REMEDIAL ACTION WORK PLAN

WILLETS POINT DEVELOPMENT – OPERABLE UNIT 2 (PHASE 2)

126th STREET/WILLETS POINT BOULEVARD
QUEENS, NEW YORK
NYSDEC BCP Site No. C241146

Prepared For

Queens Development Group, LLC
QDG Hotel Partners, LLC
QDG 126th Street Partners, LLC
QDG Parking Partners, LLC
QDG Retail Partners, LLC
c/o The Related Companies
30 Hudson Yards
New York, New York 10001

Prepared By

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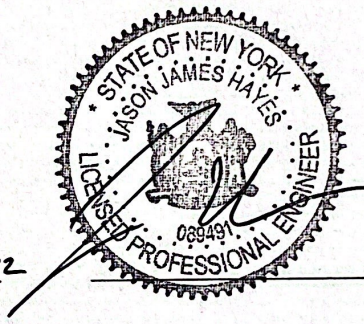
June 7, 2022
Langan Project No. 170197601

CERTIFICATION

I, Jason J. Hayes, certify that I am currently a Professional Engineer as defined in 6 NYCRR Part 375 and that this Remedial Action Work Plan (RAWP) was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the Division of Environmental Remediation (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 Hayes	6/7/2022	
NYS Professional Engineer	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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Acronym	Definition
AOC	Area of Concern
ASP	Analytical Services Protocol
BCA	Brownfield Cleanup Agreement
BCP	Brownfield Cleanup Program
bgs	Below Grade Surface
BTEX	Benzene, Toluene, Ethylbenzene, and Total Xylenes
BUD	Beneficial Use Determination
C&D	Construction and Demolition
CAMP	Community Air Monitoring Plan
CEQR	City Environmental Quality Review
CFR	Code of Federal Regulations
CHASP	Construction Health and Safety Plan
COC	Contaminants of Concern
CP	Commissioner's Policy
CPP	Citizen Participation Plan
CQAP	Construction Quality Assurance Plan
CSM	Conceptual Site Model
CVOC	Chlorinated Volatile Organic Compound
DER	Division of Environmental Remediation
DMM	Division of Materials Management
DRO	Diesel Range Organics
DUSR	Data Usability Summary Report
EC	Engineering Control
EDD	Electronic Data Deliverable
EE	Environmental Easement
el	Elevation
ELAP	Environmental Laboratory Approval Program
ESA	Environmental Site Assessment
FEMA	Federal Emergency Management Agency
FER	Final Engineering Report
GRO	Gasoline Range Organics
HASP	Health and Safety Plan
IC	Institutional Control
IEM	Independent Environmental Monitor
IRMWP	Interim Remedial Measures Work Plan

Acronym	Definition
Langan	Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
LNAPL	Light Non-Aqueous Phase Liquid
MCL	Maximum Contaminant Level
mg/kg	Milligram Per Kilogram
MTA	Metropolitan Transit Authority
NAPL	Non-Aqueous Phase Liquid
NAVD88	North American Vertical Datum of 1988
NYCDOT	New York City Department of Transportation
NYCEDC	New York City Economic Development Corporation
NYCOER	New York City Office of Environmental Remediation
NYSDEC	New York State Department of Environmental Conservation
NYSDEC SGVs	NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards and Guidance Values for Class GA Water
NYSDOH	New York State Department of Health
OSHA	United States Occupational Safety and Health Administration
OU-2	Operable Unit 2
PBS	Petroleum Bulk Storage
PCB	Polychlorinated Biphenyls
PFAS	Per- and polyfluoroalkyl Substances
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctanesulfonic acid
PGW	Protection of Groundwater
PID	Photoionization Detector
PM10	Particulates less than 10 microns in diameter
ppm	Parts per million
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
QDG	The Queens Development Group, LLC
QEP	Qualified Environmental Professional
RAO	Remedial Action Objective
RAWP	Remedial Action Work Plan
RCA	Recycled Concrete Aggregate
RE	Remedial Engineer
RI	Remedial Investigation
RIR	Remedial Investigation Report

Acronym	Definition
RIWP	Remedial Investigation Work Plan
RR	Restricted-Residential
SCG	Standards, Criteria, and Guidance
SCO	Soil Cleanup Objective
SGVs	Standards and Guidance Values
SMMP	Soil/Materials Management Plan
SMP	Site Management Plan
SOE	Support of Excavation
SVOC	Semivolatile Organic Compound
SWPPP	Stormwater Pollution Prevention Plan
TAL	Target Analyte List
TCL	Target Compound List
TCLP	Toxicity Characteristic Leaching Procedure
TOGS	Technical and Operational Guidance Series
TPH	Total Petroleum Hydrocarbon
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
UU	Unrestricted Use
VOC	Volatile Organic Compound
Volunteers	The Queens Development Group, LLC (QDG); QDG Hotel Partners, LLC; QDG 126th Street Partners, LLC; QDG Parking Partners, LLC; and QDG Retail Partners, LLC
$\mu g/m^3$	Microgram per cubic meter
1,1,1-TCA	1,1,1-trichloroethane
6 NYCRR	NYSDEC Title 6 of New York Codes, Rules, and Regulations

EXECUTIVE SUMMARY

Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C. (Langan) prepared this Remedial Action Work Plan (RAWP) on behalf of The Queens Development Group, LLC (QDG); QDG Hotel Partners, LLC; QDG 126th Street Partners, LLC; QDG Parking Partners, LLC; and QDG Retail Partners, LLC (collectively the "Volunteers") for the property known as Willets Point – Operable Unit 2 ([OU-2], also known as Phase 2), which is located at Seaver Way (formerly 126th Street) and Willets Point Boulevard and Northern Boulevard in Queens, New York (hereinafter referred to as OU-2). OU-2 is a 15.084[1]-acre portion of the Willets Point Development Brownfield Cleanup Program (BCP) Site, and is composed of Queens Borough Blocks 1824 and 1825 and part of Blocks 1820, 1822, 1823, 1826, 1827, and 1833. The Willets Point BCP Site was accepted into the New York State Department of Environmental Conservation (NYSDEC) BCP as Site No. C241146 and a Brownfield Cleanup Agreement (BCA) was signed on December 16, 2013. The Willets Point BCP Site is located in a former industrial zone in the Borough of Queens and comprises 56 tax lots within 8 city blocks and has a total area of 22.887 acres (7.803 acres for OU-1 and 15.084 acres for OU-2).

This RAWP evaluates appropriate remedial action alternatives for OU-2 based on data gathered during the Remedial Investigation (RI) conducted by Langan between September 3, 2021 and March 4, 2022. The selected remedy is consistent with the procedures defined in the Division of Environmental Remediation Technical Guidance for Site Investigation and Remediation (DER-10) and complies with applicable federal, state, and local standards, criteria, guidance, laws, regulations, and requirements.

Site Description/Physical Setting/Site History

OU-2 is located in the Willets Point neighborhood of Queens, New York and is identified as Queens Tax Blocks 1824 and 1825 and part of Blocks 1820, 1822, 1823, 1826, 1827, and 1833. OU-2 includes tax parcels between 127th Street and Seaver Way (formerly 126th Street) and between former 39th Avenue and Northern Boulevard (including Block 1822, Lot 17 and Block 1820, Lots 9 and 18 but excluding the 34th Avenue and 35th Avenue rights of way).

Subsequent to the Willets Point Development Plan Rezoning (City Environmental Quality Review [CEQR] Number: 07DME014Q), the Willets Point BCP Site is zoned commercial (C4-4) and is located within the Special Willets Point District (WP). The objective of the special purpose district is to transform a largely underutilized 61-acre district into a lively, mixed use, sustainable community and a regional retail and entertainment destination.

[1] The Brownfield Cleanup Agreement notes a total BCP site area of 23.5 acres based on tax maps. Based on updated survey-grade metes and bounds descriptions and geometrically rendered area, the total BCP site area is 22.887 acres. The updated areas of OU-1 and OU-2 are also reflected in this report.

With the exception of an unauthorized active auto body shop located in the southwest corner of Block 1825, Lot 1, OU-2 is vacant. Eight existing buildings remain on OU-2: One on Block 1820, two on Block 1822, one on Block 1823, and four on Block 1825 (including the active auto body shop). In addition, two derelict structures exist on Block 1824. Adjacent properties include industrial- and commercial-use buildings, as well NYSDEC-registered recycling facility Evergreen Recycling of Corona (EROC), Willets Point OU-1, and Citi Field baseball stadium.

Based on the March 26, 2020 Draft Topographic Survey prepared by Langan, the elevation (el) at OU-2 is primarily between 7.5 and 14 feet in reference to the North American Vertical Datum of 1988[2] (NAVD88). OU-2 is generally flat and the general topographic gradient of the surrounding area slopes gradually to the south towards Roosevelt Avenue.

Prior to the 1900s, the Willets Point area was a tidally influenced salt marsh. From the early 1900s to the early 1930s, the area was used as a dumping ground for coal ash from residential and municipal heating operations in greater New York City. In the late 1930s, Willets Point along with nearby Flushing Corona Park were graded and redeveloped. Previously deposited coal ash was left in place as fill. Willets Point was developed primarily with automotive uses, including small car repair shops, filling stations, and scrapyards. These automotive-centric industrial activities characterized Willets Point through about 2015 when they were largely shutdown.

Summary of the Remedial Investigation

Because of the relatively large scale of the investigation (spanning 15.084 acres and 8 tax blocks), sampling areas were assigned alphabetic labels that correspond to sample identification prefixes for organization purposes and ease of reference. The following table summarizes the alphabetic labeling relative to the tax block designation:

Queens Borough Tax Block	Sampling Area Alphabetic Label
1826/1827	E
1825	F
1824	G
1823	H
1822	I
1833	J
1820	K

RI findings and conclusions are as follows:

Stratigraphy

OU-2 is underlain by a layer of historic fill, predominately consisting of light brown to black, medium to fine sand, with varying amounts of gravel, roots, silt, clay, brick, coal, coal ash,

[2]All elevations herein are presented relative to the North American Vertical Datum of 1988 (NAVD88).

concrete, asphalt, glass, slag, wood, roofing paper, ceramic, plastic, metal, and rubber. The layer extends from directly beneath surface cover (in areas covered by asphalt, concrete, or vegetative cover) to depths ranging from about 5 to 21.5 feet below grade surface (bgs). In 59 of the 228 RI soil borings, a distinct layer of coal ash was encountered within the historic fill layer. The historic fill layer is underlain by a native soil layer that consists of a soft gray clay with varying amounts of sand, silt, and shell fragments, interbedded by a layer of organic material, except in the northernmost area of Area K where native soil predominantly consists of sand with varying amounts of clay and silt. The interbedded organic material contains elevated photoionization detector (PID) readings and biogenic odors. The subsurface stratigraphy is consistent with the depositional environment of the former tidal salt marsh. Bedrock was not encountered in any of the soil borings.

Hydrogeology

Groundwater was observed between about 2.01 and 11.44 feet bgs (corresponding to el 1.24 and el 7.49[3]). Groundwater was found to flow from east to west, consistent with the OU-1 remedial investigation findings. Because of the lack of drainage systems, groundwater elevations are presumed to heavily depend on precipitation and infiltration.

Historic Fill Quality

Contaminants related to historic fill include semivolatile organic compounds (SVOC), polychlorinated biphenyls (PCB), pesticides, metals, perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS), which were detected at concentrations above Unrestricted Use (UU), Protection of Groundwater (PGW), and/or Restricted-Residential (RR) Soil Cleanup Objectives (SCO), and lead and chromium, which were detected at concentrations above the United States Environmental Protection Agency (USEPA) Maximum Concentration of Contaminants for the Toxicity Characteristic, within this layer. Semivolatile organic compounds and dissolved metals potentially attributed to historic fill or previous site use were also identified in groundwater at concentrations above the NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards and Guidance Values for Class GA Water (herein referred to the NYSDEC SGVs.

Petroleum Contamination in Soil, Groundwater, and Soil Vapor

- Petroleum impacts are ubiquitous across OU-2, exhibited by visual, olfactory, and analytical evidence in soil, groundwater, and soil vapor. Petroleum-related observations, including PID measurements up to 1,591 parts per million (ppm), odors, sheen, and staining were observed at various depths from as shallow as surface grade down to 22 feet bgs. Petroleum-related VOCs (e.g., total benzene,

[3] Elevations are referenced to the North American Vertical Datum of 1988 (NAVD88).

toluene, ethylbenzene, and xylenes [BTEX]) and SVOCs were detected at concentrations exceeding UU, PGW, and/or RR SCOs.

- Light nonaqueous-phase liquid (LNAPL) was observed in soil borings in seven localized areas near the following soil borings: E-EP115, E-SB103, G-EP120, H-SB115, I-SB106, I-EP108, and J-EP112. Not all analytical data from these areas reflects elevated petroleum-related VOCs.
- Petroleum-like odors, sheen, and PID headspace readings up to 400 ppm were observed during groundwater purging and sampling. The concentrations of petroleum-related VOCs and SVOCs in soil from historical automotive use or petroleum bulk storage (PBS) are likely contributing to the petroleum-related contamination found in groundwater. Groundwater may also be impacted by off-site petroleum sources.
- Benzene, toluene, ethylbenzene, and total xylenes (BTEX) and other petroleum-related compounds were detected in soil vapor throughout OU-2. BTEX concentrations in soil vapor ranged from 9.4 micrograms per cubic meter (µg/m^3) in F-SV104 to 17,600 µg/m^3 in F-SV110. Petroleum-impacted soil and groundwater from historical automotive use or PBS are likely sources of petroleum-impacts to soil vapor. Soil vapor may also be impacted by off-site petroleum sources.

Based on the presence of LNAPL in delineation borings up to the OU-2 boundary, petroleum contamination is presumed to be present offsite to the north and south of Area I within the adjoining right of way, and to the east of Area J.

CVOC Impacts

Chlorinated volatile organic compounds (CVOC) were detected at concentrations above UU and PGW SCOs in soil in three isolated locations. CVOCs were not detected at concentrations above RR SCOs or at concentrations above the NYSDEC SGVs in groundwater. CVOCs were detected in soil vapor samples throughout OU-2. The identified CVOCs were commonly used as degreasers in the automotive industry.

1,4-Dioxane Impacts

1,4-Dioxane was not detected in any soils samples collected during the RI, but was detected at concentrations above its drinking water maximum contaminant limit (MCL) in 5 isolated monitoring wells located in Areas E, F, I, and K. 1,4-Dioxane is a solvent stabilizer associated with automotive commercial and industrial uses. The presence of 1,4-dioxane is likely attributed to regional groundwater quality, on-site historical uses, and/or off-site sources.

Methane Impacts

Methane was detected site-wide via field screening and/or laboratory analysis. Field screening detected methane in 25 of the 44 vapor points across OU-2 and is considered to be present site-wide.

Qualitative Human Health Exposure Assessment

Based on the Conceptual Site Model (CSM) and review of environmental data, complete on-site exposure pathways are present in the absence of protective measures and remediation. The complete exposure pathways indicate there is a risk of exposure to humans from site contaminants via exposure to soil, groundwater, and soil vapor for current and construction conditions.

