxicity and volume. Alternative I is more effective in the long-term because it achieves unrestricted land use that is free of long-term site management, ECs, an EE, and associated future costs that would be required under Alternatives II; however, the technical challenges and additional costs associated with constructing the SOE and dewatering coupled with the additional energy consumption and carbon emissions make this alternative less feasible than Alternative II.

Alternative I would be preferred over Alternative II if it could be feasibly and practically implemented at a similar cost; however, the implementation of Alternative I is neither practical nor economically feasible. Alternative II is similarly protective of human health and the environment. If ICs and ECs are required, these controls should be easily implementable long term pursuant to an SMP and EE.

Alternative II is the selected remedy. Figure 10 depicts the Alternative II cleanup plan.

3.4.1 Zoning

The current site use conforms to applicable zoning laws and maps, as does the reasonably anticipated future mixed commercial and residential use of the site.

3.4.2 Applicable Comprehensive Community Master Plans or Land Use Plans

The site is within the bounds of the R7-2 residential district and C2-4 commercial district, and the proposed development is consistent with community land use plans.

3.4.3 Surrounding Property Uses

The current, intended, and reasonably anticipated future land use of the site and its surroundings are compatible with the selected remedy. The reasonably anticipated future use of the site and the use of its surroundings have been documented by the Volunteer. The construction of a mixed-use commercial/residential development conforms to recent development patterns in the area.

3.4.4 Citizen Participation

The CPP is discussed in Section 4.1.9.

3.4.5 Environmental Justice Concerns

Per the "Potential Environmental Justice Areas in Northern New York County, New York" map, the site is located in a potential environmental justice area.

3.4.6 Land Use Designations

There are no federal or state land use designations.

3.4.7 Population Growth Patterns

The population growth patterns and projections support the current and reasonably anticipated future land use.

3.4.8 Accessibility to Existing Infrastructure

Upon completion of the proposed development, water, sewer, electrical, and gas services will be provided. The site is accessible to the NYCTA subway "A" and "1" lines, and bus routes.

3.4.9 Proximity to Cultural Resources

The site is not in close proximity to a registered landmark. The nearest cultural landmark is the Gould Memorial Library at Bronx Community College, which is located about 0.9 miles from the site, across the Harlem River in the Bronx, NY.

3.4.10 Proximity to Natural Resources

With the exception of Fort Tryon Park and the Hudson River, located approximately 60 and 1,400 feet west of the site, respectively, the site is not located in close proximity to important federal, state, or local natural resources including waterways, wildlife refuges, wetlands, and critical habitats of endangered or threatened species. The nearest ecological receptor is the Fort Tryon Park, which is across the street from the site, south of Broadway.

3.4.11 Off-Site Groundwater Impacts

Municipal water supply wells are not present in this area of New York City; therefore, groundwater from the site cannot affect municipal water supply wells or recharge areas.

3.4.12 Proximity to Floodplains

According to preliminary Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) No. 3604970081F (revised December 5, 2013), the site falls within Zone X, which is designated for areas of 0.2 percent annual chance of flood; areas of one percent annual chance flood with average depths of less than one foot or with drainage areas less than one square mile; and areas protected by levees from one percent annual chance flood.

3.4.13 Geography and Geology of the Site

The site geology is described in Section 2.4.

3.4.14 Current Institutional Controls

There are no current ICs for the site.

3.5 Summary of the Selected Remedial Action

In preparation for site remediation and in accordance with the approved IRMWP, the existing building will undergo abatement of hazardous materials, including asbestos-containing materials (ACM), lead based paint (LBP), PCB-containing building materials, and any other identified universal and miscellaneous hazardous waste articles. Following abatement of hazardous materials, the building will be demolished to facilitate site remediation.

After hazardous material abatement and demolition is complete, the selected remedy will be implemented and will include the following:

- Development and implementation of a HASP and CAMP for the protection of on-site workers, the community, and the environment during the remediation phase of development
- Excavation of all soils in the upper 2 feet and any soil above the groundwater table which exceeds the PGW SCOs for contaminants of concern in groundwater (about 3,500 cubic yards). The site will be further excavated to about 5 feet below cellar grade as part of site development. Following soil removal, an engineered composite cover system will be installed.
- Removal of encountered USTs and/or associated appurtenances (e.g., fill lines, vent line, and electrical conduit) and decommissioning and off-site disposal during redevelopment in accordance with DER-10, 6 NYCRR Part 613.9, NYSDEC CP-51, and other applicable NYSDEC UST closure requirements
- Continue quarterly post-injection groundwater sampling for a minimum of two years from the first event (March 2020) per the NYSDEC-approved March 2019 In-Situ Treatment Remedial Design Plan.
- Collection and analysis of documentation soil samples at the excavation bottom for re-development (about 5 feet below cellar grade)
- Installation of an engineered composite cover system (i.e., reinforced concrete building foundation) underlain by a minimum 20-mil vapor barrier/waterproofing membrane of a building foundation
- Establishment of use restrictions (institutional controls [IC]) including prohibitions on the use of groundwater from the site and prohibitions on sensitive site uses, such as farming or vegetable gardening, to eliminate future exposure pathways
- Establishment of an approved Site Management Plan to ensure long-term management of ECs and ICs, including the performance of periodic inspections and certification that the controls are performing as they were intended
- Recording of an Environmental Easement (EE) to memorialize the remedial action and the ECs and ICs to ensure that future owners of the site continue to maintain these controls as required

Additionally, to incorporate green remediation principles and techniques to the extent feasible in the future development at this site, the future on-site building will include, at a minimum, a 20-

mil vapor barrier/waterproofing membrane on the foundation to improve energy efficiency as an element of construction.

Remedial activities will be performed in accordance with this RAWP, and the Department-issued Decision Document. Deviations from the RAWP and/or Decision Document will be promptly reported to the NYSDEC for approval and fully explained in the FER.

4.0 REMEDIAL ACTION PROGRAM

4.1 Governing Documents

The primary documents governing the remedial action are summarized in this section.

4.1.1 Standards, Criteria and Guidance

The following standards, criteria, and guidance are typically applicable to Remedial Action projects in New York State, and will be consulted and adhered to as applicable:

- 29 Code of Federal Regulations (CFR) Part 1910.120 – Hazardous Waste Operations and Emergency Response
- 6 NYCRR Part 371 – Identification and Listing of Hazardous Wastes
- 6 NYCRR Part 372 – Hazardous Waste Manifest System and Related Standards for Generators, Transporters and Facilities
- 6 NYCRR Subpart 373-4 – Facility Standards for the Collection of Household Hazardous Waste and Hazardous Waste from Conditionally Exempt Small Quantity Generators
- 6 NYCRR Subpart 374-1 – Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities
- 6 NYCRR Subpart 374-3 – Standards for Universal Waste
- 6 NYCRR Part 375 – Environmental Remediation Programs
- 6 NYCRR Part 376 – Land Disposal Restrictions
- 6 NYCRR Part 750 – State Pollutant Discharge Elimination System (SPDES) Permits
- 12 NYCRR Part 56 – Industrial Code Rule 56 (Asbestos)
- CP-43 – Commissioner Policy on Groundwater Monitoring Well Decommissioning (December 2009)
- CP-51 – Soil Cleanup Guidance (2010)
- DER-10 – Technical Guidance for Site Investigation and Remediation (May 3, 2010)
- DER-23 – Citizen Participation Handbook for Remedial Programs (March, 2010)
- NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006)
- TOGS 1.1.1 – Ambient Water Quality Standards & Guidance Values and Groundwater Effluent Limitations

- USEPA OSWER Directive 9200.4-17 – Use of Monitored Natural Attenuation at Superfund, Resource Conservation and Recovery Act (RCRA) Corrective Action, and Underground Storage Tank Sites (December 1997)
- Screening and Assessment of Contaminated Sediment (Division of Fish, Wildlife and Marine Resources, June 2014)
- NYSDEC Sampling, Analysis, and Assessment of PFAS Protocol dated January 2021

4.1.2 Site-Specific Health & Safety Plan

The Remedial Engineer (RE) prepared a site-specific HASP (Appendix E). The HASP will apply to all remedial and construction-related work on site. The HASP provides a mechanism for establishing on-site safe working conditions, safety organization, procedures, and PPE requirements during implementation of the remedy. The HASP meets the requirements of 29 CFR 1910 and 29 CFR 1926 (which includes 29 CFR 1910.120 and 29 CFR 1926.65, respectively). The HASP includes, but is not limited to, the following components:

- Organization and identification of key personnel
- Training requirements
- Medical surveillance requirements
- List of site hazards
- Excavation safety
- Drill rig safety
- Work zone descriptions and monitoring procedures
- Personal safety equipment and PPE requirements
- Decontamination requirements
- Standard operating procedures
- Contingency plan
- CAMP
- Safety data sheets (SDS)

The Volunteer and associated parties preparing the remedial documents submitted to the State and those performing the construction work are responsible for the preparation of a HASP and for performance of the work according to the HASP and applicable laws.

The HASP and requirements defined in this RAWP pertain to remedial and ground-intrusive work performed at the site until the issuance of a Certificate of Completion. The Site Safety Coordinator will be William Bohrer, for whom a resume is included in Appendix G. If required, confined space entry will comply with OSHA requirements to address the potential risk posed by combustible and toxic gasses.

4.1.3 Quality Assurance Project Plan

The RE prepared a Quality Assurance Project Plan (QAPP) that describes the quality control components that will ensure that the proposed remedy accomplishes the remedial goals and RAOs and is completed in accordance with the design specifications. The QAPP is provided as Appendix H and includes:

- Responsibilities of key personnel and their organizations for the proposed remedy
- Qualifications of the quality assurance officer
- Sampling requirements including methodologies, quantity, volume, locations, frequency, and acceptance and rejection criteria
- Description of the reporting requirements for quality assurance activities including weekly quality assurance review reports, periodic quality assurance and quality control audits, and other report and data submissions

4.1.4 Construction Quality Assurance Plan

The RE prepared a Construction Quality Assurance Plan (CQAP) that describes the quality control components employed so that the proposed remedy accomplishes the remedial goals and RAOs and is completed in accordance with the design specifications. Because the remedy is being accomplished through building construction, the Contractor and Construction Manager will have the primary responsibility to provide construction quality. The CQAP procedures are discussed below in Section 4.2.1.

4.1.5 Soil/Materials Management Plan

The RE prepared a Soil/Materials Management Plan (SMMP) that includes detailed plans for managing soils/materials that are disturbed at the site, including excavation, handling, storage, transport and disposal. The SMMP also includes controls that will be applied to these efforts to facilitate effective, nuisance-free performance in compliance with applicable federal, state and local laws and regulations (see Section 5.4).

4.1.6 Stormwater Pollution Prevention Plan

Erosion and sediment controls will be implemented as necessary in conformance with requirements presented in the New York State Guidelines for Urban Erosion and Sediment Control. Best management practices for soil erosion and sediment control will be selected to minimize erosion and sedimentation off-site from the onset of remediation to the completion of development. Stormwater pollution prevention will be implemented as described below in Section 5.4.10. A Stormwater Pollution Prevention Plan (SWPPP) is required because the project will disturb more than one acre of land. During construction, the site must operate in accordance with the New York City generic stormwater pollution discharge elimination system (SPDES) permit.

4.1.7 Community Air Monitoring Program

A CAMP was prepared for the site as part of the HASP (Appendix E of this RAWP). The CAMP is detailed in Section 5.4.12 below.

4.1.8 Contractors Site Operations Plan

The RE will review plans and submittals for this remedial project (including those listed above and contractor and subcontractor document submittals) and will confirm that plans and submittals are in compliance with this RAWP. The RE is responsible to ensure that later document submittals for this remedial project, including contractor and sub-contractor document submittals, are in compliance with this RAWP. Remedial documents, including contractor and subcontractor document submittals, will be submitted to the NYSDEC and NYSDOH in a timely manner and prior to the start of work associated with the remedial document.

4.1.9 Citizen Participation Plan

Fact Sheets describing the Remedial Action proposed in the RAWP will be distributed through DEC Delivers, the NYSDEC's email listserv service. Additional Fact Sheets will be distributed to announce 1) the completion of the Remedial Action with a summary of the FER and 2) the issuance of the Certificate of Completion for the site.

No changes will be made to the approved Fact Sheets authorized for release by the NYSDEC without written consent of the NYSDEC. Other information, such as brochures and flyers, will not be included with the Fact Sheet mailing. The approved CPP for this project is included in Appendix F.

Document repositories were established at the following locations and contain the applicable project documents:

Inwood Public Library
4790 Broadway
New York, NY 10034
Phone: (212) 942-2445
Hours (call to confirm):

Monday - Thursday:	10:00 a.m. to 7:00 p.m.
Friday - Saturday:	10:00 a.m. to 5:00 p.m.
Sunday:	1:00 p.m. to 5:00 p.m.

Manhattan Community Board 12
530 West 166th Street, 6th Floor
New York, NY 10032
Phone: (212) 568-8500

4.1.10 Green Remediation Principles

Green remediation principles and techniques will be implemented to the extent feasible in the design, implementation, and site management of the remedy as per DER-31. The major green remediation components are as follows:

- Considering the environmental impacts of treatment technologies and remedy stewardship over the long term
- Reducing direct and indirect greenhouse gases and other emissions
- Increasing energy efficiency and minimizing use of non-renewable energy
- Conserving and efficiently managing resources and materials
- Reducing waste, increasing recycling and increasing reuse of materials that would otherwise be considered a waste
- Maximizing habitat value and creating habitat when possible
- Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals
- Integrating the remedy with the end use where possible and encouraging green and sustainable re-development
- Additionally, to incorporate green remediation principles and techniques to the extent feasible in the future development at this site, any future on-site buildings will include, at

a minimum, a 20-mil vapor barrier/waterproofing membrane on the foundation to improve energy efficiency as an element of construction

4.2 General Remedial Construction Information

4.2.1 Project Organization

This section presents the anticipated project organization and associated roles, including key personnel, descriptions of duties, and lines of authority in the management of this RAWP. The following project personnel are anticipated for oversight of the RAWP implementation. Project personnel resumes are provided in Appendix G.

Remediation Engineer (RE):	Jason J. Hayes, P.E.
Project Manager:	Brian Gochenaur, QEP
Langan Health & Safety Manager:	Tony Moffa, CHMM
Site Health & Safety Officer	William Bohrer, PG
Qualified Environmental Professional	Michael Burke, P.G, CHMM
Field Team Leader	Julia Leung, P.E.
Quality Assurance Officer	Michael Burke, P.G, CHMM

A field engineer, scientist, or geologist under the direct supervision of the Qualified Environmental Professional and the RE will be on-site during implementation of the RAWP to monitor particulates and organic vapor in accordance with the CAMP. CAMP results that exceed specified action levels will be reported to the NYSDEC and NYSDOH in daily reports.

A field engineer, scientist, or geologist will meet with the Construction Superintendent on a daily basis to discuss the plans for that day and schedule upcoming activities. The field engineer, scientist, or geologist will document remedial activities in the daily report. This document will be forwarded to the Field Team Leader on a daily basis and to the Qualified Environmental Professional, Project Manager, and the RE on a weekly basis.

A field engineer, scientist, or geologist will screen excavations with a PID during ground-intrusive work. PID readings, including specifically elevated readings, will be recorded in the project field book (or on separate logs) and reported to the NYSDEC and NYSDOH in the daily reports. A field engineer, scientist, or geologist under the direct supervision of the Qualified Environmental Professional will collect confirmation samples from the base of excavation in accordance with this RAWP.

The project field book will be used to document sampling activities and how they correspond to this RAWP. Field observations and laboratory tests will be recorded in the project field book or

on separate logs. Recorded field observations may take the form of notes, charts, sketches, and/or photographs. A photo log will be kept to document construction activities during remediation. The photo log may also be used to document those activities recorded in the daily reports.

The Field Team Leader will maintain the current field book and original field paperwork during performance of the remedy. Remedial activities will be documented in the monthly BCP progress reports. The Project Manager will maintain the field paperwork after completion and will maintain submittal document files.

4.2.2 Remediation Engineer (RE)

The RE for this project will be Jason J. Hayes, P.E. The RE is a registered professional engineer licensed by the State of New York. The RE will have primary direct responsibility for implementation of the remedial program at the site. The RE will certify in the FER that the remedial activities were observed by qualified environmental professionals under his supervision and that the remediation requirements set forth in this RAWP and any other relevant provisions of ECL 27-1419 have been achieved in accordance with the RAWP.

The RE will document the work of other contractors and subcontractors involved in aspects of the in-situ groundwater treatment system, remedial construction, including soil excavation, stockpiling, confirmation sample collection, air monitoring, emergency spill response services, import of backfill, and management of waste transport and disposal. The RE will be responsible for appropriate communication with the NYSDEC and NYSDOH.

The RE will review the pre-remedial plans submitted by contractors and subcontractors for compliance with this RAWP and will certify compliance in the FER. The RE will provide the certifications listed below in Section 8.1.

4.2.3 Remedial Action Construction Schedule

The remedial action construction schedule is discussed below in Section 9.0 and included in Appendix I. The NYSDEC will be promptly notified of proposed changes, delays, and/or deviations to the schedule.