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 OU-2 is provided below.

Current Conditions

Human exposure to contaminated soil is limited as OU-2 is vacant, with the exception of an unauthorized active auto body shop located in the southwest corner of Area 1825, Lot 1, and remains partially improved with a competent cover (i.e., asphalt and concrete). In localized areas where human exposure to contaminated soil is possible, the potential exposure pathway for dermal absorption, inhalation, and ingestion is controlled by limiting site access and through implementation of a Health and Safety Plan (HASP) by those handling site media (i.e., investigation and remediation activities).

Because groundwater in New York City is not used as a potable water source, there is no complete exposure pathway under current site conditions. There is a potential exposure pathway through dermal absorption, inhalation, or ingestion during heavy rain events when OU-2 floods and the water table rises in pervious areas or during investigative groundwater sampling or construction dewatering, but it is controlled by limiting site access and through the implementation of the HASP during ground-intrusive work.

Because OU-2 is mostly vacant and has few enclosed spaces, there are minimal exposure pathways for soil vapor intrusion. Soil vapor that may penetrate through the unpaved surface or through cracks or perforations in the paved areas of OU-2 primarily migrates vertically through the subsurface and will dissipate and dilute with ambient air. Any remaining potential exposure pathways through dermal absorption and inhalation is controlled by limiting site access and through the implementation of a HASP during ground-intrusive work.

Construction/Remediation Activities

During remedial construction, points of exposure include soil exposed during excavation, dust and organic vapors generated during excavation and off-site disposal, and contaminated groundwater exposed during dewatering. Routes of exposure include ingestion and dermal absorption of contaminated soil and groundwater, inhalation of organic vapors arising from contaminated soil and groundwater, and inhalation of dust arising from contaminated soil. The receptor population includes construction and remediation workers and, to a lesser extent, the public adjacent to OU-2.

The potential for completed exposure pathways is present since all five exposure pathway elements exist; however, the risk will be minimized by limiting site access and through implementation of appropriate health and safety measures, such as monitoring the air for organic vapors and dust, using vapor and dust suppression measures, cleaning truck undercarriages before they leave OU-2 to prevent off-site soil tracking, maintaining site security, and wearing the appropriate personal protective equipment.

Proposed Future Conditions

Remedial construction is expected to address source material and many on-site contaminants. After construction, residual contaminants may remain on-site if a Track 1 cleanup is not implemented, and to a lesser extent, would include those listed under current conditions. Contaminant release and transport mechanisms include penetrations through any cover material, or remaining exposed soil. If protective measures and remediation are not implemented, points of exposure would include exposure during any future soil-disturbing activities. Routes of exposure may include inhalation of vapors or dust during any soil-disturbing work. Potential methane accumulation in future site structures is an explosion and oxygen displacement hazard. The receptor population will include the building tenants, property employees, visitors, and maintenance workers. The possible routes of exposure could be avoided or mitigated by proper installation of soil vapor mitigation systems and measures, construction and maintenance of a composite cover system (i.e., minimum of 2 feet of clean fill or gravel), and implementation of a Site Management Plan (SMP).

Human Health Exposure Assessment Conclusions

- Under current conditions, there is a marginal risk for exposure. The primary exposure pathways are for dermal contact, ingestion, and inhalation of soil, groundwater, or soil vapor by site construction and remediation workers. The exposure risks can be avoided or minimized by limiting site access and implementing the appropriate health and safety and vapor and dust suppression measures outlined in a site-specific HASP and Community Air Monitoring Plan (CAMP) during ground-intrusive activities.
- In the absence of protective measures, there is a moderate risk of exposure during the construction and remediation activities. The primary exposure pathways are:

- Dermal contact, ingestion, and inhalation of contaminated soil, groundwater, or soil vapor by site visitors and construction and remediation workers; and
- Dermal contact, ingestion, and inhalation of soil (dust) and inhalation of soil vapor by the community in the vicinity of OU-2.

These exposure pathways can be avoided or minimized by performing CAMP, following the appropriate health and safety plans, implementing vapor and dust suppression techniques, and using site security to control access.

- A complete exposure pathway is possible for the migration of site contaminants to off-site human receptors during the remedial construction phase. During this phase, site access will be limited to authorized visitors and workers and protective measures will be used during construction to prevent completion of this pathway, including following a site-specific HASP and implementation of a CAMP. Dewatering is not anticipated; however, if needed, construction dewatering fluids will be pre-treated and discharged off site in accordance with appropriate permits.
- The existence of a complete exposure pathway for site contaminants to human receptors during proposed future conditions is unlikely, as the on-site areas of contamination source material will be excavated and transported for off-site disposal. Residual site soil will be capped by a composite cover (i.e., minimum of 2 feet of clean fill or gravel). Regional groundwater is not used as a potable water source in New York City. The potential pathway for soil vapor intrusion into future buildings will be minimized because future buildings will have a vapor mitigation system (i.e., sub-slab depressurization system and/or a waterproofing/vapor barrier membrane) beneath the foundation slab and will be managed under the SMP.

Summary of the Remedy

The selected remedy, will include the following tasks:

- Implementation of plans for the protection of on-site workers, the community, and the environment including a Construction Health and Safety Plan (CHASP) and CAMP during remediation and construction activities
- Establishment of Track 4 SCOs, which include NYSDEC Part 375-list RR SCOs
- Implementation of a preliminary waste characterization, including delineation of hazardous chromium and lead soil, to facilitate off-site disposal of excavated soil/fill
- As a pre-requisite to site remediation, abatement of hazardous building materials (including asbestos-containing material [ACM], lead-based paint [LBP], or other universal waste), demolition and removal of remnant foundation and roadways, clearing and grubbing of vegetation, and surface debris/refuse removal by the contractor as hazardous waste or construction and demolition (C&D) debris in accordance with Part 360 and 361

regulations - Review and certification of hazardous building materials and C&D and refuse transport and disposal methodologies is not a requirement of the Remediation Engineer (RE). The RE is responsible for documenting that C&D debris and refuse is not comingled with contaminated site soil and fill.

- Implementation of soil erosion, pollution, and sediment control measures in compliance with applicable laws and regulations
- Protection of monitoring and recovery wells to be retrofitted to remediation grade, or decommissioning and reinstallation of monitoring and recovery wells
- Protection or decommissioning/removal/abandonment of above- and below-grade telecommunication, electrical, stormwater collection, and potable water utilities
- Construction of support of excavation (SOE) systems to facilitate the Track 4: RR SCO cleanup in source area excavations
- Construction of a groundwater containment cutoff wall consisting of sealed-seam steel sheet piles along the northern and eastern boundaries of Block 1833, Lots 155 and 172 to mitigate recontamination from off-site sources
- Completion of in-situ groundwater treatment via direct mixing in the northern part of Area I and the eastern part of Area J
- Excavation and stockpiling of fill and soil contamination source areas (fill and soil creating nuisance conditions or that is grossly-impacted) in the following areas:
    - Area E: approximately 3,500 cubic yards (up to 5 feet bgs)
    - Area G: approximately 500 cubic yards (up to 6 feet bgs)
    - Area H: approximately 1,800 cubic yards (up to 8 feet bgs)
    - Area I: approximately 3,800 cubic yards (up to 8.5 feet bgs)
    - Area J: approximately 5,300 cubic yards (up to 8 feet bgs)
- Excavation and stockpiling of all soil and fill exceeding RR SCOs in the upper 2 feet across the entire site
- Removal, decommissioning, and off-site disposal of any encountered underground storage tanks (UST) and/or associated appurtenances (e.g., fill lines, vent line, and electrical conduit) in accordance with DER-10, 6 NYCRR Part 613.9, NYSDEC CP-51, and other applicable NYSDEC UST closure requirements
- Screening for indications of contamination (by visual means, odor, and monitoring with PIDs) of excavated soil/fill during intrusive site work
- Appropriate off-site disposal of excavated soil/fill in accordance with federal, state, and local rules and regulations for handling, transport, and disposal

- Collection and analysis of documentation soil samples from the excavation base and, to the extent possible, sidewalls of the excavation in accordance with DER-10, to document post-excavation conditions in relation to Track 4 RR SCOs
- Placement of a physical demarcation layer where contamination remains (site wide), consisting of orange snow fencing or equivalent material at the excavation bottom prior to backfilling.
- Post-excavation groundwater monitoring to assess the effectiveness of the remedy in five monitoring/recovery wells (recovery wells E-RW202 and E-RW105 in Area E, monitoring well I-MW101 in Area I, and monitoring wells J-MW117 and J-MW118 in Area J).
- Backfilling of areas requiring more than 2 feet of remedial excavation with certified-clean fill (i.e., fill meeting the lower of Protection of Groundwater (PGW) and RR SCOs), recycled concrete aggregate (RCA), or virgin crushed stone
- Capping of site-wide excavated areas with an engineered composite cover system consisting of at least 2 feet of certified-clean fill (i.e., fill meeting the lower of PGW and RR SCOs), with the top 4 inches composed of ¾-inch virgin crushed stone
- Establishment of an NYSDEC-approved SMP to provide for long-term management of ECs and ICs, including the performance of periodic inspections and certification that the controls are performing as they were intended, and inclusion of a requirement in the SMP to evaluate future proposed structures on OU-2 for soil vapor intrusion
- Recording of an Environmental Easement to establish use restrictions including prohibitions on the use of groundwater and to memorialize the ECs and ICs to mandate that future owners of OU-2 continue to maintain these controls as required

1.0 INTRODUCTION

Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C. (Langan) prepared this Remedial Action Work Plan (RAWP) on behalf of The Queens Development Group, LLC (QDG); QDG Hotel Partners, LLC; QDG 126th Street Partners, LLC; QDG Parking Partners, LLC; and QDG Retail Partners, LLC (collectively the "Volunteers") for the property known as Willets Point – Operable Unit 2 ([OU-2], also known as Phase 2), which is located at Seaver Way (formerly 126th Street) and Willets Point Boulevard and Northern Boulevard in Queens, New York (hereinafter referred to as OU-2). OU-2 is a 15.084[4]-acre portion of the Willets Point Development Brownfield Cleanup Program (BCP) Site, and is composed of Queens Borough Blocks 1824 and 1825 and part of Blocks 1820, 1822, 1823, 1826, 1827, and 1833. The Willets Point BCP Site was accepted into the New York State Department of Environmental Conservation (NYSDEC) BCP as Site No. C241146 and a Brownfield Cleanup Agreement (BCA) was signed on December 16, 2013. The Willets Point Development BCP Site is located in a former industrial zone in the Borough of Queens and comprises 56 tax lots within 8 city blocks and has a total area of 22.887 acres (7.803 acres for OU-1 and 15.084 acres for OU-2). A site survey that depicts the OU-2 boundary and the Willets Point BCP Site boundary is included as Appendix A.

This RAWP evaluates appropriate remedial action alternatives for OU-2 based on data gathered during the Remedial Investigation (RI) conducted by Langan between September 3, 2021 and March 4, 2022. The selected remedy is consistent with the procedures defined in the Division of Environmental Remediation Technical Guidance for Site Investigation and Remediation (DER-10) and complies with applicable federal, state, and local standards, criteria, guidance, laws, regulations, and requirements.

1.1 Site Location and Description

OU-2 is located in the Willets Point neighborhood of Queens, New York and is identified as Queens Tax Blocks 1824 and 1825 and part of Blocks 1820, 1822, 1823, 1826, 1827, and 1833. OU-2 includes tax parcels between 127th Street and Seaver Way (formerly 126th Street) and between former 39th Avenue and Northern Boulevard (including Block 1822, Lot 17 and Block 1820, Lots 9 and 18 but excluding the 34th Avenue and 35th Avenue rights of way). A site location map is provided as Figure 1.

Subsequent to the Willets Point Development Plan Rezoning (City Environmental Quality Review [CEQR] Number: 07DME014Q), the Willets Point BCP Site is zoned commercial (C4-4) and is located within the Special Willets Point District (WP). The objective of the special purpose district

[4] The Brownfield Cleanup Agreement notes a total BCP site area of 23.5 acres based on tax maps. Based on updated survey-grade metes and bounds descriptions and geometrically rendered area, the total BCP site area is 22.887 acres. The updated areas of OU-1 and OU-2 are also reflected in this report.

is to transform a largely underutilized 61-acre district into a lively, mixed use, sustainable community and a regional retail and entertainment destination.

With the exception of an unauthorized active auto body shop located in the southwest corner of Block 1825, Lot 1, OU-2 is vacant. Eight existing buildings remain on OU-2: One on Block 1820, two on Block 1822, one on Block 1823, and four on Block 1825 (including the active auto body shop). In addition, two derelict structures exist on Block 1824. Adjacent properties include industrial- and commercial-use buildings, as well NYSDEC-registered recycling facility Evergreen Recycling of Corona (EROC), Willets Point OU-1, and Citi Field baseball stadium. A site layout plan is provided as Figure 2.

Based on the March 26, 2020 Draft Topographic Survey prepared by Langan, the elevation (el) at OU-2 is primarily between 7.5 and 14 feet in reference to the North American Vertical Datum of 1988 (NAVD88). OU-2 is generally flat and the general topographic gradient of the surrounding area slopes gradually to the south towards Roosevelt Avenue.

1.2 Redevelopment Plan

The proposed redevelopment of OU-2 is in concept-phase and under review. The Volunteers anticipate that OU-2 remediation activities will be performed in advance of redevelopment. The structures that remain within OU-2 will be demolished. The active, unauthorized auto repair tenant will be evicted, and demolition of the structure will follow. Future proposed development will likely include multifamily housing and commercial uses.

1.3 Description of Surrounding Property

The following table summarizes surrounding property usage:

Direction	Adjoining and Adjacent Properties			Surrounding Properties
	Block No(s).	Lot No(s).	Description	
North	1822, 1823, and 1833	Block 1822, Lot 23 Block 1823, Lots 7 and 12 Block 1833, Lot 300	Auto repair garage, security business office, contractor yards and parking, Northern Boulevard/Whitestone Expressway	Flushing Bay Promenade, automotive repair and wrecking facilities
East	1833, 1832, 1831, 1822, 1821	Block 1833, Lot 1 Block 1832, Lots 1 and 10 Block 1822, Lots 21, 23, and 33 Block 1821, Lot 1, 27, and 35	NYSDEC-registered recycling facility (EROC), various automotive businesses (tire shop, muffler shop, auto parts, junkyards, transfer stations, auto repair)	Automotive repair and wrecking facilities followed by metal scrap yards
South	1833, 1826, 1827	Block 1833, Lots 200 and part of 155 Block 1826, part of Lots 5, 14, 18, and 20 Block 1827, part of Lot 1	Willets Point OU-1, Willets Point Boulevard	Roosevelt Avenue, MTA New York City Transit Casey Stengel Bus Depot and Corona Maintenance Facility (MTA "7" aboveground subway line)
West	1787, 1820, 1822, 1823	Block 1787, Lot 20 Block 1820, Lots 34 and 108 Block 1822, Lots 7 and 55 Block 1823, Lots 14 and 58	Citi Field baseball stadium, vacant lots, automotive repair and wrecking facilities, tile contractor	Automotive repair and wrecking facilities, locksmith, deli

Public infrastructure (storm drains, sewers, and underground utility lines) exists within the streets surrounding OU-2. The New York City Metropolitan Transit Authority (MTA) "7" subway line runs aboveground along Roosevelt Avenue and is located about 218 feet south of OU-2.