4.2.4 Work Hours

The hours for operation of remedial construction will either conform to the requirements of the New York City Department of Buildings (NYCDOB) construction code or to a site-specific variance issued by the NYCDOB. The NYSDEC will be notified by the Volunteer of any variances issued by the NYCDOB. The NYSDEC reserves the right to deny alternate remedial construction hours.

4.2.5 Site Security

The site perimeter will be secured with gated, signed, plywood fencing with restricted points of entry in accordance with the NYCDOB and New York City Department of Transportation (NYCDOT) permits and requirements. The purpose of the fencing is to limit site access to authorized personnel, protect pedestrians from site activities, and maintain site security.

4.2.6 Traffic Control

Site traffic will be controlled through designated points of access along Sherman Avenue and Broadway. Access points will be continuously monitored and if necessary, a flagging system will be used to protect workers, pedestrians, and authorized guests. Traffic will also adhere to applicable local, state, and federal laws.

4.2.7 Contingency Plan

Contingency plans, as described below, have been developed to effectively deal with potential unexpected discovery of additional contaminated media or USTs.

Discovery of Additional Contaminated Soil

During remediation and construction, soil will be continuously monitored by the RE's field representatives via visual, olfactory, and instrumental field screening techniques to identify additional soil that may not be suitable for disposal at the NYSDEC-approved disposal facility. If such soil is identified, the suspected impacts will be confirmed by collecting and analyzing samples in accordance with the NYSDEC-approved facility's requirements. If the previously approved facility is not permitted to receive the impacted soil, the soil will be excavated to the extent practicable and disposed of off-site at a permitted facility that can receive the material based on the characterization data.

Identification of unknown or unexpected contaminated media identified by screening during ground-intrusive site work will be promptly communicated by phone and email to the NYSDEC Project Manager. These findings will be detailed in the daily reports and the subsequent monthly BCP progress report.

Discovery of USTs

Two 40-gallon, 1.5-foot-diameter by 3-foot-long USTs were identified along the northern property boundary during a geotechnical test pit investigation performed in January/February 2021. These USTs, and any other USTs encountered during remedial activities, will be decommissioned in accordance with 6 NYCRR Part 612.2 and 613.9 and NYSDEC DER-10 Section 5.5. After the

tank, its contents, and associated piping are removed, post-excavation soil samples will be collected per NYSDEC DER-10 requirements. If encountered, petroleum-impacted soil will be excavated, stockpiled separately, and disposed of off-site at a permitted facility in accordance with applicable regulations. UST closure documentation, including contractor affidavits, bills of lading for sludge disposal, and tank disposal receipts, will be included as appendices to the FER (see Section 8.0). NYSDEC PBS registration requirements will be complied with as necessary based on the type, number, and capacity of the discovered USTs.

If other previously unidentified contaminant sources are found during on-site remedial excavation or development-related construction, sampling will be performed on product, if encountered, and surrounding subsurface materials (e.g., soil, stone, etc.). Chemical analyses will include Part 375 VOCs, SVOCs, PCBs, pesticides, cyanide, and metals including trivalent and hexavalent chromium. Analyses will not be otherwise limited without NYSDEC approval.

If other USTs are encountered during ground-intrusive site work, the findings will be promptly communicated by phone to the NYSDEC Project Manager, as well as, detailed in the appropriate daily report. These findings will also be included in the monthly BCP progress reports.

4.2.8 Worker Training and Monitoring

Worker training and monitoring will be conducted in accordance with the site-specific HASP, which is included in Appendix E.

4.2.9 Agency Approvals

The applicant has addressed all State Environmental Quality Review Act (SEQRA) requirements for this site. Permits or government approvals required for remedial construction will be obtained prior to the start of remedial construction. The planned end use for the site conforms to current zoning for the property as determined by New York City Department of City Planning. A Certificate of Completion will not be issued for the project unless conformance with the zoning designation is demonstrated. Local, regional, and national governmental permits, certificates or other approvals or authorizations required to perform the remedial and development work will be acquired prior to the start of remediation.

A list of all local, regional and national governmental permits, certificates or other approvals or authorizations required to perform the remedial and development work is provided below:

- NYCDOB Demolition Permit (NYC Building Code) – NYCDOB: 212-566-5000
- NYCDOB New Building Permit (NYC Building Code) – NYCDOB: 212-566-5000

This list includes a citation of the law, statute or code to be complied with, the originating agency and phone number in that agency. Considering the system is online, direct contacts of reviewers are not provided. This list will be updated in the FER.

No remedial or construction work will be conducted in regulated wetlands or adjacent areas.

4.2.10 NYSDEC BCP Signage

A project sign will be erected at the main entrance to the site prior to the start of any remedial activities. The sign will indicate that the project is being performed under the New York State Brownfield Cleanup Program. The sign will meet the detailed specifications provided by the NYSDEC Project Manager and contained in Appendix J.

4.2.11 Pre-Construction Meeting with the NYSDEC

Prior to the start of remedial construction, a meeting will be held between the NYSDEC, RE, Volunteer, Construction Manager, and remediation contractor to discuss project roles, responsibilities, and expectations associated with this RAWP.

4.2.12 Emergency Contact Information

An emergency contact sheet that defines the specific project contacts (with names and phone numbers) for use by NYSDEC and NYSDOH in the case of an emergency (day or night) is included in the HASP (Appendix E).

4.2.13 Remedial Action Costs

The total estimated cost of the Track 4 Remedial Action is $5.6 million. An itemized and detailed summary of estimated costs for the remedy is provided in Table 6.

4.3 Site Preparation

4.3.1 Mobilization

Prior to commencing remedial construction, the remediation contractor will mobilize to the site and prepare for remedial activities. Mobilization and site preparation activities may include the following:

- Identifying the location of aboveground and underground utilities (e.g., power, gas, water, sewer, and telephone), equipment, and structures as necessary to implement remediation

- Mobilizing necessary remediation personnel, equipment, and materials to the site
- Constructing one or more stabilized construction entrances consisting of non-hazardous material at or near the site exit, which takes into consideration the site setting and site perimeter
- Constructing an equipment decontamination pad for trucks, equipment, and personnel that come into contact with impacted materials during remediation
- Installing temporary fencing or other temporary barriers to limit unauthorized access to areas where remediation will be conducted

4.3.2 Monitoring Well Decommissioning

Existing groundwater monitoring wells will be properly decommissioned, in accordance with NYSDEC CP-43, when no longer required. The only exception to this is if the full length of the well is to be excavated during remediation and development. If required, well decommissioning will be performed by an experienced driller and logged by the driller and a Langan field engineer, scientist, or geologist. Decommissioning documentation will be provided in the FER.

4.3.3 Erosion and Sedimentation Controls

Since the planned earthwork activities will be below the adjacent sidewalk grade, full-time erosion and sedimentation measures are not anticipated. Best management practices for soil erosion will be selected and implemented, as needed, to minimize erosion and sedimentation off site.

4.3.4 Temporary Stabilized Construction Entrance(s)

Temporary stabilized construction entrances will be installed at the existing curb cuts along Sherman Avenue and Broadway. The entrances will be covered with gravel or RCA and graded so that runoff water will be directed on site. Vehicles exiting construction areas will be cleaned using clean water or dry brushing, as needed, to remove site soil from the tires and undercarriages. The Contractor will protect and maintain the existing sidewalks and roadways at both site access points.

4.3.5 Utility Marker and Easements Layout

The Volunteer and its contractors are solely responsible for the identification of utilities and/or easements that might be affected by work under this RAWP and implementation of the required, appropriate, or necessary health and safety measures during performance of the work under this RAWP. The Volunteer and its contractors are solely responsible for safe execution of the work

performed under this RAWP. The Volunteer and its contractors must obtain the necessary local, state, and/or federal permits or approvals that may be required to perform the work detailed in this RAWP. Approval of this RAWP by the NYSDEC does not constitute satisfaction of these requirements.

4.3.6 Sheeting and Shoring

Appropriate management of the structural stability of on-site or off-site structures during site activities is the sole responsibility of the Volunteer and its contractors. The Volunteer and its contractors are solely responsible for the safe execution of the work performed under this RAWP. The Volunteer and its contractors must obtain the necessary local, state, and/or federal permits or approvals that may be required to perform the work detailed in this RAWP. Additionally, the Volunteer and its contractors are solely responsible for the implementation of the required, appropriate, or necessary health and safety measures during performance of work conducted under this RAWP.

4.3.7 Equipment and Material Staging

The Contractor will notify the RE and the Volunteer, in writing with receipt confirmed, at least 30 calendar days in advance of pending site work mobilization. During mobilization, construction equipment will be delivered to the site, temporary facilities constructed, and temporary utilities installed. The Contractor will place and maintain temporary toilet facilities within the work areas for usage by all site personnel.

4.3.8 Decontamination Area

The contractor will construct decontamination pads at each site entrance/exit planned for construction vehicle usage. The location of decontamination pads may change periodically to accommodate the contractor's sequencing of work. The pads will be constructed by the contractor to collect wastewater for off-site disposal or treatment and discharge, if generated during decontamination activities. The design will consider adequate space to decontaminate equipment and vehicles, and sloping and liners to facilitate collection of wastewater. Collected decontamination wastewater shall be either discharged in accordance with the contractor's NYCDEP permit or tested and transported to an off-site disposal facility that is permitted to accept this waste, in accordance with applicable local, state and federal regulations.

If the contractor uses high pressure washing methods, the contractor shall provide splash protection around the vehicle decontamination facility. Splash protection shall minimize potential contamination from splatter and mist movement off site during the vehicle decontamination

process. Splash protection shall be temporary and stable and capable of being dismantled in the event of high winds.

Accumulated truck rinsate and decontamination materials will be collected and commingled with other waste streams for discharge or disposal, as appropriate. The contractor will maintain the decontamination pad(s) throughout the duration of the remediation. Prior to demobilization, the contractor will deconstruct the pads and dispose of materials as required.

4.3.9 Site Fencing

The site perimeter will be secured with gated, signed, plywood fencing maintained by the Contractor. The purpose of the fencing is to limit site access to authorized personnel, protect pedestrians from site activities, and maintain site security.

4.3.10 Demobilization

After remediation and construction is completed, the Contractor will be responsible for demobilizing labor, equipment, and materials not designated for off-site disposal. The RE will document that the Contractor performs follow-up coordination and maintenance for the following activities:

- Removal of sediment and erosion control measures and disposal of materials in accordance with applicable rules and regulations
- Removal of remaining contaminated material or waste
- Equipment decontamination
- General refuse disposal

4.4 Reporting

Periodic reports and an FER will be required to document the remedial action. The RE responsible for certifying the reports will be an individual licensed to practice engineering in the State of New York; Jason J. Hayes, P.E. of Langan will have this responsibility. Should Mr. Hayes become unable to fulfill this responsibility, another suitably qualified NYS Professional Engineer will take his place. Daily and monthly reports will be included as appendices to the FER. In addition to the periodic reports and the FER, copies of the relevant contractor documents will be submitted to the NYSDEC.

4.4.1 Daily Reports

Daily reports will be submitted to the NYSDEC and NYSDOH Project Managers by the end of each day, or at a frequency acceptable to them, following the reporting period and will include:

- An update of progress made during the reporting day including a photograph log
- Locations of work and quantities of material imported and exported from the site
- References to an alpha-numeric map for site activities
- A summary of complaints with relevant details (names, phone numbers)
- A summary of CAMP findings, including exceedances
- An explanation of notable site conditions

Daily reports are not intended to be the primary mode of communication for notifying NYSDEC of emergencies (accident, spill), requests for changes to the RAWP, or other sensitive and/or time critical information. However, such conditions will still be included in the daily reports. Emergency conditions and changes to the RAWP will be addressed directly to the NYSDEC Project Manager via personal communication.

4.4.2 Monthly Reports

Monthly reports will be submitted to the NYSDEC and NYSDOH Project Managers by the tenth of the month following the reporting period. The monthly reports will include the following information, as well as, any additional information required by the BCA:

- Activities relative to the site during the previous reporting period and those anticipated for the next reporting period, including a quantitative presentation of work performed (i.e., tons of material exported and imported, etc.)
- Description of approved activity modifications, including changes of work scope and/or schedule
- Sampling results received following internal data review and validation, as applicable
- An update of the remedial schedule including the percentage of project completion, unresolved delays encountered or anticipated that may affect the future schedule, and efforts made to mitigate such delays

4.4.3 Other Reporting

Photographs of remedial activities will be taken and submitted to the NYSDEC in digital (JPEG) format. Photographs will illustrate the remedial program elements and will be of acceptable quality. Representative photographs of the site will be provided. Field photographs will be included in daily and monthly reports, as necessary, and a comprehensive photograph log will be included in the FER. Upon request, photographs will be submitted to the NYSDEC and NYSDOH Project Managers on CD or other acceptable electronic media. CDs will have a label and a general

file inventory structure that separates photographs into directories and sub-directories according to logical Remedial Action components. A photograph log keyed to photo file ID numbers will be prepared to provide explanation for all representative photographs.

Site record keeping for all remedial work will be appropriately documented. These records will be maintained on site at all times during the project and will be available for inspection by NYSDEC and NYSDOH staff.

4.4.4 Complaint Management Plan

The management plan for documenting complaints is detailed below.

Item	Description
Approach	Complaints regarding remediation or construction activities/operations to be minimized and mitigation measures implemented to reduce the incidence of complaints
Objective	Manage environmental complaints from the community regarding remediation
Implementation Strategy/Mitigation Measures	Complaints will be documented on a complaint register. The register will be maintained as an ongoing record. Each entry will include the following information: • Time, date, and nature of complaint • Type of communication (telephone, letter, personal, etc.) • Name, contact address, and contact number • Response and investigation undertaken as a result of the complaint including action taken and signature of the responsible person Each complaint will be investigated as soon as practicable in relation to the requirements.
Monitoring	A representative from the Volunteer will follow up on the complaint within two weeks of receipt to ensure it is resolved.
Reporting	Upon receipt and following complaint investigation and resolution, the NYSDEC will be notified. Complaint resolutions will be documented in daily reports and the monthly BCP progress report.

Item	Description
Corrective Action	Should an incident of failure to comply occur in relation to the management of environmental complaints, one or more of the following corrective actions will be undertaken as appropriate: • Conduct additional training of staff to handle environmental complaints • Investigate why the environmental complaint was not addressed within the specified time frame • Investigate complaint and action follow-up according to results of investigation

4.4.5 Deviations from the RAWP

Necessary deviations from the RAWP will be coordinated with the NYSDEC in advance. Notification will be provided to the NYSDEC by telephone/email for conditions requiring immediate action (e.g., conditions judged to be a danger to the surrounding community). Based on the significance of the deviation, an addendum to this RAWP may be necessary and will include:

- Reasons for deviating from the approved RAWP
- Approval process to be followed for changes/editions to the RAWP
- Effect of the deviations on the overall remedy

5.0 REMEDIAL ACTION

Remediation will include the excavation of all soils in the upper 2 feet (about 3,500 cubic yards) and any soil above the groundwater table which exceeds the PGW SCOs for contaminants of concern in groundwater for transport and off-site disposal. The site will be further excavated to about 5 feet below existing cellar grade as part of re-development. Following soil removal, an engineered composite cover system will be installed. Soil exceeding the PGW and/or RURR SCOs, and soil exhibiting petroleum-related nuisance conditions may remain below development depth; however, exposure will be eliminated by installation of an engineered composite cover system.

5.1 Soil Cleanup Objectives

The Track 4 SCOs will be the lower of the PGW and RURR SCOs based on the soil data obtained from the RI and supplemental soil investigation. The lower of the PGW and RURR SCOs are listed in Table 4. Soil and materials management will be conducted in accordance with the SMMP as described below.

5.2 Remedial Performance Evaluation (Confirmation Sampling)

5.2.1 Soil Sampling Frequency

One documentation soil sample will be collected for every 900 square feet of excavation base in accordance with NYSDEC DER-10, or at an alternative frequency approved by NYSDEC. Sidewall documentation samples will not be collected from the site perimeter because excavation will extend across the site footprint and support of excavation measures (e.g., sheeting, lagging) will preclude collection of sidewall samples. An estimated 53 base of excavation documentation soil samples, plus QA/QC samples, will be collected to document remedial performance.

5.2.2 Methodology

Documentation soil samples will be collected from the base of the excavation in accordance with NYSDEC DER-10 to document remedial performance and will be analyzed for the Part 375 list of VOCs, SVOCs, PCBs, pesticides, cyanide, and metals including hexavalent and trivalent chromium, PFAS, and 1,4-dioxane.

Additional sampling may be required should the excavation area be over-excavated. Should additional soil sampling be deemed necessary (e.g., additional tank closure, unknown environmental condition through visual evidence of a remaining source), documentation sampling will be conducted in accordance with NYSDEC DER-10.

5.2.3 QA/QC

Quality control procedures for confirmation soil sampling are included in the QAPP (refer to Appendix H). Confirmation analytical results will be provided in the NYSDEC's electronic data deliverable (EDD) format for EQuIS™. Guidance on the sampling frequency is presented in NYSDEC DER-10 Section 5.4.