Land use within a half-mile radius is urban and includes residential, commercial, institutional, and light industrial buildings, and public parks. The nearest ecological receptor is Flushing Bay, located approximately 450 feet north of OU-2. A second ecological receptor connected to Flushing Bay,

Flushing Creek, is located approximately 500 feet east of OU-2. Sensitive receptors, as discussed in DER-10, located within a half-mile of OU-2 include those listed below:

Number	Name (Approximate distance from site)	Address
1	Behind LGA Park (approximately 475 feet northwest)	Flushing Bay Promenade, Corona, NY 11368
2	Christian Academy - Spirituality (approximately 1,360 feet northeast)	13101 39th Ave # B7, Queens, NY 11354
3	RuDanceNY Dance School (about 1,600 feet east)	132-01 Roosevelt Ave 2 floor, Flushing, NY 11354
4	Flushing Meadow Park (approximately 1,670 feet south)	Avenue of the Americas, Corona, NY 11368
5	New York City Housing Authority's Bland Day Care Center (about 2,100 feet east)	133-16 Roosevelt Ave, Flushing, NY 11354
6	Morning Sun Art School (about 2,130 feet east)	132-15 41st Ave, Queens, NY 11355
7	Happy Maryann Day School (about 2,220 feet southeast)	13218 41st Ave, Queens, NY 11354
8	Joyful Music Studio (about 2,310 feet southeast)	132-35 41st Rd, Flushing, NY 11355
9	Nationwide Master School (about 2,350 feet northeast)	13101 39th Ave # B7, Queens, NY 11354
10	New York Golden Eagle Senior Corp. (about 2,390 feet northeast)	3636 Prince St 2nd floor, Flushing, NY 11354
11	Flushing Music School & Academy (approximately 2,420 feet east)	132-37 41st Rd 1st floor, Flushing, NY 11355
12	Angie's Academy (about 2,490 feet southeast)	132-49 41st Rd, Flushing, NY 11355
13	American Adult Day Care Center (about 2,490 feet southeast)	132-41 41st Rd, F Flushing, NY 11355
14	Sun May School (about 2,570 feet northeast)	13515 37th Avenue # 4A, Flushing, NY 11354
15	Flushing Day Care Center (about 2,560 feet northeast)	36-06 Prince St, Queens, NY 11354

Number	Name (Approximate distance from site)	Address
16	Monroe College Queens Extension Center (about 2,620 feet east)	135-16 Roosevelt Ave, Queens, NY 11354
17	Kon Wah Day School (approximately 2,620 feet northeast)	135-27 38th Ave, Flushing, NY 11354
18	Boys Club of New York – Abbe Clubhouse (about 2,620 feet southeast)	133-01 41st Rd, Flushing, NY 11355
19	James A. Bland Playground (about 2,640 feet east)	40th Rd, Flushing, NY 11354

1.4 Site History

1.4.1 Past Uses and Ownership

The City of New York via the Department of Housing Preservation and Development is the current owner of all parcels comprising OU-2. Prior to the 1900s, the Willets Point area was a tidally influenced salt marsh. From the early 1900s to the early 1930s, the area was used as a dumping ground for coal ash from residential and municipal heating operations in greater New York City. In the late 1930s, Willets Point along with nearby Flushing Corona Park were graded and redeveloped. Previously deposited coal ash was left in place as fill. Willets Point was developed primarily with automotive uses, including small car repair shops, filling stations, and scrapyards. These automotive-centric industrial activities characterized Willets Point through about 2015 when they were largely shutdown. With the exception of an unauthorized auto body shop located in the southwest corner of Block 1825, Lot 1, OU-2 is vacant. Eight existing buildings remain on OU-2: One on Block 1820, two on Block 1822, one on Block 1823, and four on Block 1825 (including the active auto body shop). In addition, two derelict structures exist on Block 1824.

1.4.2 Previous Environmental Reports

Previous investigation reports were reviewed in preparation of this RAWP. These reports are summarized below and are included in Appendix B.

The following limited environmental investigations were implemented on behalf of the New York City Economic Development Corporation (NYCEDC) at the Willets Point Development BCP Site, including on OU-2:

- Phase II Environmental Site Assessment (Final), dated December 2005, prepared by HDR|LMS;
- Limited Phase II Site Investigation Report, dated February 2009, prepared by HDR; and
- Site Investigation Report Willets Point Infrastructure Improvements, dated March 7, 2011 prepared by EPM.

In addition to the reports listed above, between November 1 and 5, 2019, Langan conducted a limited site investigation that included collection of soil and groundwater samples from select areas of OU-2. Results were provided in a December 10, 2019 Monthly Progress Report, which was submitted to NYSDEC and New York State Department of Health (NYSDOH). Analytical results from the 2019 investigation are included in the Monthly Progress Report.

Phase II Environmental Site Assessment (Initial), dated November 2005, prepared by HDR|LMS and Phase II Environmental Site Assessment (Final), dated December 2005, prepared by HDR|LMS

The Phase II Environmental Site Assessment (ESA) was completed in September 2005 across the Special Willets Point District. The investigation consisted of the advancement of 48 soil borings, installation of 7 temporary monitoring wells, and collection of 22 soil and seven groundwater samples. Soil and groundwater were observed for staining and odor, and screened for volatile organic compounds (VOC) with a photoionization detector (PID). The borings and monitoring wells were installed in the public rights-of-way and sidewalks. Soil samples were analyzed for Target Compound List (TCL) VOC, semivolatile organic compounds (SVOC), pesticides, polychlorinated biphenyls (PCB), Target Analyte List (TAL) metals, and ethylene glycol via United Stated Environmental Protection Agency (USEPA) methods 8260C, 8270D, 8081, 8082, and 6010. Groundwater samples were analyzed for TCL VOCs and SVOCs via USEPA methods 8260C and 8270D.

Subsurface stratigraphy identified during this investigation consisted of a layer of historic fill consisting of sand with varying amounts of ash, brick, coal, concrete, glass, cinders, and slag underlain by sand with varying amounts of clay, organic material, and gravel. Groundwater was encountered between about 5 and 10 feet below grade surface (bgs). Petroleum-like impacts including odors, staining, and PID readings above background were observed in three soil borings in the northern part of the investigation area, but outside of the Willets Point Development BCP Site.

Results from the investigation across the Special Willets Point District indicated that various petroleum-related SVOCs and heavy metals are present in historic fill and petroleum-related VOCs are present in groundwater. Results from samples collected east of OU-2 within 127th Street identified SVOCs in historic fill. This Phase II ESA also included a metes and bounds topographic site feature survey, geotechnical review, infrastructure layout, noise comparative evaluation, and traffic assessment.

Limited Phase II Site Investigation Report, dated February 2009, prepared by HDR

The Limited Phase II Site Investigation was completed between October 27 and 29, 2009 on the tax lot located at 126-26 34th Avenue, also identified on Queens Borough Tax Map as Block 1822, Lot 17. This tax lot is located within OU-2.

The Limited Phase II Site Investigation consisted of a geophysical survey, advancement of six soil borings, installation of five temporary monitoring wells, and collection of six soil and five groundwater samples. Soil and groundwater were observed for staining and odor, and screened for VOCs with a PID. Soil samples were analyzed for VOCs, SVOCs, herbicides, pesticides via USEPA, PCBs, TAL metals, and total petroleum hydrocarbon (TPH) diesel range organics (DRO) and TPH gasoline range organics (GRO) via USEPA methods 8260C, 8270D, 8151, 8081, 8082, 6010, and 3546. Groundwater samples were analyzed for VOCs, SVOCs, herbicides, pesticides, PCBs, and metals USEPA methods 8260C, 8270D, 8151, 8081, 8082, and 6010. These data were not validated and are used for informational purposes only.

Results from the investigations indicated that various petroleum-related VOCs, SVOCs, PCBs, pesticides, and heavy metals are present in historic fill and petroleum-related VOCs, SVOCs, and metals are present in groundwater on Block 1822, Lot 17. Petroleum-related impacts including odors and staining were observed in three of the six soil borings, one of which was located in a former underground storage tank (UST) grave. Sheen was observed in purged groundwater from two of the five temporary groundwater monitoring wells.

Site Investigation Report Willets Point Infrastructure Improvements, dated March 7, 2011 prepared by EPM

The Site Investigation was completed between January and February 2011 across the Willets Point Development BCP Site in support of public infrastructure improvements in the Willets Point neighborhood.

The site investigation consisted of advancement of 10 soil borings, installation of 1 permanent groundwater monitoring well and 6 temporary monitoring wells, installation of 4 soil vapor points, and collection of 24 soil, 7 groundwater, 4 soil vapor samples, and 2 marine sediment samples. Soil and groundwater were observed for staining and odor, and screened for VOCs with a PID. Soil, sediment, and groundwater samples were analyzed for VOCs, SVOCs, PCBs, and metals via USEPA methods 8260C, 8270D, 8082, and 6010. Soil vapor samples were analyzed for VOCs via EPA Method TO-15. These data were not validated and are used for informational purposes only.

Results from the investigation across the Willets Point Development BCP Site indicated that various petroleum-related and/or historic-fill related SVOCs, PCBs, pesticides, and heavy metals are present in historic fill; one petroleum-related VOC, SVOCs, and metals are present in groundwater; and chlorinated- and petroleum-related VOCs were identified in soil vapor. Results from samples collected west-northwest of the site identified heavy metals, VOCs, and SVOCs in

historic fill and one petroleum-related VOC in groundwater. Soil vapor samples indicated elevated levels of BTEX, methyl-ethyl ketone, chlorinated VOCs, and methane. Petroleum-like odors or staining were observed in 6 of 10 soil samples and a maximum PID reading of 76.3 parts per million (ppm) was observed. Petroleum-like odor and sheen was observed in purged groundwater from four of the six groundwater monitoring wells.

December 10, 2019 Monthly Progress Report No. 62

Monthly Progress Report No. 62, submitted to NYSDEC and NYSDOH, included a summary of field documentation, soil boring logs, sampling logs, laboratory analytical reports, and data usability summary reports for the limited site investigation performed within OU-2. The limited site investigation was completed by Langan between October 30 and November 5, 2019 across the Willets Point Development BCP Site to support an evaluation of a potential split of the Willets Point Development BCP Site.

The limited site investigation consisted of the advancement of 13 soil borings, installation of 2 permanent monitoring wells, and collection of 30 soil and 2 groundwater samples. Two soil borings and one monitoring well were located outside of the OU-2 boundary but within OU-1. Soil and groundwater were observed for staining and odor, and screened for VOCs with a PID. Soil and groundwater samples were analyzed for one or more of the following: VOCs, SVOCs, pesticides, PCBs, and metals via USEPA methods 8260C, 8270D, 8081, 8082, and 6010, respectively. Analytical data collected during the OU-2 limited site investigation were validated and uploaded to the NYSDEC's Environmental Information Management System (EIMS) via EQuIS™.

Results from the limited site investigation identified the presence of VOCs, SVOCs, PCBs, and metals (arsenic, barium, cadmium, mercury and lead) in historic fill. Two samples within Block 1825 (within OU-2) contained concentrations of lead above the USEPA Maximum Concentration of Contaminants for the Toxicity Characteristic. Petroleum-related VOCs were identified in the groundwater sample from the monitoring well in the southern region of Block 1827, within OU-1. Evidence of impacts, including staining, odors, and elevated PID readings were observed at approximately 1.5 to 5 feet bgs in 3 of 15 soil borings and in 1 of 2 groundwater monitoring wells.

2.0 DESCRIPTION OF REMEDIAL INVESTIGATION FINDINGS

The OU-2 RI was completed in three mobilizations between September 3 and October 15, 2021, October 27 and 28, 2021, and February 25 and March 4, 2022 to investigate, to the extent practical, the nature and extent of soil, groundwater, and soil vapor contamination. All RI activities were performed with an independent environmental monitor (IEM) present. Four AOCs were initially developed based on historical site review and were further investigated during the RI. The October 27 to 28, 2021 mobilization was part of an effort to gather additional data from a petroleum-impacted area identified during the first mobilization. A second synoptic monitoring well gauging event was conducted on December 7, 2021, and two sub-surface anomalies detected during the geophysical survey were investigated via test pits on December 13, 2021. The February 25 to March 4, 2022 mobilization included installation and sampling of two groundwater monitoring wells in Area J to gather additional data in the southeastern part of Area J. The investigations are described in detail in the Remedial Investigation Report (RIR), which was submitted to NYSDEC in January 2022. The RIR was prepared in accordance with NYSDEC Title 6 of New York Codes, Rules, and Regulations (6 NYCRR) Part 375, the NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation (May 2010), the NYSDEC Draft Brownfield Cleanup Program Guide (May 2004), and the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006). A sample collection summary for the RI sampling events is provided in Table 1. Analytical results for samples collected during the RI are provided in Tables 2A through 5G, and shown on Figures 3A through 5G.

Because of the relatively large scale of the investigation (spanning 15.084 acres and 8 tax blocks), sampling areas were assigned alphabetic labels that correspond to sample identification prefixes for organization purposes and ease of reference. The following table summarizes the alphabetic labeling relative to the tax block designation:

Queens Borough Tax Block	Sampling Area Alphabetic Label
1826/1827	E
1825	F
1824	G
1823	H
1822	I
1833	J
1820	K

Sample area alphabetic labels are shown on Figure 2.

2.1 Field Investigation

The investigation described in the RIR consisted of the following tasks:

- A geophysical survey was completed to identify potential USTs and subsurface utilities.
- 145 exploratory soil probes were advanced to depths ranging from 4 to 24 feet bgs; 121 soil samples were collected for analysis.
- 85 soil borings were advanced to depths ranging from 4 to 20 feet bgs; 268 soil samples were collected for analysis.
- 48 two-inch groundwater monitoring wells were installed, developed and sampled. One additional two-inch groundwater monitoring well was installed to assess the presence of light non-aqueous phase liquid (LNAPL) but was not developed or sampled.
- 46 monitoring well locations were surveyed and synoptic depth to groundwater measurements were recorded. Three additional wells (49 total) were surveyed after the synoptic gauging event.
- 44 temporary soil vapor points were installed, sampled and removed.
- 1 ambient air sample was collected.
- The CAMP was implemented during intrusive subsurface activities.

2.1.1 Summary of Remedial Investigation Findings

The findings summarized herein are based on field observations, instrumental readings, and laboratory analytical results of soil, groundwater, and soil vapor samples collected during the RI.

Findings and conclusions are as follows:

Stratigraphy

OU-2 is underlain by a layer of historic fill, predominately consisting of light brown to black, medium to fine sand, with varying amounts of gravel, roots, silt, clay, brick, coal, coal ash, concrete, asphalt, glass, slag, wood, roofing paper, ceramic, plastic, metal, and rubber. The layer extends from directly beneath surface cover (in areas covered by asphalt, concrete, or vegetative cover) to depths ranging from about 5 to 21.5 feet bgs. In 59 of the 228 RI soil borings, a distinct layer of coal ash was encountered within the historic fill layer. The historic fill layer is underlain by a native soil layer that consists of a soft gray clay with varying amounts of sand, silt, and shell fragments, interbedded by a layer of organic material, except in the northernmost area of Area K where native soil predominantly consists of sand with varying amounts of clay and silt. The interbedded organic material contains elevated PID readings and biogenic odors. The subsurface stratigraphy is consistent with the depositional environment of the former tidal salt marsh. Bedrock was not encountered in any of the soil borings.

Hydrogeology

Groundwater was observed between about 2.01 and 11.44 feet bgs (corresponding to el 1.24 and el 7.49[5]). Groundwater was found to flow from east to west, consistent with the OU-1 remedial investigation findings. Because of the lack of drainage systems, groundwater elevations are presumed to heavily depend on precipitation and infiltration.

Historic Fill Quality

Contaminants related to historic fill include SVOCs, PCBs, pesticides, metals, perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS), which were detected at concentrations above Unrestricted Use (UU), Protection of Groundwater (PGW), and/or Restricted-Residential (RR) Soil Cleanup Objectives (SCO), and lead and chromium, which were detected at concentrations above the USEPA Maximum Concentration of Contaminants for the Toxicity Characteristic, within this layer. Semivolatile organic compounds and dissolved metals potentially attributed to historic fill or previous site use were also identified in groundwater at concentrations above the NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards and Guidance Values for Class GA Water (herein referred to the NYSDEC SGVs. Soil sample analytical result maps from the RI are included as Figures 3A through 3K. Groundwater sample analytical results maps are included as Figures 4A through 4G.

Petroleum Contamination in Soil, Groundwater, and Soil Vapor

Petroleum contamination summarized below is based on field observations, instrumental readings, and laboratory analytical results of soil, groundwater, and soil vapor samples collected during the RI

- Petroleum impacts are ubiquitous across OU-2, exhibited by visual, olfactory, and analytical evidence in soil, groundwater, and soil vapor. Petroleum-related observations, including PID measurements up to 1,591 ppm, odors, sheen, and staining were observed at various depths from as shallow as surface grade down to 22 feet bgs. Petroleum-related VOCs (e.g., total benzene, toluene, ethylbenzene, and xylenes [BTEX]) and SVOCs were detected at concentrations exceeding UU, PGW, and/or RR SCOs.
- LNAPL was observed in soil borings in seven localized areas near the following soil borings: E-EP115, E-SB103, G-EP120, H-SB115, I-SB106, I-EP108, and J-EP112. Not all analytical data from these areas reflects elevated petroleum-related VOCs.
- Petroleum-like odors, sheen, and PID headspace readings up to 400 ppm were observed during groundwater purging and sampling. The concentrations of petroleum-related VOCs and SVOCs in soil from historical automotive use or petroleum bulk storage (PBS) are likely contributing to the petroleum-related

[5] Elevations are referenced to the North American Vertical Datum of 1988 (NAVD88).

contamination found in groundwater. Groundwater may also be impacted by off-site petroleum sources.

- Benzene, toluene, ethylbenzene, and total xylenes (BTEX) and other petroleum-related compounds were detected in soil vapor throughout OU-2. BTEX concentrations in soil vapor ranged from 9.4 micrograms per cubic meter (µg/m^3) in F-SV104 to 17,600 µg/m^3 in F-SV110. Petroleum-impacted soil and groundwater from historical automotive use or PBS are likely sources of petroleum-impacts to soil vapor. Soil vapor may also be impacted by off-site petroleum sources. Soil vapor sample analytical results maps are included as Figures 5A through 5G.

Based on the presence of LNAPL in delineation borings up to the OU-2 boundary, petroleum contamination is presumed to be present offsite to the north and south of Area I, and to the east of Area J.

CVOC Impacts

Chlorinated volatile organic compounds (CVOC) were detected at concentrations above UU and PGW SCOs in soil in three isolated locations. CVOCs were not detected at concentrations above RR SCOs or at concentrations above the NYSDEC SGVs in groundwater. CVOCs were detected in soil vapor samples throughout OU-2. The identified CVOCs were commonly used as degreasers in the automotive industry.

1,4-Dioxane Impacts

1,4-Dioxane was not detected in any soils samples collected during the RI, but was detected at concentrations above its drinking water maximum contaminant limit (MCL) in 5 isolated monitoring wells located in Areas E, F, I, and K. 1,4-Dioxane is a solvent stabilizer associated with automotive commercial and industrial uses. The presence of 1,4-dioxane is likely attributed to regional groundwater quality, on-site historical uses, and/or off-site sources.

Methane Impacts

Methane was detected site-wide via field screening and/or laboratory analysis. Field screening detected methane in 25 of the 44 vapor points across OU-2 and is considered to be present site-wide.

2.2 Geology and Hydrogeology

Provided below is a description of the geologic and hydrogeologic observations made during the RI. Subsurface profiles are included as Figures 6A, 6B, 6C, 6D, and 6E. Soil boring logs, a groundwater contour map, and groundwater monitoring well construction logs are appended to the RIR.

2.2.1 Historic Fill

OU-2 is underlain by a layer of historic fill, predominately consisting of light brown to black, medium to fine sand, with varying amounts of gravel, roots, silt, clay, brick, coal, coal ash, concrete, asphalt, glass, slag, wood, roofing paper, ceramic, plastic, metal, and rubber. The historic fill layer extends from directly beneath surface cover (in areas covered by asphalt, concrete, or vegetative cover) to depths ranging from about 5 feet bgs in F-EP121 to about 21.5 feet bgs in J-EP110. A distinct layer of coal ash was observed in 59 of the 228 OU-2 RI soil borings and exploratory probes in the historic fill layer. The historic fill layer ranges between the following depths for each sampling area:

- Area E: 7.5 to 15 feet bgs
- Area F: 5 to 11.5 feet bgs
- Area G: 6.5 to 17.5 feet bgs
- Area H: 7.5 to 15 feet bgs
- Area I: 8 to 14 feet bgs
- Area J: 10.5 to 21.5 feet bgs
- Area K: 5.5 to 12 feet bgs

Elevation of OU-2 is primarily between 7.5 and 14 feet. Not all boring locations were surveyed, for approximate local elevations, refer to the existing site survey included in Appendix A.

2.2.2 Native Soils

The historic fill layer is underlain by a native soil layer that predominantly consists of a soft gray clay with varying amounts of sand, silt, and shell fragments, interbedded by a layer of organic material. On Block 1820 (Area K), the historic fill layer is underlain by a native soil layer that predominantly consists of sand with varying amounts of clay and silt. The layer exhibited elevated PID readings and biogenic odors. The subsurface stratigraphy is consistent with the depositional environment of the former tidally-influenced salt marsh.

2.2.3 Hydrogeological Conditions

Groundwater was observed between about 2.01 and 11.44 feet bgs (which correlates to el 1.24 and el 7.49). Groundwater elevation contours were modeled with the overall flow direction from east to west, which is consistent with groundwater flow direction modeled on OU-1. Because of the lack of drainage systems, groundwater elevations are presumed to heavily depend on precipitation and infiltration.

2.3 Contaminant Conditions

2.3.1 Conceptual Site Model

A conceptual site model (CSM) was developed based on the RI findings to produce a simplified framework for understanding the distribution of impacted soil/fill and contaminated liquids, potential migration pathways, and potentially complete exposure pathways.

2.3.1.1 Potential Sources of Contamination

Potential sources of contamination include former automotive industrial uses of OU-2, current automotive industrial uses of surrounding properties, and historic fill. Historical automotive industrial operations on OU-2 and current automotive industrial operations on adjoining properties are likely sources of petroleum-related VOCs and CVOCs in soil, groundwater, or soil vapor and petroleum-related SVOCs and metals in soil and groundwater. Nuisance petroleum impacts were observed in soil borings in seven localized areas near the following borings: E-EP115, E-SB103, G-EP120, H-SB115, I-SB106, I-EP108, and J-EP112. The presence of historic fill throughout OU-2 has been established as a source of SVOCs, PCBs, pesticides, and metals.

2.3.1.2 Exposure Media

Impacted media include soil, groundwater, and soil vapor. Analytical data indicate that historic fill contains petroleum-related VOCs, SVOCs, pesticides, PCBs, and metals at concentrations greater than the UU, PGW, and/or RR SCOs. Groundwater impacts include petroleum-related VOCs, SVOCs, metals, per- and polyfluoroalkyl substances (PFAS), and 1,4-dioxane. Soil vapor is impacted with petroleum-related VOCs, CVOCs, and methane.

2.3.1.3 Receptor Populations

OU-2 is currently vacant (with the exception of an unauthorized active auto body shop located in the southwest corner of Block 1825, Lot 1) with access via locked gates limited to authorized visitors and personnel. During site development and remedial construction, human receptors will be limited to construction and remediation workers, authorized visitors, design team visitors, and the public adjacent to OU-2. Under future conditions, receptors will include the new building occupants and visitors.

2.3.2 Description of Areas of Concern

This section discusses the RI results with respect to the Areas of Concerns (AOC) identified.

2.3.2.1 AOC 1: Historic Fill

In addition to OU-2's historical use as a dumping ground for coal ash, fill from unknown sources was used as backfill during various phases of OU-2's development history. Previous environmental investigations identified a historic fill layer and soil samples collected from this

layer contained concentrations of SVOCs, PCBs, metals, PFOA, and PFOS consistent with NYC historic fill composition. During the 2019 Eligibility Investigation, a historic fill layer was identified extending to depths between 8.5 and 19 feet bgs in borings installed in Areas E, F, G, H, and J. During the 2021 RI, a historic fill layer was identified extending to depths between 5 feet bgs (in F-EP121) and 21.5 feet bgs (in J-EP110). Fill consists of medium to fine sand with varying amounts of gravel, roots, silt, clay, brick, coal, coal ash, concrete, asphalt, glass, slag, wood, roofing paper, ceramics, tile, pea gravel, plastic, metal, and rubber.

AOC-1 Findings Summary

AOC 1 is a site-wide AOC. All borings and monitoring wells are associated with this AOC. AOC 1 is further described for each of seven sampling areas (Area E though K) in the following sections.

AOC 1 Area E

Soil

- Historic fill contains VOCs, SVOCs, PCBs, metals, and PFOS Part 375 UU, PGW, and/or RR SCOs exceedances. The historic fill layer was observed to depths between about 7.5 and 15.5 feet bgs and predominantly consisted of sand with varying amounts of gravel, silt, clay, vegetation, brick, ceramic, coal, coal ash, concrete, asphalt, glass, slag, wood, roofing paper, plastic, metal, and rubber. A layer of coal ash was identified between about 6.5 and 8 feet bgs in two soil borings in the central part of Area E and at about 4 and 8 feet bgs in one soil boring in the northern part of the Area. Additionally, coal ash was observed as a constituent within fill throughout Area E.
- Eight VOCs were detected above UU SCOs and/or PGW but below RR SCOs in samples collected within the historic fill layer. VOCs are associated with AOC 2.
- Ten SVOCs exceeded UU, PGW and/or RR SCOs in samples collected within the historic fill layer. Total SVOC concentrations were above 250 milligrams per kilogram (mg/kg) in two soil samples: 478.78 mg/kg in E-SB103_0-2 and 916.8 mg/kg in E-SB104_0-2.
- Pesticides were not detected above the UU SCOs.
- Total PCBs were detected above the UU SCOs but below PGW and RR SCOs from samples collected within the historic fill layer from four soil samples at concentrations consistent with NYC historic fill composition.
- Twelve metals exceeded the UU, PGW, and/or RR SCOs in samples collected within the historic fill layer. Concentrations of chromium above the USEPA Maximum Concentration of Contaminants for the Toxicity Characteristic were identified in the upper 2 feet of E-SB104.

- PFOS exceeded the UU guidance value[6] from two samples collected within the historic fill layer.

Groundwater

- One or more of three dissolved-phase metals exceeded the NYSDEC SGVs in three groundwater samples located across Area E, and in two groundwater samples collected during previous investigations within Area E.
- PFOA and PFOS were detected at concentrations above the guidance values in all four groundwater monitoring wells.

AOC 1 Area F

Soil

- Historic fill located throughout the area contains VOCs, SVOCs, pesticides, PCBs, metals, and PFOS at concentrations above the Part 375 UU, PGW, and/or RR SCOs. The historic fill layer was observed to depths between about 5 and 11.5 feet bgs and predominantly consisted of sand with varying amounts of gravel, silt, clay, brick, coal, coal ash, concrete, asphalt, glass, slag, wood, roofing paper, ceramic, plastic, metal, and rubber. Layers of coal ash were observed between about 1 and 11 feet bgs in 25 of 54 soil borings. Additionally, coal ash was observed as a constituent within fill.
- Eight VOCs exceeded the UU SCOs, PGW, and/or RR SCOs in samples collected within the historic fill layer. VOCs are associated with AOC 2.
- Eight SVOCs exceeded the UU, PGW, and/or RR SCOs in samples collected within the historic fill layer. SVOC concentrations were consistent with NYC historic fill composition.
- Four pesticides were detected above the UU SCOs but below PGW and RR SCOs in samples collected within the historic fill layer. Pesticide concentrations were consistent with NYC historic fill composition.
- Total PCBs were detected above the UU SCOs but below PGW and RR SCOs from samples collected within the historic fill layer from 2 soil samples at concentrations consistent with NYC historic fill composition.
- Thirteen metals exceeded the UU, PGW, and/or RR SCOs in samples collected within the historic fill layer. Concentrations of lead above the USEPA Maximum Concentration of Contaminants for the Toxicity Characteristic were identified from 0 to 8 feet bgs in 6 soil

[6] No standards for PFAS in soil currently exist in New York State; however, NYSDEC published soil guidance values for perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS) in October 2020 (latest revision in January 2021 – herein referred to as PFAS Guidance Values)

samples collected from 5 soil borings. The lead concentrations are likely attributed to the previous coal ash dumping as coal ash was observed in each of these borings.

- PFOS exceeded the UU and/or PGW guidance values in 17 samples collected within the historic fill layer.

Groundwater

- One or more of three dissolved-phase metals and four total metals exceeded the NYSDEC SGVs in ten groundwater samples.
- PFOA and/or PFOS exceeded the guidance values in all of the groundwater samples.

AOC 1 Area G

Soil

- Historic fill located throughout the area contains VOCs, SVOCs, pesticides, PCBs, metals, and PFOS at concentrations above the Part 375 UU, PGW, and/or RR SCOs. The historic fill layer was observed to depths between about 6.5 and 18 feet bgs and predominantly consisted of sand with varying amounts of gravel, roots, silt, clay, brick, coal, coal ash, concrete, asphalt, glass, slag, wood, roofing paper, ceramic, plastic, and metal. Layers of coal ash were observed throughout the area between about 1.5 and 17.5 feet bgs in 13 of 47 soil borings. Coal ash was observed within fill throughout the area.
- Seven VOCs exceeded the UU SCOs, PGW, and/or RR SCOs in samples collected within the historic fill layer. VOCs are associated with AOC 2.
- Eight SVOCs exceeded the UU, PGW, and/or RR SCOs in samples collected within the historic fill layer. SVOC concentrations were consistent with NYC historic fill composition.
- Four pesticides were detected above the UU SCOs but below PGW and RR SCOs in samples collected within the historic fill layer. Pesticide concentrations were consistent with NYC historic fill composition.
- Total PCBs were detected about the UU SCOs but below PGW and RR SCOs in 3 soil samples collected within the historic fill layer at concentrations consistent with NYC historic fill composition.
- Twelve metals exceeded the UU, PGW, and/or RR SCOs in samples collected within the historic fill layer. Concentrations of lead above the USEPA Maximum Concentration of Contaminants for the Toxicity Characteristic were identified from 6 to 8 feet bgs in G-SB105. The lead concentrations are likely attributed to the previous coal ash dumping as a layer of coal ash was observed from 1.5 to 11 feet bgs in G-SB105.