The QA/QC procedures required by the NYSDEC Analytical Services Protocol (ASP) and SW-846 methods will be followed. This will include instrument calibration, standard compound spikes, surrogate compound spikes, and analysis of quality control samples. The laboratory will provide sample bottles, which will be pre-cleaned and preserved. Where there are differences in the SW-846 and NYSDEC ASP requirements, the NYSDEC ASP will take precedence.

5.2.4 DUSR

ASP Category B deliverables will be prepared for all remedial performance samples collected during implementation of this RAWP. DUSRs will be prepared by a qualified data validator and the findings will be reported in the FER.

5.2.5 Reporting

Analytical laboratories that analyze confirmation soil samples, prepare results, and perform contingency sampling will be NYSDOH ELAP-certified laboratories.

5.3 Estimated Material Removal Quantities

The estimated volume of soil requiring removal and off-site disposal for a Track 4 cleanup is about 3,500 cubic yards to facilitate installation of the site cover system. Further excavation will be required to achieve development depth. Over-excavation and import of backfill material is not anticipated; however some import may be needed for sub-base material and site ramps.

5.4 Soil/Materials Management Plan

This section presents the approach to management, disposal, and reuse of soil, fill, and materials excavated from the site. This plan is based on the current knowledge of site conditions and will be augmented, as necessary, using additional data collected during remediation. A field engineer, scientist, or geologist, under the direction of the RE will monitor and document the handling and transport of contaminated material removed from the site for disposal as a regulated solid waste. A field engineer, scientist, or geologist, under the direction of the RE, will assist the remediation contractor in identifying impacted materials during remediation, determining materials suitable for direct load out versus temporary on-site stockpiling, selection of samples for waste

characterization, if necessary, and determining the proper off-site disposal facility. Separate stockpile areas will be constructed as needed for the various materials to be excavated or generated, with the intent to most efficiently manage and characterize the materials and to avoid comingling impacted materials with non-impacted soil.

- Nonhazardous Historic Fill Material – This material refers to historic fill that contains historic fill-related contaminants above the PGW and/or RURR SCOs and will not be reused on-site. This material will be excavated to depths of up to 5 feet below cellar grade as part of re-development. This material will be transported off-site and disposed of at a facility permitted to accept the material. Characterization sampling will be completed in conformance with the requirements of the selected disposal facilities. Samples will be collected from the base of the excavation to document concentrations of contaminants in soil remaining in place.

- Petroleum Impacted Historic Fill and Native Material – This material refers to historic fill and native material that contains petroleum-related VOCs above the PGW and/or RURR SCOs and will not be reused on site. Petroleum-impacted soil was encountered during the RI and supplemental soil investigation between 0 and 12 feet below cellar grade. Petroleum-impacted historic fill excavated for site development will not be reused on-site and will be transported off-site and disposed of at a facility permitted to accept the material. Characterization sampling will be completed in conformance with the requirements of the selected disposal facilities. Samples will be collected from the base of the excavation to document concentrations of contaminants in soil remaining in place.

5.4.1 Soil Screening Methods

Visual, olfactory, and instrumental soil screening and assessment will be performed by an engineer, geologist, or scientist under the direction of the RE during remediation and development-related excavations into known or potentially contaminated material. Soil screening will be performed regardless of when the invasive work is done and will include all excavation and invasive work performed during the remedy and during the development phase, such as excavations for foundations and utility work, prior to issuance of the Certificate of Completion.

Resumes will be provided for personnel responsible for field screening (i.e., those representing the RE) the excavation and other ground-intrusive work performed during remediation and development.

5.4.2 Stockpile Methods

Stockpiles will be constructed as necessary to separate and stage excavated material pending loading or characterization sampling. Separate stockpile areas will be constructed to avoid comingling materials of differing waste types. Stockpile areas will meet the following minimum requirements:

- Excavated soil will be placed onto a minimum thickness of 6 mil low-permeability liner of sufficient strength and thickness to prevent puncture during use; separate stockpiles will be created where material types are different (e.g., petroleum-impacted material stockpiled in a contaminated soil area). The use of multiple layers of thinner liners is permissible.
- Equipment and procedures will be used to place and remove the soil that will minimize the potential to jeopardize the integrity of the liner.
- Stockpiles will be covered at the designated times (see below) with minimum 6-mil plastic sheeting or tarps which will be securely anchored to the ground. Stockpiles will be routinely inspected and broken sheeting covers will be promptly replaced.
- Stockpiles will be covered upon reaching their capacity (i.e., about 1,000 cubic yards) until ready for loading. Stockpiles that have not reached their capacity, whether active or inactive, will be covered at the end of each workday.
- Each stockpile will be encircled with silt fences and hay bales, as needed, to contain and filter particulates from rainwater that has drained off the soils and to mitigate the potential for surface water run-off.
- Stockpiles will be inspected at a minimum of once daily and after every storm event. Results of inspections will be recorded in a logbook, maintained at the site, and made available for inspection by the NYSDEC.

5.4.3 Materials Excavation and Load Out

A field engineer, scientist, or geologist under the supervision of the RE will monitor ground-intrusive work and the excavation and load-out of excavated material.

The Volunteer and its contractors are solely responsible for safe execution of ground-intrusive and other remedial work performed under this RAWP. The Volunteer and its contractors are solely responsible for the identification of utilities and/or easements that might be affected by the work conducted under this RAWP.

Loaded vehicles leaving the site will be appropriately lined, securely covered, manifested, and placarded in accordance with the appropriate federal, state, and local requirements, including applicable transportation requirements (i.e., New York State Department of Transportation [NYSDOT] and NYCDOT requirements). Trucks hauling historic fill material will not be lined unless free liquids are present or the material is grossly impacted.

A truck wash will be operated on site. The RE will be responsible for documenting that outbound trucks will be washed at the truck wash, as necessary, before leaving the site until the remedial construction is complete. Locations where vehicles enter or exit the site will be inspected daily for evidence of off-site sediment tracking.

The RE will be responsible for documenting that egress points for truck and equipment transport from the site will be clean of dirt and other materials derived from the site during remediation and development. The remediation contractor will clean adjacent streets as necessary to maintain a clean condition with respect to site-derived materials.

The Volunteer and associated parties preparing the remedial documents submitted to New York State, and the parties performing this work, are responsible for the safe performance of ground-intrusive work, the structural integrity of excavations, and for structures that may be affected by excavations (such as building foundations and bridge footings).

The Volunteer and associated parties will ensure that site development activities will not interfere with, or otherwise impair or compromise, remedial activities proposed in this RAWP.

Development-related grading cuts and fills will not be performed without NYSDEC approval and will not interfere with, or otherwise impair or compromise, the performance of remediation required by this RAWP.

Mechanical processing of historic fill and contaminated soil on-site is prohibited unless otherwise approved by NYSDEC.

Primary contaminant sources (including, but not limited to, tanks and hotspots) identified during site characterization, the RI, and implementation of the remedy will be surveyed by a surveyor licensed to practice in the State of New York. The survey information will be shown on maps to be included with the FER.

5.4.4 Materials Transport Off-Site

Transport of materials will be performed by licensed haulers in accordance with appropriate local, state, and federal regulations, including 6 NYCRR Part 364. Haulers will be appropriately licensed

and trucks properly placarded. Trucks headed to disposal facilities will travel north on Broadway to Interstate 95, or other routes approved by NYSDEC. Truck transport routes are shown on Figure 12.

Trucks loaded with site materials will exit the vicinity of the site using approved truck routes. These routes are the most appropriate routes to and from the site and take into account:

- Limiting transport through residential areas and past sensitive sites
- Use of city mapped truck routes
- Prohibiting off-site queuing of trucks entering the facility
- Limiting total distance to major highways
- Promoting safety in access to highways
- Overall safety in transport
- Community input (where necessary)

Trucks will be prohibited from excessive stopping and idling in the neighborhood outside of the site.

Egress points for truck and equipment transport from the site will be kept clean of dirt and other materials during remediation and development.

To the extent possible, queuing of trucks will be performed on-site in order to minimize off-site disturbance. Off-site queuing will be minimized.

Material transported by trucks exiting the site will be secured with tight-fitting covers. Loose-fitting canvas-type truck covers will be prohibited. If loads contain wet material capable of producing free liquid, truck liners will be used.