- PFOS exceeded the UU and/or PGW guidance values in nine samples collected within the historic fill layer.

Groundwater

- Two VOCs, chloroform and total xylenes, exceeded the NYSDEC SGVs in G-MW109. Detections of total xylenes are associated with AOC 2.
- One SVOC, phenol, exceeded the NYSDEC SGVs in G-MW109.
- One or more of three dissolved-phase metals and four total metals exceeded the NYSDEC SGVs in all ten groundwater monitoring wells located across the area.
- PFOA and/or PFOS exceeded the guidance values in all of the groundwater samples.

AOC 1 Area H

Soil

- Historic fill located throughout the area contains VOCs, SVOCs, pesticides, PCBs, metals, and PFOS at concentrations above the Part 375 UU, PGW, and/or RR SCOs. The historic fill layer was observed to depths between about 7.5 and 14 feet bgs and predominantly consisted of sand with varying amounts of gravel, silt, clay, brick, coal, coal ash, concrete, asphalt, glass, slag, wood, roofing paper, ceramic, plastic, and metal. Layers of coal ash were observed throughout the area between about 3 and 14 feet bgs in 13 of 39 soil borings. Coal ash was observed within fill throughout the area.
- Four VOCs were detected above the UU and/or PGW SCOs but below RR SCOs in samples collected within the historic fill layer. VOCs are associated with AOC 2.
- Seven SVOCs exceeded the UU, PGW, and/or RR SCOs in samples collected within the historic fill layer. SVOC concentrations were consistent with NYC historic fill composition.
- Four pesticides were detected above the UU SCOs but below PGW and RR SCOs in samples collected within the historic fill layer. Pesticide concentrations were consistent with NYC historic fill composition.
- Total PCBs were detected above the UU SCOs but below PGW and RR SCOs in samples collected within the historic fill layer from eight soil samples at concentrations consistent with NYC historic fill composition.
- Eleven metals exceeded the UU, PGW, and/or RR SCOs in samples collected within the historic fill layer. Concentrations of lead above the USEPA Maximum Concentration of Contaminants for the Toxicity Characteristic were not detected in the six borings that were analyzed for Toxicity Characteristic Leaching Procedure (TCLP) metals.

- PFOS exceeded the UU and/or PGW guidance values in six samples collected within the historic fill layer.

Groundwater

- One SVOC, benzo(a)anthracene, exceeded the SGV in H-MW102.
- One or more of five dissolved-phase metals exceeded the NYSDEC SGVs in all eight groundwater monitoring wells.
- PFOA and/or PFOS exceeded the guidance values in seven of the eight groundwater monitoring wells.

AOC 1 Area I

Soil

- Historic fill located throughout the area contains VOCs, SVOCs, pesticides, PCBs, metals, PFOS, and PFOA at concentrations above the Part 375 UU, PGW, and/or RR SCOs. The historic fill layer was observed to depths between about 8 and 14 feet bgs and predominantly consisted of sand with varying amounts of gravel, silt, clay, brick, coal, coal ash, concrete, asphalt, glass, slag, wood, ceramic, plastic, metal, and rubber. Layers of coal ash were observed throughout the area between about 3 and 14 feet bgs in 4 of 22 soil borings. Coal ash was observed within fill throughout the area.
- Ten VOCs were detected above the UU and/or PGW SCOs but below RR SCOs in samples collected within the historic fill layer. VOCs are associated with AOC 2.
- Seven SVOCs exceeded the UU, PGW, and/or RR SCOs in samples collected within the historic fill layer. SVOC concentrations were consistent with NYC historic fill composition.
- Three pesticides were detected above the UU SCOs but below PGW and RR SCOs in samples collected within the historic fill layer. Pesticide concentrations were consistent with NYC historic fill composition.
- Total PCBs exceeded the UU SCOs, PGW, and/or RR SCOs in 6 samples collected within the historic fill layer at concentrations consistent with NYC historic fill composition.
- Nine metals exceeded the UU, PGW, and/or RR SCOs in samples collected within the historic fill layer. Concentrations of lead were not detected above the USEPA Maximum Concentration of Contaminants for the Toxicity Characteristic in the boring that was analyzed for TCLP metals.
- PFOS and/or PFOA exceeded the UU guidance values in seven samples collected within the historic fill layer.

Groundwater

- Two SVOCs, benzo(a)anthracene and bis(2-ethylhexyl)phthalate, exceeded the NYSDEC SGVs in I-MW103.
- Three dissolved-phase metals exceeded the NYSDEC SGVs in all five groundwater monitoring wells.
- PFOA and PFOS exceeded the guidance values in all five groundwater monitoring wells.

AOC 1 Area J

Soil

- Historic fill located throughout the area contains VOCs, SVOCs, pesticides, PCBs, metals, PFOS, and PFOA at concentrations above the Part 375 UU, PGW, and/or RR SCOs. The historic fill layer was observed to depths between at least 8 and 21.5 feet bgs and predominantly consisted of sand with varying amounts of gravel, silt, clay, brick, coal, coal ash, concrete, asphalt, glass, wood, roofing paper, ceramic, plastic, metal, and rubber. A layer of coal ash was observed between about 16 and 19.5 feet bgs in one soil boring in the eastern part of the area, and coal ash was observed within fill in two soil borings in the northwestern part of the area.
- Thirteen VOCs exceeded the UU SCOs, PGW, and/or RR SCOs in samples collected within the historic fill layer. VOCs are associated with AOC 2.
- Eleven SVOCs exceeded the UU, PGW, and/or RR SCOs in samples collected within the historic fill layer. SVOC concentrations were consistent with NYC historic fill composition.
- Four pesticides were detected above the UU SCOs but below PGW and RR SCOs in samples collected within the historic fill layer. Pesticide concentrations were consistent with NYC historic fill composition.
- Total PCBs exceeded the UU, PGW, and/or RR SCOs in eight samples collected within the historic fill layer at concentrations consistent with NYC historic fill composition. One sample, J-EP113_10-12, contained atypical concentrations (compared to the rest of the historic fill) of total PCBs at 13.9 mg/kg.
- Nine metals exceeded the UU, PGW, and/or RR SCOs in samples collected within the historic fill layer. Concentrations of lead above the USEPA Maximum Concentration of Contaminants for the Toxicity Characteristic were identified from 10 to 12 feet bgs in J-EP113 and are likely attributed to coal ash.
- PFOS and/or PFOA exceeded the UU and/or PGW guidance values in four samples collected within the historic fill layer.

Groundwater

- Two dissolved-phase metals exceeded the NYSDEC SGVs in both groundwater monitoring wells.
- PFOA and PFOS exceeded the guidance values in J-MW102.

AOC 1 Area K

Soil

- Historic fill located throughout the area contains VOCs, SVOCs, pesticides, PCBs, metals, and PFOS at concentrations above the Part 375 UU, PGW, and/or RR SCOs. The historic fill layer was observed to depths between about 5.5 and 12 feet bgs and predominantly consisted of sand with varying amounts of gravel, roots, silt, clay, brick, coal, coal ash, concrete, asphalt, glass, slag, wood, and vegetation. Coal ash was observed as a constituent within fill throughout the area in four of 18 soil borings.
- One VOC, acetone, were detected above the UU SCOs but below PGW and RR SCOs in samples collected within the historic fill layer.
- Six SVOCs exceeded the UU, PGW, and/or RR SCOs in samples collected within the historic fill layer. SVOC concentrations were consistent with NYC historic fill composition.
- Four pesticides were detected above the UU and/or PGW SCOs but below RR SCOs in samples collected within the historic fill layer. Pesticide concentrations were consistent with NYC historic fill composition.
- Total PCBs were detected above the UU SCOs but below PGW and RR SCOs in one sample collected within the historic fill layer at a concentration consistent with NYC historic fill composition.
- Seven metals were detected above the UU and/or PGW SCOs but below RR SCOs in samples collected within the historic fill layer.
- PFOS exceeded the UU guidance value in three samples collected within the historic fill layer.

Groundwater

- One or more of four dissolved-phase metals exceeded the NYSDEC SGVs in four groundwater monitoring wells.
- PFOA and/or PFOS exceeded the guidance values in four groundwater monitoring wells.

AOC 1 Conclusions

Former coal ash and general refuse dumping are constituents of the historic fill layer. Re-grading and infilling to support historical development introduced historic fill from unknown sources. Historic fill is ubiquitous across OU-2 and extends from surface grade to depths between about

5 feet bgs in F-EP121 and 21.5 feet bgs in J-EP110. Coal ash was observed within historic fill across OU-2, and layers of coal ash were observed in six of the seven Areas; a distinct layer of coal ash was not observed on Area K.

Volatile organic compounds detected in soil and groundwater are associated with known on-site petroleum contamination associated with historical automotive uses. Semivolatile organic compounds may be related to historic fill quality and/or on-site petroleum contamination. Total SVOC concentrations were above 250 mg/kg in two soil samples from Area E. Pesticides, PCBs, and metals in soil are generally consistent with NYC historic fill composition.

Semivolatile organic compounds detected in groundwater may be the result of suspended solids in the groundwater samples derived from historic fill. Semivolatile organic compound detections in soil and groundwater may also be associated with known on-site petroleum impacts to soil and groundwater.

Iron, magnesium, manganese, selenium, and sodium detected in groundwater samples above the NYSDEC SGVs are indicative of regional groundwater conditions.

Localized areas of fill in Areas F, G, and J contain concentrations of lead and a localized area of fill in Area E contains concentrations of chromium above the USEPA Maximum Concentration of Contaminants for the Toxicity Characteristic. Concentrations of lead and chromium have not impacted groundwater based on the absence of dissolved-phase lead or chromium concentrations in groundwater samples. Dissolved-phase lead and arsenic were detected two isolated monitoring wells on Area H. Lead is commonly used in batteries and formerly used in automotive paints and may be related to historical automotive commercial or industrial uses, as discussed in AOC 2. Chromium is used for steel hardening and for decorative finishes on auto parts and may be related to historical automotive commercial or industrial uses, as discussed in AOC 2.

PFOA and PFOS were detected in every groundwater sample collected across OU-2. PFAS were detected in historic fill soil samples; however, detected concentrations did not exceed the RR soil guidance values. No on-site PFAS source in soil was identified.

2.3.2.2 AOC 2: Historical Site Uses

The RI identified metals impacts to soil, lead impacts to groundwater, and petroleum impacts to soil, groundwater, and soil vapor. Petroleum impacts were identified through field observations (i.e., visual staining, odors, and elevated PID readings) and laboratory analytical results.

AOC 2 Findings Summary

All soil borings, exploratory probes, monitoring wells, and soil vapor points were advanced to investigate impacts associated with historical automotive commercial and industrial uses. The following discussion identifies localized areas of impacts associated with AOC 2.

AOC 2 Area E

Soil

- Six petroleum-related VOCs were detected above UU and/or PGW SCOs but below RR SCOs across the area. Petroleum impacts, including PID measurements up to 180.6 ppm, odors, staining, and/or LNAPL were observed in soil at depths ranging from 1 to 15 feet bgs.
- Lead and chromium exceeded the UU, PGW, and/or RR SCOs. Concentrations of chromium above the USEPA Maximum Concentration of Contaminants for the Toxicity Characteristic were identified in the upper 2 feet of E-SB104.
- LNAPL was observed in the E-EP115 boring and was sampled for TPH identification. Laboratory analysis found that the sample resembled hydraulic fluid.

Groundwater

- One petroleum-related VOC (tert-butyl methyl ether), a gasoline additive to prevent engine knocking, exceeded the NYSDEC SGVs in one monitoring well (E-MW102). Headspace PID readings ranged between 7.0 and 37.3 ppm. The highest headspace PID readings was identified in monitoring well E-MW115.
- 1,4-dioxane was detected at concentrations above the drinking water MCL in E-MW104.
- LNAPL was observed in one monitoring well (E-MW103) and was sampled for TPH identification. Laboratory analysis found that the sample resembled hydraulic oil.

Soil Vapor

- Petroleum-related VOCs were detected at concentrations indicative of an on-site source. PID readings, after purging, ranged from 1.2 to 20.4 ppm. BTEX concentrations ranged from 37 to 1,367 µg/m^3. The highest concentrations of petroleum-related VOCs were detected in E-SV103 and E-SV104.

AOC 2 Area F

Soil

- Six petroleum-related VOCs exceeded the UU, PGW, and/or RR SCOs. Petroleum impacts, including PID measurements up to 477.3 ppm, odors, sheen, and/or staining, were observed in soil at depths ranging from 2 to 10 feet bgs.
- Lead and chromium exceeded the UU, PGW, and/or RR SCOs in samples within the historic fill layer. Concentrations of lead above USEPA Maximum Concentration of Contaminants for the Toxicity Characteristic were identified from 0 to 8 feet bgs in 6 soil samples collected from 5 soil borings.
- LNAPL was observed in the F-EP103 boring and was sampled for TPH identification. The sample was not identifiable by the laboratory and there were no VOCs or SVOCs in samples collected from F-EP103 above UU SCOs.

Groundwater

- One petroleum-related VOC (benzene) exceeded the NYSDEC SGVs in three monitoring wells. Headspace PID readings ranged between 5.7 and 18.0 ppm. The highest headspace PID reading was identified in monitoring well F-MW110.

Soil Vapor

- Petroleum-related VOCs were detected at concentrations indicative of an on-site source. PID readings, after purging, ranged from 0 to 40.6 ppm. BTEX concentrations ranged from 9 to 17,600 µg/m^3. The highest concentrations of petroleum-related VOCs (BTEX, cyclohexane, n-heptane, n-hexane, all of which are primarily associated with gasoline) were detected in F-SV110.

AOC 2 Area G

Soil

- Six petroleum-related VOCs exceeded the UU, PGW, and/or RR SCOs. Petroleum impacts, including PID measurements up to 603.5 ppm, odors, sheen and/or staining, were observed in soil at depths ranging from 0 to 12 feet bgs.
- Lead and chromium exceeded the UU, PGW, and/or RR SCOs in samples collected within the historic fill layer. A concentrations of lead above the USEPA Maximum Concentration of Contaminants for the Toxicity Characteristic was identified from 6 to 8 feet bgs in 1 soil sample.
- LNAPL was observed in the G-SB120 boring and was sampled for TPH identification. Laboratory analysis found that the sample resembled weathered diesel.

Groundwater

- One petroleum-related VOC (total xylenes) exceeded the NYSDEC SGVs in one monitoring well (G-MW109). Headspace PID readings ranged between 5.3 and 260 ppm. The highest headspace PID reading was identified in monitoring well G-MW102.

Soil Vapor

- Petroleum-related VOCs were detected at concentrations indicative of an on-site source. PID readings, after purging, ranged from 0 to 12.0 ppm. BTEX concentrations ranged from 92 to 13,680 µg/m^3. The highest concentrations of petroleum-related VOCs (BTEX, cyclohexane, n-heptane, n-hexane) were detected in G-SV101 and G-SV105.

Area H

Soil

- Three petroleum-related VOCs were detected above the UU and PGW SCOs but below RR SCOs. Petroleum impacts, including PID measurements up to 180.9 ppm, odors, sheen and/or staining, were observed in soil at depths ranging from 0 to 9.5 feet bgs.
- Lead and chromium exceeded the UU, PGW, and/or RR SCOs.
- LNAPL was observed in the H-SB115SE2 boring and sampled for TPH identification. Laboratory analysis found that the sample resembled heavy mineral oil.

Groundwater

- One petroleum-related VOC (toluene) exceeded the NYSDEC SGVs in one monitoring well (H-MW103). Petroleum-like odors and sheen were observed during groundwater purging and sampling. Headspace PID readings ranged between 9.1 and 24.9 ppm. The highest headspace PID reading was identified in monitoring well H-MW105.

Soil Vapor

- Petroleum-related VOCs were detected at concentrations indicative of an on-site source. PID readings, after purging, ranged from 0 to 11.1 ppm. BTEX concentrations ranged from 128 to 7,690 µg/m^3. The highest concentrations of petroleum-related VOCs (BTEX, cyclohexane, n-heptane, n-hexane) were detected in H-SV103 and H-SV104. CVOCs (including 1,1-dichloroethene (1,1-DCE), cis-1,2-dichloroethene (cis-1,2-DCE), tetrachlorethene (PCE), trichloroethene (TCE), and vinyl chloride) were detected in multiple samples with the highest concentrations detected at H-SV104.

AOC 2 Area I

Soil

- Nine petroleum-related VOCs were detected above the UU and PGW SCOs but below RR SCOs. Petroleum impacts, including PID measurements up to 832.2 ppm, odors, sheen, and/or staining, were observed in soil at depths ranging from 0 to 11.5 feet bgs.
- Lead and chromium exceeded the UU, PGW, and/or RR SCOs.
- LNAPL was observed in the I-SB106NE2 boring and was sampled for TPH identification. Laboratory analysis found that the sample resembled hydraulic fluid with possible kerosene range organics. Additional borings were advanced to delineate the extent of LNAPL observed near borings I-SB106 and I-EP108, and was present up to the property boundary. Petroleum contamination in Area I is presumed to be present off-site.

Groundwater

- Twelve petroleum-related VOCs exceeded the NYSDEC SGVs in one monitoring well (I-MW101). Headspace PID readings ranged between 20.3 and 400 ppm. The highest headspace PID readings was identified in monitoring well I-MW101.
- 1,4-Dioxane exceeded the guidance value in I-MW105.

Soil Vapor

- Petroleum-related VOCs were detected at concentrations indicative of an on-site source. PID readings, after purging, ranged from 0 to 0.2 ppm. BTEX concentrations ranged from 33 to 2,350 µg/m^3. The highest concentrations of petroleum-related VOCs (BTEX, cyclohexane, n-heptane, n-hexane, and MTBE) were detected in I-SV103 and I-SV104.

AOC 2 Area J

Soil

- Petroleum-related VOCs were detected above the UU, PGW, SCOs and/or RR SCOs. Petroleum impacts, including PID measurements up to 1,591 ppm, odors, sheen, LNAPL, and/or staining, were observed in soil at depths ranging from 0.5 to 19.5 feet bgs.
- One petroleum-related SVOC, naphthalene, was detected above UU and PGW SCOs.
- Lead and chromium exceeded the UU, PGW, and/or RR SCOs in samples collected within the historic fill layer. A concentrations of lead above the USEPA Maximum Concentration of Contaminants for the Toxicity Characteristic was identified from 10 to 12 feet bgs in 1 soil sample.
- LNAPL was observed in the J-EP112 boring and was sampled for TPH identification. Laboratory analysis found that the sample resembled motor oil. Additional borings were

advanced to delineate the extent of LNAPL observed near boring J-EP112, and was present up to the property boundary. Petroleum contamination in Area J is presumed to be present off-site

Groundwater

- One or more of five petroleum-related VOCs exceeded the NYSDEC SGVs in both monitoring wells. Petroleum-like odors and sheen were observed during groundwater purging and sampling in J-MW102. The headspace PID reading was 2.5 ppm in J-MW102.
- LNAPL was observed in J-MW112. A soil sample from the boring converted to J-MW112 (J-EP112) was collected for TPH identification analysis. Laboratory analysis found that the sample resembled motor oil.
- Because of the apparent presence of LNAPL and gross impacts in multiple borings across the area, additional monitoring wells and groundwater samples were not installed. Groundwater quality will be evaluated as part of the remedial action.

Soil Vapor

- Petroleum-related VOCs were not detected at concentrations indicative of an on-site source. PID readings, after purging, ranged from 0 to 0.1 ppm. BTEX concentrations ranged from 29 to 258 µg/m^3.

AOC 2 Area K

Soil

- Petroleum-related VOCs were not detected above UU, PGW, and/or RR SCOs. Petroleum impacts, including PID measurements up to 47.3 ppm and odors were observed in soil at depths ranging from 0 to 7 feet bgs.
- Lead and chromium exceeded the UU SCOs but not PGW or RR SCOs.

Groundwater

- One petroleum-related VOC, MTBE, exceeded the NYSDEC SGVs in the three most southern monitoring wells. Headspace PID readings ranged between 6.7 and 21.8 ppm. The highest headspace PID readings was identified in monitoring well K-MW103.
- 1,4-dioxane exceeded the drinking water MCL in K-MW103.

Soil Vapor

- Petroleum-related VOCs were detected at concentrations indicative of an on-site source. PID readings, after purging, ranged from 0.1 to 0.5 ppm. BTEX concentrations ranged from 11 to 4,740 µg/m^3. The highest concentrations of petroleum-related VOCs (BTEX,

cyclohexane, n-heptane, n-hexane, and MTBE) were detected in K-SV103. CVOCs (including cis-1,2-dichloroethene, TCE, and vinyl chloride) were detected at elevated concentrations in multiple samples with the highest concentrations detected at K-SV102, K-SV103, K-SV104.

AOC 2 Conclusions

Petroleum impacts to soil, groundwater, and soil vapor; CVOC impacts to soil and soil vapor; 1,4-dioxane impacts to groundwater; lead and chromium impacts to soil; and lead impacts to groundwater were identified during the 2021 RI and are likely related to historical automotive commercial or industrial uses. Petroleum impacts include observation of staining, odors, and PID readings in soil and/or groundwater, and BTEX and other petroleum-related VOC and SVOC exceedances identified in soil and groundwater samples. Petroleum-related VOCs and CVOCs were also identified in soil vapor at concentrations above background. Elevated concentrations of CVOCs and gasoline-related compounds in soil vapor such as cyclohexane, n-heptane, and n-hexane are commonly associated with automotive repair. Elevated concentrations of lead in surficial soil may be attributed to the previous coal ash dumping, lead battery storage, lead-based paint from auto repair, and/or other automotive commercial and industrial uses. Elevated concentrations of chromium are also likely related to previous automotive commercial and industrial uses. 1,4-Dioxane is a solvent stabilizer associated with automotive commercial and industrial uses.

2.3.2.3 AOC 3: Petroleum Bulk Storage

The Remedial Investigation Work Plan (RIWP) identified suspected and former aboveground storage tanks, underground storage tanks, and drums. Additionally, two subsurface anomalies indicative of tanks were identified during the geophysical survey. Soil borings, monitoring wells, and soil vapor points were installed to evaluate potential historical PBS; locations and findings are included in the following discussion. The two subsurface anomalies were investigated via test pits on December 13, 2021, and evidence of USTs was not observed.

AOC 3 Findings Summary

Soil borings, monitoring wells, and soil vapor points were installed across OU-2 in the vicinity of suspected historical PBS to investigate potential petroleum-related impacts.

AOC 3 Area E

Soil

- Petroleum-related impacts including VOCs detected above UU and/or PGW SCOs but below RR SCOs, sheen, and/or staining were identified at the following locations that coincide with areas of suspected historical PBS: E-EP101, E-EP109, E-EP118, E-EP119, E-EP120, and E-SB103.

Groundwater

- Petroleum-related impacts including VOCs exceeding SGVs and/or observed impacts during groundwater sampling was identified at the following location that coincides with suspected PBS:
    - E-MW103 (LNAPL)

Soil Vapor

- Petroleum-related VOCs were detected at concentrations indicative of an on-site source and coincide with areas of suspected former PBS at E-SV103 and E-SV104.

AOC 3 Area F

Soil

- Petroleum-related impacts including VOCs exceeding UU, PGW, and/or RR SCOs, sheen, and/or staining were identified at the following locations that coincide with areas of suspected PBS: F-EP108, F-EP109, F-EP127, F-EP130, F-EP131, F-SB103, F-SB106, F-SB110, and F-SB111.

Groundwater

- Petroleum-related impacts including VOCs exceeding SGVs and/or observed impacts during groundwater sampling were identified at the following locations that coincide with areas of suspected PBS: F-MW103 and F-MW106.

Soil Vapor

- Petroleum-related VOCs were detected at concentrations indicative of an on-site source and coincide with areas of suspected former PBS in the following locations: F-SV101, F-SV102, and F-SV109.

AOC 3 Area G

Soil

- No petroleum-related VOCs or impacts associated with PBS or other chemical storage were observed.

Groundwater

- Petroleum-related impacts including VOCs exceeding SGVs and/or observed impacts during groundwater sampling were identified at the following location that coincides with an area of suspected PBS: G-MW109

Soil Vapor

- Petroleum-related VOCs were detected in a soil vapor sample that coincides with an area of suspected former PBS in the following location: G-SV108

AOC 3 Area H

Soil

- Petroleum-related impacts including VOCs detected above UU and PGW SCOs but below RR SCOs, sheen, and/or staining were identified at the following locations that coincide with areas of suspected PBS: H-SB102, H-SB103, H-SB104, H-SB106, H-EP109, and H-EP113.

Groundwater

- Petroleum-related impacts including VOCs and SVOCs exceeding SGVs and/or observed impacts during groundwater sampling were identified at the following location that coincides with an area of suspected PBS: H-MW103.

Soil Vapor

- Petroleum-related VOCs were detected in soil vapor samples that coincide with areas of suspected former PBS in the following locations: H-SV102, H-SV103, and H-SV104.

AOC 3 Area I

Soil

- Petroleum-related impacts including VOCs detected above UU and PGW SCOs but below RR SCOs, sheen, and/or staining were identified at the following locations that coincide with areas of suspected PBS: I-EP104, I-SB101, and I-SB103.

Groundwater

- Petroleum-related impacts including VOCs and SVOCs exceeding SGVs and/or observed impacts during groundwater sampling were identified at the following locations that coincide with areas of suspected PBS: I-MW101 and I-MW103.

Soil Vapor

- Petroleum-related VOCs were detected at concentrations indicative of an on-site source and coincide with areas of suspected former PBS in the following locations: I-SV103 and I-SV104.

AOC 3 Area J

Historical evidence of PBS or other chemical storage was not identified; therefore, petroleum-related impacts identified on Area 1833 (J) are not associated with AOC 3.

AOC 3 Area K

Soil

- Petroleum-related impacts to soil were not observed in locations that coincide with areas of suspected PBS in Area K.

Groundwater

- Petroleum-related impacts including VOCs exceeding NYSDEC SGVs and/or observed impacts during groundwater sampling were identified at the following locations that coincide with areas of suspected PBS: K-MW103 and K-MW104

Soil Vapor

- Petroleum-related VOCs were detected at concentrations indicative of an on-site source and coincide with an area of suspected former PBS in the following location: K-SV104

AOC 3 Conclusions

Two anomalies indicative of PBS USTs were found during the geophysical survey. Test pit investigation of these anomalies did not find USTs. Generally, there are not distinguishable differences between petroleum impacts related to PBS and previous site use. Because AOC 2 and AOC 3 overlap and PBS tanks or drums were not located during the RI, AOC 3 is considered redundant and all petroleum impacts on OU-2 are associated with AOC 2.

2.3.2.4 AOC 4: Other Potential Off-Site Sources

Several potential off-site sources exist at properties surrounding OU-2 (i.e., various automotive repair and wrecking facilities, junkyards, filling stations, small industrial facilities). Soil borings, monitoring wells, and soil vapor points were installed near OU-2 boundaries to investigate this AOC. Investigation locations at OU-2 boundaries served to document if contaminants in the groundwater or soil vapor are migrating to OU-2 from off-site location. Soil findings are not discussed in connection with this AOC.

AOC 4 Area E

Groundwater

- PFOA and PFOS exceeded the PFAS Guidance Values in all groundwater samples. 1,4-Dioxane exceeded the New York State drinking water MCL at monitoring well E-MW104, located in the southern portion of the area.

Soil Vapor

- CVOCs including carbon tetrachloride, cis-1,2-DCE, methylene chloride, TCE, PCE, and vinyl chloride were detected in E-SV115 at the southwestern boundary of OU-2.

AOC 4 Area F

Groundwater

- PFOA and/or PFOS exceeded the PFAS Guidance Values in all monitoring wells. 1,4-Dioxane exceeded the New York State drinking water MCL at monitoring well F-MW106.

Soil Vapor

- Soil vapor sampling coverage was limited because of the presence of shallow groundwater. In the areas that were sampled, CVOCs including 1,1,1-trichloroethene (1,1,1-TCA), carbon tetrachloride, cis-1,2-DCE, TCE, PCE, and vinyl chloride were detected across the area with the exception of two soil vapor points.

AOC 4 Area G

Groundwater

- One VOC, chloroform, and one SVOC, phenol, exceeded the NYSDEC SGVs in G-MW109 near the eastern boundary.
- PFOA and/or PFOS exceeded the PFAS Guidance Values in all monitoring wells.

Soil Vapor

- CVOCs including 1,1,1-TCA, methylene chloride, and PCE were detected in all soil vapor samples.

AOC 4 Area H

Groundwater

- PFOA and/or PFOS exceeded the PFAS Guidance Values in all monitoring wells.

Soil Vapor

- CVOCs including 1,1-DCE, carbon tetrachloride, cis-1,2-DCE, methylene chloride, PCE, TCE, and vinyl chloride were detected in all soil vapor samples, with the highest concentrations observed on the western part of the area.

AOC 4 Area I

Groundwater

- PFOA and PFOS exceeded the PFAS Guidance Values in all monitoring wells. 1,4-Dioxane exceeded the New York State drinking water MCL at monitoring well I-MW105.

Soil Vapor

- CVOCs including carbon tetrachloride, cis-1,2-dichloroethene, PCE, and vinyl chloride were detected in three of five soil vapor samples. CVOCs were not detected in the two most centrally located soil vapor samples.