5.4.5 Materials Disposal Off-Site

Disposal facilities will be determined at a later date and will be reported to the NYSDEC Project Manager prior to off-site transport and disposal of excavated material. About 3,500 cubic yards of historic fill is expected to be disposed off-site. Soil/fill/solid waste excavated and removed from the site will be treated as contaminated and regulated material and will be disposed in accordance with local, state (including 6NYCRR Part 360) and federal regulations. If disposal of soil/fill from this site is proposed for unregulated disposal (i.e. clean soil removed for development purposes), a formal request with an associated plan will be made to NYSDEC's Project Manager. Unregulated off-site management of materials from this site is prohibited without formal

NYSDEC approval. Material that does not meet UU SCOs is prohibited from being taken to a New York State recycling facility (6NYCRR Part 360-16 Registration Facility)

The following documentation will be obtained and reported by the RE for each disposal location used in this project to fully demonstrate and document that the disposal of material derived from the site conforms to applicable laws:

(1) A letter from the RE or Volunteer to the receiving facility describing the material to be disposed of and requesting formal written acceptance of the material. This letter will state that material to be disposed of is contaminated material generated at an environmental remediation site located in New York State. The letter will provide the project identity and the name and phone number of the RE. The letter will include as an attachment a summary of chemical data for the material being transported (including waste characterization and RI data); and

(2) A letter from each receiving facility stating that it is in receipt of the correspondence (above) and acceptance of the material is approved.

These documents will be included in the FER.

Non-hazardous historic fill material and contaminated soil transported off-site will be handled, at a minimum, as a solid waste per 6 NYCRR Part 360. Historic fill and contaminated soil excavated from the site are prohibited from being disposed of at Part 360 Registration Facilities (also known as Soil Recycling Facilities).

Soil that is contaminated but non-hazardous and is removed from the site is considered by the NYSDEC Division of Materials Management (DMM) to be construction and demolition (C&D) materials with contamination not typical of virgin soils. Soil not meeting UU SCOs will be considered a solid waste unless a BUD is processed stating otherwise. This soil may be sent to a permitted Part 360 landfill in New York or other appropriate out-of-state disposal facility permitted to accept contaminated soil from a brownfield site. This soil may be sent to a permitted C&D processing facility without permit modifications only upon prior notification of NYSDEC. This material is prohibited from being sent or redirected to a New York Part 360 Registration Facility. In this case, as dictated by DMM, special procedures will include, at a minimum, a letter to the C&D facility that provides a detailed explanation that the material is derived from an NYSDEC DER remediation site, that the material is contaminated, and that the material must not be redirected to on-site or off-site Soil Recycling Facilities. The letter will provide the project identity and the name and phone number of the RE. The letter will include as an attachment a summary of chemical data for the material being transported.

The FER will include an accounting of the destination of material removed from the site during implementation of the remedy, including excavated soil, contaminated soil, historic fill, solid waste, hazardous waste, non-regulated material, and fluids. Documentation associated with disposal of each material type must also include records and approvals for receipt of the material. This information will also be presented in a table to be included in the FER.

A "Bill of Lading" system or equivalent will be used for off-site movement of non-hazardous wastes and contaminated soils. This information will be reported in the FER. Hazardous wastes derived from the site, if any, will be stored, transported, and disposed of in compliance with applicable local, state, and federal regulations.

Hazardous wastes derived from on-site, if any, will be stored, transported, and disposed of in full compliance with applicable local, state, and federal regulations.

Appropriately licensed haulers, in compliance with applicable local, state, and federal regulations, will be used to transport the material removed from this site.

Waste characterization will be performed for off-site disposal in a manner suitable to the receiving facility and in conformance with applicable permits. Sampling and analytical methods, sampling frequency, analytical results, and QA/QC results will be reported in the FER. Data available for excavated material to be disposed of at a given facility must be submitted to the disposal facility with suitable explanation prior to shipment and receipt.

5.4.6 Materials Reuse On-Site

Soil excavated during the remedy may be reused on site if the requirements in this section are met. Grossly-impacted soil will not be reused. Reused soil must be non-hazardous and must meet the PGW and/or RURR SCOs (refer to Table 4). Soil removed during implementation of the remedy or removed for grading or other purposes will not be reused within a cover soil layer, within landscaping berms, or as backfill for subsurface utility lines. Organic matter (wood, roots, stumps, etc.) or other solid waste derived from clearing and grubbing of the site is prohibited for reuse on-site. Reuse of soil will be coordinated in advance with the NYSDEC Project Manager. Material deemed unfit for reuse will be transported for off-site disposal.

5.4.7 Fluids Management

Liquids to be removed from the site, including dewatering fluids, will be handled, transported, and disposed of in accordance with applicable local, state, and federal regulations. Liquids discharged into the New York City sewer system will be addressed through approval by NYCDEP.

5.4.8 Demarcation

It is anticipated that the site will be remediated to a Track 4 remedy, and contaminated soil with petroleum nuisance conditions will remain on-site deeper than 5 feet below cell grade. The concrete slab will serve as a demarcation barrier for any residual contaminated soil left in place.

5.4.9 Backfill from Off-Site Sources

Materials proposed for import onto the site will be approved by the RE and will be in compliance with the provisions in this RAWP prior to receipt at the site. Imported soil for backfill must meet the requirements of 6 NYCRR Part 375-6.7(d) and NYSDEC DER-10 Section 5.4(e), Table 5.4(e)10, and Appendix 5. Material from industrial sites, spill sites, other environmental remediation sites, or other potentially contaminated sites will not be imported to the site. Solid waste will not be imported onto the site.

The FER will include the following certification by the RE: "I certify that all import of soils from off-site, including source evaluation, approval, and sampling, has been performed in a manner that is consistent with the methodology defined in the RAWP".

Backfill material will consist of clean fill (as described in the following paragraph) or other acceptable fill material such as virgin stone from a quarry or RCA. If RCA is imported to the site, it will be from a NYSDEC-registered facility in compliance with 6 NYCRR Part 360 registration and permitting requirements for the period of acquisition of RCA. RCA imported from compliant facilities will not require chemical testing, unless required by the NYSDEC under the terms for operation of the facility. RCA imported to the site must be derived from recognizable and uncontaminated concrete, with no more than 10% by weight passing through a No. 80 sieve. RCA is not acceptable for and will not be used as cover or drainage material. A site-specific BUD will be obtained by the NYSDEC for import of RCA for use as backfill in over-excavated areas to development depth.

Imported soil (i.e., clean fill) will meet the PGW and/or RURR SCOs. Non-compliant soil will not be imported to the site. Clean fill will be segregated at a source/facility that is free of environmental contaminants. Qualified environmental personnel will collect representative samples at a frequency consistent with NYSDEC CP-51. The samples will be analyzed for Part 375 VOCs, SVOCs, pesticides/herbicides, PCBs, cyanide, and metals including trivalent and hexavalent chromium, and PFAS by a NYSDOH ELAP-certified laboratory. Upon meeting these criteria, the certified-clean fill will be transported to the site and segregated from impacted material, as necessary, on plastic sheeting until it is used as backfill.

Soil that meets 'exempt' fill requirements under 6 NYCRR Part 360, but do not meet backfill or cover soil objectives for this site and will not be imported onto the site without prior approval by the NYSDEC. The contents of this RAWP and NYSDEC approval of this RAWP should not be construed as an approval for this purpose.

Trucks entering the site with imported soils will be secured with tight fitting covers.

5.4.10 Stormwater Pollution Prevention

Silt fence or hay bales will be installed around the perimeter of the remedial construction area, as required. Barriers and hay bale checks will be installed and inspected once a week and after every storm event. Results of inspections will be recorded in a logbook maintained at the site and available for inspection by the NYSDEC. Necessary repairs to silt fence and/or hay bales will be made immediately. Accumulated sediments will be removed as required to keep the barrier and hay bale check functional. Undercutting or erosion of the silt fence toe anchor will be repaired immediately with appropriate materials. Manufacturer's recommendations will be followed for replacing silt fence damaged due to weathering. Erosion and sediment control measures identified in the RAWP will be observed to ensure that they are operating correctly. Where discharge locations or points are accessible, they will be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to the sewer system.

5.4.11 Contingency Plan

As discussed above in Section 4.2.7, if USTs or other previously unidentified contaminant sources are found during on-site remedial excavation or development-related construction, sampling will be performed on product, if encountered, and surrounding subsurface materials (e.g., soil, stone, etc.). Chemical analyses will be for full scan parameters (Part 375 VOCs, SVOCs, PCBs, pesticides, and metals). Analyses will not be otherwise limited without NYSDEC approval.

Identification of unknown or unexpected contaminated media identified by screening during ground-intrusive work will be promptly communicated by phone to the NYSDEC Project Manager. These findings will also be detailed in the daily reports and the subsequent monthly BCP progress report.

5.4.12 Community Air Monitoring Plan

Community air monitoring will be conducted in compliance with the NYSDOH Generic CAMP outlined below.