AOC 4 Area J

Groundwater

- PFOA and PFOS exceeded the PFAS Guidance Values in J-MW102.

Soil Vapor

- CVOCs including methylene chloride, TCE, PCE, and vinyl chloride were detected in both soil vapor samples.

AOC 4 Area K

Groundwater

- PFOA and PFOS were detected at concentrations above the PFAS Guidance Values in all monitoring wells except K-MW101 in the northeast corner of the area. 1,4-Dioxane was detected at a concentration above the New York State drinking water MCL at monitoring well K-MW103.

Soil Vapor

- CVOCs carbon tetrachloride, cis-1,2-DCE, methylene chloride, PCE, TCE, vinyl chloride including were detected in all soil vapor samples except K-SV103 centrally located in the area.

AOC 4 Conclusions

Based on the RI data, impacts to OU-2 are consistent with petroleum and previous automotive uses. Adjoining and surrounding uses include various automotive repair and wrecking facilities, junkyards, filling stations, small industrial facilities and other similar businesses. These adjoining and surrounding uses may be impacting OU-2 in conjunction with historical on-site uses.

No on-site source of PFAS were identified in soil. PFAS impacts to groundwater are attributed to on- and/or off-site sources.

Multiple samples had 1,4-dioxane concentrations above the drinking water MCL. 1,4-Dioxane was not detected in on-site soil. 1,4-Dioxane was historically used as a stabilizer of chlorinated solvents, primarily 1,1,1-TCA. 1,1,1-TCA was detected in soil, but below the UU SCO. The presence of 1,4-dioxane may be attributable to on- and off-site sources.

2.3.3 Nature and Extent of Contamination

This section evaluates the nature and extent of soil, groundwater, and soil vapor contamination as derived from a combination of field observations and analytical data that were discussed in the RIR.

2.3.3.1 Soil Contamination

Soil sample analytical result maps from the RI are included as Figures 3A through 3K.

Historic Fill

Contaminants related to historic fill include SVOCs, PCBs, pesticides, metals, PFOA, and PFOS. Historic fill is present across OU-2 directly beneath surface cover (in areas covered by asphalt, concrete, or vegetative cover) to depths ranging from about 5 to 21.5 feet bgs. Soil samples collected from the historic fill layer contained concentrations of SVOCs (including m&p cresol, o-cresol, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, chrysene, dibenzo[a,h]anthracene, fluoranthene, hexachlorobenzene, indeno[1,2,3-c,d]pyrene, naphthalene, phenanthrene, phenol, and pyrene) above UU, PGW, and/or RR SCOs. Soil samples contained concentrations of metals (including arsenic, barium, cadmium, hexavalent chromium, trivalent chromium, copper, lead, manganese, mercury, nickel, selenium, silver, and zinc) above the UU, PGW, and/or RR SCOs. Concentrations of lead and chromium above USEPA Maximum Concentration of Contaminants for the Toxicity Characteristic were identified in Areas E, F, G, and J. Total PCBs were identified at concentrations above the UU, PGW and/or RR SCOs. Pesticides were not detected at concentrations above RR SCOs. Note that no standards for PFAS in soil currently exist in New York State; however, NYSDEC published soil guidance values for PFOA and PFOS in October 2020. Two PFAS compounds, PFOS and PFOA were detected above the UU guidance values.

Petroleum-Related Contamination

Petroleum impacts are ubiquitous across OU-2, exhibited by visual, olfactory, and analytical evidence in soil. Petroleum-related observations, including PID measurements up to 1,591 ppm, odors, sheen, and staining were observed at various depths from as shallow as surface grade down to 22 feet bgs. Petroleum-related VOCs (e.g., BTEX) and SVOCs were detected at concentrations exceeding UU, PGW, and/or RR SCOs.

During soil logging, LNAPL was observed in seven localized areas near the following borings:

- E-EP115 – Southwestern corner of Area E. Laboratory TPH identification analysis found that the sample resembled hydraulic fluid.
- E-SB103 – Northeastern corner of Area E. Laboratory TPH identification analysis found that the sample resembled hydraulic fluid.
- G-EP120 – Eastern part of Area G. Laboratory TPH identification analysis found that the sample resembled weathered diesel.
- H-SB115 – Western part of Area H. Laboratory TPH identification analysis (from delineation boring H-SB115SE2) found that the sample resembled heavy mineral oil.
- I-SB106 – Northwestern part of Area I. Laboratory TPH identification analysis found that the sample resembled hydraulic fluid with possible kerosene range organics.
- I-EP108 – Southern part of Area I. TPH identification analysis was not performed.
- J-EP112 – Southeastern part of Area J. Laboratory TPH identification analysis found that the sample resembled motor oil.

Based on the presence of LNAPL in delineation borings up to the OU-2 boundary, petroleum contamination is presumed to be present offsite to the north and south of Area I, and to the east of Area J.

CVOC Contamination

CVOCs including 1,1-DCE, 1,1,1-TCA, cis-1,2-DCE, carbon tetrachloride, methylene chloride, TCE, PCE, and vinyl chloride were detected in soil vapor samples, but were not detected in soil at concentrations exceeding RR SCOs nor in groundwater above SGVs. Isolated CVOC concentrations including methylene chloride, vinyl chloride, cis-1,2-DCE, and/or TCE above UU and PGW SCOs were detected on Areas F, H, and J in the following general areas: Near the southern boundary of Area F about 9 to 11 feet bgs, near the southwestern corner of Area H about 6 to 8 feet bgs, and on the eastern boundary of Area J about 17 to 18 feet bgs.

2.3.3.2 Groundwater Contamination

Groundwater sample analytical results maps are included as Figures 4A through 4G.

Historic Fill Contamination

SVOCs (including polycyclic aromatic hydrocarbons [PAHs], m&p cresol, o-cresol, and phenol), mercury, lead, and arsenic at concentrations above the NYSDEC SGVs may be attributed to historic fill quality and/or historical automotive industrial uses at OU-2.

Petroleum-Related Contamination

Petroleum-contaminated groundwater was observed intermittently throughout OU-2 in the following general areas:

- Northern part of Area E: Petroleum-related VOCs were detected in groundwater at concentrations above the NYSDEC SGVs in E-MW102 and LNAPL was observed in E-MW103.
- Eastern and southeastern part of Area F: Petroleum-related VOCs were detected in groundwater at concentrations above the NYSDEC SGVs in F-MW103, F-MW106, and F-MW110.
- Eastern part of Area G: Petroleum-related VOCs were detected in groundwater at concentrations above the NYSDEC SGVs in G-MW109.
- Western part of Area H: Petroleum-related VOCs were detected in groundwater at concentrations above the NYSDEC SGVs and petroleum-like odors and sheen were observed during purging and sampling in H-MW103.
- Northern part of Area I: Petroleum-related VOCs were detected in groundwater at concentrations above the NYSDEC SGVs in I-MW101.
- Area J: Petroleum-related VOCs were detected in groundwater at concentrations above the NYSDEC SGVs in J-MW101 and J-MW102, LNAPL was observed in J-MW112, and petroleum-like odors and sheen were observed during purging and sampling in J-MW102.
- Southern part of Area K: Petroleum-related VOCs were detected in groundwater at concentrations above the NYSDEC SGVs in K-MW103, K-MW104, and K-MW105.

The presence of LNAPL, petroleum-related VOCs and SVOCs detected in groundwater, and/or other potential off-site sources are contributing to the petroleum-related contamination found in groundwater across OU-2.

CVOC Contamination

CVOCs were not detected at concentrations above the NYSDEC SGVs. 1,4-Dioxane is not considered a CVOC, but is often associated with CVOCs for its use as a solvent stabilizer. 1,4-Dioxane was not detected in any soil samples collected during the RI, but was detected at concentrations marginally above its drinking water MCL in 5 isolated monitoring wells located in Areas E, F, I, and K. The presence of 1,4-dioxane is likely attributed to regional groundwater quality, on-site historical uses, and/or unknown off-site sources.

Regional Groundwater Quality

Iron, magnesium, manganese, selenium, and sodium, which were detected at concentrations above the NYSDEC SGVs in one or more samples, have been identified as regional contaminants in groundwater throughout NYC and are not considered indicative of a release. PFAS concentrations above PFAS Guidance Values may be primarily attributed unknown off-site sources that are creating a regional condition and, in the absence of soil PFAS concentrations above RR guidance values, are not considered contaminants of concern.

2.3.3.3 Soil Vapor Contamination

Soil vapor sample analytical results maps are included as Figures 5A through 5G.

Total VOC concentrations ranged from about 79.3 µg/m^3 at I-SV101 to 217,318 µg/m^3 at F-SV110. The analytical results indicate that soil vapor site-wide is impacted by historical automotive site uses, former PBS, and/or off-site sources. As reflected by the concentration range in the soil vapor analytical results, soil vapor impacts are subject to a high degree of variability, which is consistent with the variability in the former on-site uses. Although a direct comparison of soil vapor concentrations cannot be made, multiple CVOCs including cis-1,2-DCE, 1,1-DCE, TCE, PCE, and vinyl chloride were detected at a concentration at which the NYSDOH Decision Matrices recommend 'no further action' to 'mitigate', depending on indoor concentrations. The identified CVOCs were commonly used as degreasers in the automotive industry. Other identified petroleum-related compounds such as cyclohexane, n-heptane, and n-hexane are also commonly used in the automotive industry. Methane was analyzed in one soil vapor sample per sampling area and detected in every one. Field screening detected methane in 25 of the 44 vapor points across OU-2 and is considered to be present site-wide.

2.4 Qualitative Human Health Exposure Assessment

Based on the CSM and review of environmental data, complete on-site exposure pathways appear to be present in the absence of protective measures and remediation. The complete exposure pathways indicate there is a risk of exposure to humans from site contaminants via exposure to soil, groundwater, and soil vapor for current and construction conditions.

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 OU-2 is provided below.

2.4.1 Current Conditions

Human exposure to contaminated soil is limited as OU-2 is vacant and remains partially improved with a competent cover (i.e., asphalt and concrete). In localized areas where human exposure to contaminated soil is possible, the potential exposure pathway for dermal absorption, inhalation, and ingestion is controlled by limiting site access and through implementation of a Health and Safety Plan (HASP) by those handling site media (i.e., investigation and remediation activities).

Because groundwater in New York City is not used as a potable water source, there is no complete exposure pathway under current site conditions. There is a potential exposure pathway through dermal absorption, inhalation, or ingestion during heavy rain events when OU-2 floods and the water table rises in pervious areas or during investigative groundwater sampling or construction dewatering, but it is controlled by limiting site access and through the implementation of the HASP during ground-intrusive work.

Because OU-2 is vacant and has no enclosed spaces, there are minimal exposure pathways for soil vapor intrusion. Soil vapor that may penetrate through the unpaved surface or through cracks or perforations in the paved areas of OU-2 primarily migrates vertically through the subsurface and will dissipate and dilute with ambient air. Any remaining potential exposure pathways through dermal absorption and inhalation is controlled by limiting site access and through the implementation of a HASP during ground-intrusive work.

2.4.2 Construction/Remediation Activities

During remedial construction, points of exposure include soil exposed during excavation, dust and organic vapors generated during excavation and off-site disposal, and contaminated groundwater exposed during dewatering. Routes of exposure include ingestion and dermal absorption of contaminated soil and groundwater, inhalation of organic vapors arising from contaminated soil and groundwater, and inhalation of dust arising from contaminated soil. The receptor population includes construction and remediation workers and, to a lesser extent, the public adjacent to OU-2.

The potential for completed exposure pathways is present since all five exposure pathway elements exist; however, the risk will be minimized by limiting site access and through implementation of appropriate health and safety measures, such as monitoring the air for organic vapors and dust, using vapor and dust suppression measures, cleaning truck undercarriages before they leave OU-2 to prevent off-site soil tracking, maintaining site security, and wearing the appropriate personal protective equipment.

2.4.3 Proposed Future Conditions

Remedial construction is expected to address source material and many on-site contaminants. After construction, residual contaminants may remain on-site if a Track 1 cleanup is not implemented, and to a lesser extent, would include those listed under current conditions. Contaminant release and transport mechanisms include penetrations through any remaining exposed soil. If protective measures and remediation are not implemented, points of exposure would include exposure during any future soil-disturbing activities. Routes of exposure may include inhalation of vapors or dust during any soil-disturbing work. Potential methane accumulation in potential future site structures is an explosion and oxygen displacement hazard. The receptor population will include the building tenants, property employees, visitors, and maintenance workers. The possible routes of exposure could be avoided or mitigated by proper installation of soil vapor mitigation systems and measures, construction and maintenance of a composite cover system (i.e., minimum of 2 feet of clean fill or gravel), and implementation of a Site Management Plan (SMP).

2.4.4 Human Health Exposure Assessment Conclusions

- Under current conditions, there is a marginal risk for exposure. The primary exposure pathways are for dermal contact, ingestion, and inhalation of soil, groundwater, or soil vapor by site construction and remediation workers. The exposure risks can be avoided or minimized by limiting site access and implementing the appropriate health and safety and vapor and dust suppression measures outlined in a site-specific HASP and CAMP during ground-intrusive activities.
- In the absence of protective measures, there is a moderate risk of exposure during the construction and remediation activities. The primary exposure pathways are:
    - Dermal contact, ingestion, and inhalation of contaminated soil, groundwater, or soil vapor by site visitors and construction and remediation workers; and
    - Dermal contact, ingestion, and inhalation of soil (dust) and inhalation of soil vapor by the community in the vicinity of OU-2.

  These exposure pathways can be avoided or minimized by performing CAMP, following the appropriate health and safety plans, implementing vapor and dust suppression techniques, and using site security to control access.
- A complete exposure pathway is possible for the migration of site contaminants to off-site human receptors during the remedial construction phase. During this phase, site access will be limited to authorized visitors and workers and protective measures will be used during construction to prevent completion of this pathway, including following a site-specific HASP and implementation of a CAMP.
- The existence of a complete exposure pathway for site contaminants to human receptors during proposed future conditions is unlikely, as the on-site areas of contamination source material will be excavated and transported for off-site disposal. Residual site soil will be capped by a composite cover (i.e., minimum of 2 feet of clean fill or gravel). Regional groundwater is not used as a potable water source in New York City. Dewatering is not anticipated; however, if needed, construction dewatering fluids will be pre-treated and discharged off site in accordance with appropriate permits. The potential pathway for soil vapor intrusion into future buildings will be minimized because future buildings will have a vapor mitigation system (e.g. sub-slab depressurization system and/or a waterproofing/vapor barrier membrane) beneath the foundation slab and will be managed under the SMP.

2.5 Significant Threat

The NYSDEC and NYSDOH have determined that OU-2 does not pose a significant threat to human health and the environment.