The CAMP will include real-time monitoring for VOCs and particulates at the downwind perimeter of each designated work area when ground-intrusive work is in progress. Continuous monitoring

will be required for all ground-intrusive work. Ground-intrusive work includes, but is not limited to, soil/fill excavation and handling and utility trenching. Periodic monitoring for VOCs may be required during non-intrusive work such as the collection of soil samples. "Periodic" monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location and taking a reading prior to leaving a sample location.

CAMP monitoring of total VOC levels will be conducted using PIDs, and monitoring for particulates will be conducted using particulate sensors equipped with filters that can detect airborne particulates less than 10 microns in diameter (PM10). Monitoring for particulates and odors will be conducted during ground-intrusive work by a field engineer, scientist, or geologist under the supervision of the RE. The work zone is defined as the general area in which machinery is operating in support of remediation. A portable PID will be used to monitor the work zone and for periodic monitoring of total VOC levels during work such as soil sampling. The site perimeter will be visually monitored for fugitive dust emissions.

The following actions will be taken based on total VOC levels measured:

- If total VOC levels exceed 5 ppm above background for the 15-minute average at the perimeter, work will be temporarily halted and monitoring continued. If levels readily decrease (per instantaneous readings) below 5 ppm above background, work will resume with continued monitoring.
- If total VOC levels at the downwind perimeter of the work zone persist at levels in excess of 5 ppm above background but less than 25 ppm, work will be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work will resume provided that the total VOC level 200 feet downwind of the hot 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 above background for the 15-minute average
- If the total VOC level is above 25 ppm at the perimeter of the hot zone, work will be shut down.

The following actions will be taken based on visual dust observations:

- If the downwind particulate level is 100 µg/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 must be employed. Work may continue with dust suppression techniques provided that downwind PM10 levels do not exceed 150 µg/m^3 above the background level and provided that no visible dust is migrating from the work area.

- If, after implementation of dust suppression techniques, downwind PM10 levels are greater than 150 µg/m³ above the background level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM10 concentration to within 150 µg/m³ of the upwind level and in preventing visible dust migration.

Sustained concentrations of VOCs or PM10 will be reported to the NYSDEC and NYSDOH Project Managers and included in the daily report. In addition, a map showing the location of the downwind and upwind CAMP stations will be included in the daily report.

5.4.13 Odor, Dust and Nuisance Control Plan

Dust, odor, and nuisance control will be accomplished by the remediation contractor as described in this section. The FER will include the following certification by the RE: "I certify that ground-intrusive work during remediation and development-related construction was conducted in accordance with dust and odor suppression methodology defined in the RAWP."

Odor Control Plan

This odor control plan is capable of controlling emissions of nuisance odors off site. Specific odor control methods to be used if needed will include application of foam suppressants or tarps over the odor or VOC source areas. If nuisance odors are identified, work will be halted and the source of odors will be identified and corrected. Work will not resume until nuisance odors have been abated. The NYSDEC and NYSDOH will be notified of odor events and of other complaints about the project. Implementation of odor controls is the responsibility of the Contractor. Monitoring odor emission, including the halt of work, will be the responsibility of the RE, who is responsible for certifying the FER. Application of odor controls is the responsibility of the remedial contractor.

Necessary means will be employed to prevent on- and off-site 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) using foams to cover exposed odorous soils. If odors develop and cannot be otherwise controlled, additional means to eliminate odor nuisances will include: (d) direct load-out of soils to trucks for off-site disposal; (e) use of chemical odorants in spray or misting systems; and (f) use of staff to monitor odors in surrounding neighborhoods.

Where odor nuisances have developed during remedial work and cannot be corrected, or where the release of nuisance odors cannot otherwise be avoided due to on-site conditions or close proximity to sensitive receptors, odor control will be achieved by sheltering excavation and

handling areas under tented containment structures equipped with appropriate air venting/filtering systems.

Dust Control Plan

A dust suppression plan that addresses dust management during ground-intrusive on-site work will include, at a minimum, the items listed below:

- Dust suppression will be achieved through the use of a dedicated water distribution system, on-site water truck for road wetting, or an alternate source with suitable supply and pressure for use in dust control.
- Gravel will be used for on-site roads to provide a clean and dust-free road surface.
- On-site roads will be limited in total area to minimize the area required for water spraying.

Other Nuisances

A plan for rodent control will be developed and used by the remediation contractor during site preparation (including clearing and grubbing) and during remedial work.

A plan for noise control will be developed and used by the remediation contractor during site preparation and remedial work and will conform, at a minimum, to the NYCDEP noise control standards.

5.5 Soil Vapor Intrusion Evaluation

Historic fill and native soil will be excavated into the water table to accommodate site development (about 5 feet below cellar grade). A concrete building foundation and waterproofing membrane, which will sit at the water table, will cover the entire site footprint. These barriers will prevent direct human exposure to residual impacted groundwater.

Since the entire building foundation will sit at the water table, sub-slab samples will not be able to be collected from beneath the building slab; therefore, indoor air samples will be collected following completion of the building to assess indoor air quality. Any potential indoor air quality issues would be addressed through the future building's heating, ventilation, and air conditioning (HVAC) system which will be installed in accordance with NYCDOB requirements.

6.0 RESIDUAL CONTAMINATION TO REMAIN ON-SITE

Soil exceeding the PGW and/or RURR SCOs, and soil exhibiting petroleum-related nuisance conditions may remain on-site after the Track 4 cleanup is complete. Exposure to residual contaminated soils will be prevented by an engineered, composite cover system that will be built across the site footprint. The FER will report the results of post-excavation documentation soil samples in tabular and map form. The FER will also include surveyed limits of excavation and location of all final documentation samples.

Since residual contaminated soil will exist beneath the site after the remedy is complete, ECs and ICs are required to protect human health and the environment. These ECs and ICs are described hereafter. Long-term management of EC/ICs and of residual contamination will be executed under a site-specific SMP that will be developed and included in the FER.

ECs will be implemented to protect public health and the environment by appropriately managing residual contamination. The Controlled Property (the site) will have one primary EC system, consisting of a concrete building slab.

7.0 ENGINEERING CONTROLS

Following completion of the remedy, it is anticipated that the site will meet Track 4 SCOs. Long-term engineering controls will be required as part of the remedial action. Exposure to residual contaminated soils will be prevented by an engineered, composite cover system that will be built across the site footprint. An engineered composite cover system will consist of a concrete building slab that will be underlain by a minimum 20-mil vapor barrier/waterproofing membrane.

The composite cover system will be a permanent EC. The composite cover will be inspected and its performance certified at specified intervals as required by this RAWP and the SMP. The SMP (to be included in the FER) will outline maintenance requirements and the procedures to be followed in the event that the composite cover system is disturbed after the remedial action is complete.

An SMMP will be included in the SMP and will outline the procedures to be followed in the event that the composite cover system and underlying residual contamination are disturbed after the remedial action is complete.

8.0 INSTITUTIONAL CONTROLS

After the remedy is complete, the site will have residual contamination remaining in place. ECs for the residual contamination have been incorporated into the remedy to render the overall site remedy protective of public health and the environment. Two elements have been designed to ensure continual and proper management of residual contamination in perpetuity: an EE and an SMP.

A site-specific EE will be recorded with New York County to provide an enforceable means of ensuring the continual and proper management of residual contamination and protection of public health and the environment in perpetuity or until released in writing by NYSDEC. It requires that the grantor of the EE and the grantor's successors and assigns adhere to all ECs and ICs placed on this site by this NYSDEC-approved remedy. ICs provide restrictions on site usage and mandate operation, maintenance, monitoring and reporting measures for all ECs and ICs. The SMP describes appropriate methods and procedures to ensure compliance with all ECs and ICs that are required by the EE. Once the SMP has been approved by the NYSDEC, compliance with the SMP is required by the grantor of the EE and grantor's successors and assigns.

8.1 Environmental Easement

An EE, as defined in Article 71 Title 36 of the Environmental Conservation Law, is required when residual contamination above UU SCOs is left on-site after the remedial action is complete. If the site will have residual contamination after completion of all remedial actions, then an EE is required. As part of this remedy, an EE approved by NYSDEC will be filed and recorded with the New York County Clerk. The EE will be submitted as part of the FER.

The EE renders the site a Controlled Property. The EE must be recorded with the New York County Clerk or City Register before the Certificate of Completion can be issued by NYSDEC. A series of ICs is required under this remedy to implement, maintain and monitor the EC systems, prevent future exposure to residual contamination by controlling disturbances of the subsurface soil and restricting the use of the site to restricted-residential, industrial and commercial use(s) only. These ICs are requirements or restrictions placed on the site that are listed in, and required by, the EE. ICs can, generally, be subdivided between controls that support ECs, and those that place general restrictions on site usage or other requirements. ICs in both of these groups are closely integrated with the SMP, which provides all of the methods and procedures to be followed to comply with this remedy.

Under the Track 4 scenario, the EC will be in the form of a long-term composite cover (i.e., concrete building foundation). The ICs that support the ECs are:

- On-site environmental monitoring devices, including but not limited to, groundwater monitor wells, must be protected and replaced as necessary to ensure proper functioning in the manner specified in the SMP;
- Compliance with the EE by the Grantee and the Grantee's successors and adherence of all elements of the SMP is required.
- All ECs must be operated and maintained as specified in the SMP.
- All ECs on the Controlled Property must be inspected and certified at a frequency and in a manner defined in the SMP. A composite cover system consisting of concrete building slabs must be inspected, certified and maintained as required in the SMP;
- Environmental or public health monitoring must be performed as defined in the SMP.
- Data and information pertinent to Site Management for the Controlled Property must be reported at the frequency and in a manner defined in the SMP.
- ECs may not be discontinued without an amendment or extinguishment of the EE. The EE may be extinguished only by release by the Commissioner of NYSDEC, or the Commissioner's designee, and filed with the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

Adherence to these ICs for the site is mandated by the EE and will be implemented under the SMP (discussed in the next section).

The Controlled Property (site) will also have a series of ICs in the form of site restrictions and requirements. The site restrictions that apply to the Controlled Property are:

- Vegetable gardens and farming in residual site soil on the Controlled Property are prohibited.
- Use of groundwater underlying the Controlled Property is prohibited without treatment rendering it safe for intended purpose as approved by NYSDOH and NYSDEC.
- All future activities on the Controlled Property that will disturb residual contaminated material, if present, are prohibited unless they are conducted in accordance with the soil management provisions in the SMP.
- The Controlled Property may be used for restricted-residential, commercial and industrial use only (as allowed by zoning), provided the long-term ECs and ICs included in the SMP are employed.

- The Controlled Property may not be used for a higher level of use, such as unrestricted or residential (single family) use without an amendment or extinguishment of this EE.

Grantor agrees to submit to NYSDEC a written statement that certifies, under penalty of perjury, that: (1) controls employed at the Controlled Property are unchanged from the previous certification or that any changes to the controls were approved by the NYSDEC; and, (2) nothing has occurred that impairs the ability of the controls to protect public health and environment or that constitute a violation or failure to comply with the SMP. NYSDEC retains the right to access such Controlled Property at any time in order to evaluate the continued maintenance of any and all controls. This certification shall be submitted annually, or an alternate period of time that NYSDEC may allow. This statement must be certified by an expert that the NYSDEC finds acceptable.

8.2 Site Management Plan

Site Management is the last phase of remediation and begins with the approval of the FER and issuance of the Certificate of Completion for the Remedial Action. The SMP is submitted as part of the FER but will be written in a manner that allows its use as a complete and independent document. Site Management continues in perpetuity or until released in writing by NYSDEC. The property owner is responsible to ensure that all Site Management responsibilities defined in the EE and the SMP are performed.

The SMP is intended to provide a detailed description of the procedures required to manage residual contamination left in place at the site following completion of the remedial action in accordance with the BCA with the NYSDEC. This includes: (1) development, implementation, and management of all ECs and ICs; (2) development and implementation of monitoring systems and a Monitoring Plan; (3) development of a plan to operate and maintain any treatment, collection, containment, or recovery systems (including, where appropriate, preparation of an Operation and Maintenance Manual); (4) submittal of Site Management Reports, performance of inspections and certification of results, and demonstration of proper communication of site information to NYSDEC; and (5) defining criteria for termination of treatment system operation, if applicable.

To address these needs, this SMP will include four plans: (1) an Engineering and Institutional Control Plan for implementation and management of IC/ECs; (2) a Monitoring Plan for implementation of Site Monitoring; (3) an Operation and Maintenance Plan for implementation of remedial collection, containment, treatment, and recovery systems; and (4) a Site Management Reporting Plan for submittal of data, information, recommendations, and certifications to NYSDEC. The SMP will be prepared in accordance with the requirements in NYSDEC Draft DER-10 Technical Guidance for Site Investigation and Remediation and the guidelines provided by

NYSDEC. The SMP will include a provision for evaluation of the potential for soil vapor intrusion for any occupied buildings on the site, including a provision for implementing actions recommended to address exposures related to soil vapor intrusion.

Site management, reporting, and IC/EC certification will be scheduled on a certification period basis. The certification period will be annual, unless otherwise approved by NYSDEC. The SMP will be based on a calendar year and will be due for submission to NYSDEC by three months following the end of the reporting period.

If groundwater monitoring is required after the remedial action is complete, the SMP will include a monitoring plan for groundwater to evaluate site-wide performance of the remedy. No exclusions for handling of remaining contaminated soil will be provided in the SMP. All handling of remaining contaminated material will be subject to provisions contained in the SMP.

9.0 FINAL ENGINEERING REPORT

An FER will be submitted to the NYSDEC following implementation of the remedy defined in this RAWP. The FER will be prepared in conformance with NYSDEC DER-10 and will include the following:

- Documentation that the remedial work required under this RAWP has been completed and has been performed in compliance with this plan
- A comprehensive account of the locations and characteristics of material removed from the site including the surveyed map(s) of each source, as necessary
- As-built drawings for constructed elements, certifications, manifests, and bills of lading
- A description of the changes to the remedy from the elements provided in the RAWP and associated design documents, if any
- A tabular summary of performance evaluation sampling results and material characterization results and other sampling and chemical analyses performed as part of the remedy
- Written and photographic documentation of remedial work performed under this remedy
- An itemized tabular description of actual costs incurred during implementation of the remedy
- Sufficient information to show that remaining soil left on-site meets the PGW and/or RURR SCOs.
- A summary of remaining contamination that exceeds the PGW and/or RURR SCOs, or exhibits petroleum-related nuisance conditions. A table and a map that shows remaining contamination in excess of the PGW and/or RURR SCOs will also be included.
- An accounting of the destination of material removed from the site, including excavated contaminated soil, historic fill, solid waste, hazardous waste, non-regulated material, and fluids. Documentation associated with the disposal of material must also include records and approvals for receipt of the material.
- An accounting of the origin and chemical quality of each material type imported onto the site.

Before approval of the FER and issuance of a Certificate of Completion, the daily reports and monthly BCP progress reports must be submitted in digital form on electronic media (i.e., PDF).

9.1 Certifications

The following certification will appear in front of the FER Executive Summary. The certification will be signed by the RE, Jason J. Hayes, who is a NYS-licensed Professional Engineer. The certification will be appropriately signed and stamped. The certification will include the following statements:

I, _____, am currently a registered professional engineer licensed by the State of New York. I had primary direct responsibility for implementation of the remedial program for the 4650 Broadway (NYSDEC Brownfield Cleanup Agreement Index No. C231123-11-18, Site No. C231123).

I certify that the site description presented in this Final Engineering Report is identical to the site descriptions presented in the Brownfield Cleanup Agreement for the 4650 Broadway site.

I certify that the Remedial Action Work Plan dated [month day year] and Stipulations [if any] in a letter dated [month day year] and approved by the NYSDEC were implemented and that all requirements in those documents have been substantively complied with.

I certify that the remedial activities were observed by qualified environmental professionals under my supervision and that the remediation requirements set forth in the Remedial Action Work Plan and any other relevant provisions of ECL 27-1419 have been achieved.

I certify that the export of contaminated soil, fill, water, or other material from the property was performed in accordance with the Remedial Action Work Plan, and were taken to facilities licensed to accept this material in full compliance with all federal, state, and local laws.

I certify that import of soils from off-site, including source approval and sampling, has been performed in a manner that is consistent with the methodology defined in the Remedial Action Work Plan.

I certify that ground-intrusive work during remediation and development-related construction was conducted in accordance with dust and odor suppression methodology defined in the Remedial Action Work Plan.

I certify that all information and statements in this certification are true. I understand that a false statement made herein is punishable as Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law.

It is a violation of Article 130 of New York State Education Law for any person to alter this document in any way without the express written verification of adoption by any New York State licensed engineer in accordance with Section 7209(2), Article 130, New York State Education Law.

10.0 SCHEDULE

Mobilization for implementation of the RAWP is expected to take about one to two weeks. Once mobilization is complete, remediation of the site will continue. The remedy, which will be implemented in accordance with this RAWP, is anticipated to take about 3 months to complete. After completion of the remedy, a FER will be submitted to the NYSDEC for review and approval. A detailed project schedule is included in Appendix I.