2.6 Remedial Action Objectives

Based on the results of the RI and previous investigation data, the following Remedial Action Objectives (RAOs) have been identified:

2.6.1 Soil

RAOs for Public Health Protection:

- Prevent ingestion/direct contact with contaminated soil
- Prevent inhalation of, or exposure to, 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

2.6.2 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 groundwater aquifer to pre-disposal/pre-release conditions, to the extent practicable
- Remove site source(s) of groundwater contamination

2.6.3 Soil Vapor

RAOs for Public Health Protection:

- Mitigate the risk of impacts to public health resulting from existing, or the potential for, soil vapor intrusion into building(s) at OU-2

3.0 DESCRIPTION OF REMEDIAL ACTION PLAN

This section presents an analysis of the proposed remedial alternatives that can potentially be achieved under the BCP. The proposed SCOs under Alternative I would be the Part 375 UU SCOs under a Track 1 cleanup. Alternative II would utilize RR SCOs under a Track 4 cleanup. Both alternatives would achieve the established RAOs. SCOs for Alternatives I and II are presented in Tables 6 and 7, respectively. The alternatives are described and analyzed below. Following evaluation, Alternative II was selected as the preferred remedy.

3.1 Standards, Criteria and Guidance

In accordance with ECL § 27-1415 and DER-10, the objectives of the remedial action are to: (1) reduce the concentrations of contaminants of concern at OU-2 to meet those levels that will protect public health and the environment, and (2) isolate OU-2 from migration of contaminated groundwater and soil vapor from potential on-site sources. In accordance with DER-10, the Volunteer will have no remedial responsibilities with respect to groundwater contamination migrating under OU-2 from an off-site source outside of BCP Site C241146; however, remedial alternatives will be developed that eliminate or mitigate on-site environmental impacts or human exposures, to the extent practical, resulting from off-site contamination. Where identifiable on-site sources of contamination are found, the sources will be removed or treated to the extent practical.

Also in accordance with DER-10, the RAOs for this site are defined as medium-specific objectives for the protection of public health and the environment and are developed based on contaminant-specific standards, criteria, and guidance (SCG).

The SCGs for OU-2 include:

- NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation (issued May 3, 2010, latest update April 9, 2019);
- NYSDEC DER-23 Citizen Participation Handbook for Remedial Programs (March 2010);
- NYSDEC DER-32 Brownfield Cleanup Program Applications and Agreements (June 2017);
- NYSDEC TOGS 1.1.1 – Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations (1998);
- NYSDEC TOGS 5.1.8 – New York State Stormwater Management Design Manual (2008);
- NYSDEC TOGS 5.1.10 – New York Standards and Specifications for Erosion and Sediment Controls (2005);
- NYSDEC CP-51 - Soil Cleanup Guidance (2010);
- NYSDEC CP-43 Groundwater Monitoring Well Decommissioning Policy (2009);

- NYSDOH – Guidance for Evaluating Soil Vapor Intrusions in the State of New York (2006) and subsequent updates;
- Title 10 of the Official Compilation of Codes, Rules and Regulations of the State of New York, Chapter 1, Part 5-1 – Drinking Water Supplies, Public Water Systems;
- 6 NYCRR Part 360 – General Provisions;
- 6 NYCRR Part 364 – Waste Transporter Permits;
- 6 NYCRR Part 370 – Hazardous Waste Management System;
- 6 NYCRR Part 375 – Environmental Remediation Programs;
- 6 NYCRR Part 376 – Land Disposal Restrictions;
- 6 NYCRR Part 700-706 – Surface Water and Groundwater Classification Standards;
- 6 NYCRR Part 750 – State Pollutant Discharge Elimination System (SPDES) Regulations;
- Code of Federal Regulations (CFR) Title 29 Part 1910.120 – Hazardous Waste Operations and Emergency Response Standard;
- CFR Title 29 Part 1926 – Safety and Health Regulations for Construction;
- NYSDEC Spill Response Guidance Manual; and
- NYSDEC Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances Under NYSDEC's Part 375 Remedial Programs (June 2021).

3.2 Technical Description of Alternative I – Track 1 Cleanup

Alternative I, a Track 1 cleanup, would include the following tasks:

- Development and implementation of plans for the protection of on-site workers, the community, and the environment including a construction health and safety plan (CHASP) and CAMP during remediation and construction activities
- Implementation of a preliminary waste characterization, including advanced delineation of hazardous chromium and lead soil, to facilitate off-site disposal of excavated soil/fill
- Abatement of hazardous building materials and subsequent demolition of the remaining buildings/structures as a prerequisite to remediation
- Implementation of soil erosion, pollution, and sediment control measures in compliance with applicable laws and regulations
- Protection of monitoring and recovery wells to be retrofitted to remediation grade, or decommissioning and reinstallation of monitoring and recovery wells
- Clearing and grubbing of vegetation, surface debris/refuse, residual foundations, and former roadways as a prerequisite to remediation

- Protection or decommissioning/removal/abandonment of above- and below-grade telecommunication, electrical, stormwater collection, and potable water utilities
- Construction of the support of excavation (SOE) system to facilitate excavation of soil/fill that exceeds the UU SCOs
- Dewatering and groundwater treatment, as necessary, to facilitate the removal of soil/fill that exceeds UU SCOs
- Completion of in-situ groundwater treatment via chemical injections or other methods (including any requisite pre-design investigation and treatability studies), where needed in petroleum source areas based on a Remedial Design
- Excavation, stockpiling, off-site transport, and disposal of fill and soil that exceeds UU SCOs as defined by 6 NYCRR Part 375-6.8
- Removal, decommissioning, and off-site disposal of any encountered USTs and/or associated appurtenances (e.g., fill lines, vent line, and electrical conduit) in accordance with DER-10, 6 NYCRR Part 613.9, NYSDEC CP-51, and other applicable NYSDEC UST closure requirements
- Screening for indications of contamination (by visual means, odor, and monitoring with PIDs) of excavated soil/fill during intrusive site work
- Appropriate off-site disposal of soil/fill removed from OU-2 in accordance with federal, state, and local rules and regulations for handling, transport, and disposal
- Collection and analysis of confirmation soil samples from the excavation base and, to the extent possible, sidewalls of the excavation, in accordance with DER-10 to confirm Track 1: UU SCOs were achieved
- Backfilling of remedial excavation with certified-clean soil/fill meeting Track 1: UU SCOs or virgin crushed stone

The Alternative I extent is based on data presented in the RIR. The requirements for each of the Alternative I tasks are described below.

3.2.1 On-Site Worker, Public Health, and Environmental Protection

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

3.2.2 Support of Excavation

To accommodate removal of soil that exceeds UU SCOs, an SOE system would be constructed. Excavation would extend below the water table across the OU-2 footprint. A sheet pile wall would be constructed around the OU-2 perimeter to facilitate soil excavation and dewatering. To mitigate the possibility of contaminant migration after the remedy is complete, the sheet pile wall would require an infiltration rate of 10^{-6} centimeter/second or less across the barrier to mitigate the potential for source material migration onto OU-2 from an offsite source. To achieve this, the sheet pile wall would have sealed seams (i.e., Adeka UltraSeal® P-201A hydrophilic sealant). Additional SOE to support hot-spot excavation areas throughout OU-2 may be constructed, as necessary.

3.2.3 Dewatering

Dewatering would be required to achieve Track 1: UU SCO cleanup. The dewatering system and treatment parameters would be designed and implemented by a dewatering contractor. Following treatment, dewatering effluent would be discharged to the NYC stormwater sewer system. Verification sampling would be conducted in accordance with a SPDES permit, obtained by the dewatering contractor. At a minimum, the dewatering treatment system is anticipated to include a settling tank. Inclusion of bag filters and carbon units in the treatment train prior to off-site discharge is likely and would be determined during preparation of the SPDES permit application. A copy of the SPDES permit and final dewatering system design would be provided to NYSDEC prior to the start of dewatering. The dewatering system is anticipated to operate continuously for the duration of the remedial action. All blocks within OU-2 except for a portion of Block 1820 (Area K) would be subject to dewatering during remedial excavation activities to manage groundwater and precipitation.

3.2.4 In-Situ Groundwater Treatment

In the event that remedial excavation and substantial dewatering (pump and treat) system do not decrease contaminant levels in groundwater to meet Class GA standards or asymptotic conditions, additional groundwater treatment measures would be considered. If additional treatment measures are required, a Remedial Design would be prepared and submitted to the NYSDEC and NYSDOH for review and approval. Depending on the concentrations remaining in site groundwater, remedial measures may include in-situ remedial measures (e.g., chemical oxidation, activated carbon, bioremediation). The Remedial Design would detail the groundwater treatment program including the pre-design investigation and subsequent treatment plan.

3.2.5 Fill and Soil Removal

VOCs, SVOCs, pesticides, PCBs, metals, TCLP metals, and emerging contaminants (PFAS) were detected at concentrations that exceed the UU SCOs and guidance values. To achieve a Track 1 cleanup, soil removal and disposal would extend from surface grade to varying depths of up to

19 feet bgs. The estimated volume of soil/fill requiring removal and off-site disposal for a Track 1 cleanup is about 322,000± cubic yards.

3.2.6 UST System Removal

Any USTs encountered during remedial excavation would be decommissioned in accordance with applicable NYSDEC tank closure requirements, including DER-10 Section 5.5, 6 NYCRR Part 613.9, and NYSDEC CP-51. USTs and/or associated appurtenances would be registered and administratively closed with the NYSDEC petroleum bulk storage (PBS) unit. Petroleum-impacted soil, if encountered, would be excavated, stockpiled separately, characterized, and removed for off-site disposal at a permitted disposal facility in accordance with applicable regulations. If the area-wide remedial excavation would not extend beyond the bottom of the encountered tank, additional confirmation soil samples under the tank excavation would be collected as required.

3.2.7 Confirmation Soil Sampling

Confirmation soil samples would be collected from the excavation base at a frequency of one per 900 square feet and from excavation sidewalls at a frequency of one per 30 linear-feet, in accordance with DER-10 unless otherwise approved by the NYSDEC. Sidewall samples would be collected from the vertical midpoint of any excavation sidewall that is not obstructed by SOE. An estimated 732 base confirmation soil samples, plus quality assurance/ quality control (QA/QC) samples, would be collected to confirm remedial performance and would be analyzed for the Part 375 list of VOCs, SVOCs, PCBs, pesticides, cyanide, and metals (including hexavalent and trivalent chromium), 1,4-dioxane and PFAS compounds.

3.2.8 Excavation Backfill

Imported fill would be limited to clean fill that meets the Track 1: UU SCOs or other acceptable fill such as virgin stone from a quarry. The top 4 inches would consist of virgin ¾-inch crushed stone to serve as dust and vegetation suppression and mitigate erosion.

3.3 Technical Description of Alternative II – Track 4 Cleanup

Alternative II, a Track 4 cleanup, would include the following tasks:

- Implementation of plans for the protection of on-site workers, the community, and the environment including a Construction Health and Safety Plan (CHASP) and CAMP during remediation and construction activities
- Establishment of Track 4 SCOs, which include NYSDEC Part 375-list RR SCOs
- Implementation of a preliminary waste characterization, including delineation of hazardous chromium and lead soil, to facilitate off-site disposal of excavated soil/fill

- As a pre-requisite to site remediation, abatement of hazardous building materials (including asbestos-containing material [ACM], lead-based paint [LBP], or other universal waste), demolition and removal of remnant foundation and roadways, clearing and grubbing of vegetation, and surface debris/refuse removal by the contractor as hazardous waste or construction and demolition (C&D) debris in accordance with Part 360 and 361 regulations - Review and certification of hazardous building materials and C&D and refuse transport and disposal methodologies is not a requirement of the Remediation Engineer (RE). The RE is responsible for documenting that C&D debris and refuse is not comingled with contaminated site soil and fill.
- Implementation of soil erosion, pollution, and sediment control measures in compliance with applicable laws and regulations
- Protection of monitoring and recovery wells to be retrofitted to remediation grade, or decommissioning and reinstallation of monitoring and recovery wells
- Protection or decommissioning/removal/abandonment of above- and below-grade telecommunication, electrical, stormwater collection, and potable water utilities
- Construction of support of excavation (SOE) systems to facilitate the Track 4: RR SCO cleanup in source area excavations
- Construction of a groundwater containment cutoff wall consisting of sealed-seam steel sheet piles along the northern and eastern boundaries of Block 1833, Lots 155 and 172 to mitigate recontamination from off-site sources
- Completion of in-situ groundwater treatment via direct mixing in the northern part of Area I and the eastern part of Area J
- Excavation and stockpiling of fill and soil contamination source areas (fill and soil creating nuisance conditions or that is grossly-impacted)in the following areas:
    - Area E: approximately 3,500 cubic yards (up to 5 feet bgs)
    - Area G: approximately 500 cubic yards (up to 6 feet bgs)
    - Area H: approximately 1,800 cubic yards (up to 8 feet bgs)
    - Area I: approximately 3,800 cubic yards (up to 8.5 feet bgs)
    - Area J: approximately 5,300 cubic yards (up to 8 feet bgs)
- Excavation and stockpiling of all soil and fill exceeding RR SCOs in the upper 2 feet across the entire site
- Removal, decommissioning, and off-site disposal of any encountered underground storage tanks (UST) and/or associated appurtenances (e.g., fill lines, vent line, and electrical conduit) in accordance with DER-10, 6 NYCRR Part 613.9, NYSDEC CP-51, and other applicable NYSDEC UST closure requirements

- Screening for indications of contamination (by visual means, odor, and monitoring with PIDs) of excavated soil/fill during intrusive site work
- Appropriate off-site disposal of excavated soil/fill in accordance with federal, state, and local rules and regulations for handling, transport, and disposal
- Collection and analysis of documentation soil samples from the excavation base and, to the extent possible, sidewalls of the excavation in accordance with DER-10, to document post-excavation conditions in relation to Track 4 RR SCOs
- Placement of a physical demarcation layer where contamination remains, consisting of orange snow fencing or equivalent material at the excavation bottom prior to backfilling.
- Post-excavation groundwater monitoring to assess the effectiveness of the remedy in five monitoring/recovery wells (recovery wells E-RW202 and E-RW105 in Area E, monitoring well I-MW101 in Area I, and monitoring wells J-MW117 and J-MW118 in Area J) and in the in-situ groundwater treatment area discussed above.
- Backfilling of areas requiring more than 2 feet of remedial excavation with certified-clean fill (i.e., fill meeting the lower of Protection of Groundwater (PGW) and RR SCOs), recycled concrete aggregate (RCA), or virgin crushed stone
- Capping of site-wide excavated areas with an engineered composite cover system consisting of at least 2 feet of certified-clean fill (i.e., fill meeting the lower of PGW and RR SCOs), with the top 4 inches composed of ¾-inch virgin crushed stone
- Establishment of an NYSDEC-approved SMP to provide for long-term management of ECs and ICs, including the performance of periodic inspections and certification that the controls are performing as they were intended, and inclusion of a requirement in the SMP to evaluate future proposed structures on OU-2 for soil vapor intrusion
- Recording of an Environmental Easement to establish use restrictions including prohibitions on the use of groundwater and to memorialize the ECs and ICs to mandate that future owners of OU-2 continue to maintain these controls as required

The Alternative II remediation extents are shown on Figures 7A through 7G. The requirements for each of the Alternative II tasks are described below.

3.3.1 On-Site Worker, Public Health, and Environmental Protection

A site-specific CHASP would be enforced during remedial excavation and cover system construction to protect on-site workers from accidents and acute and chronic exposures related to the identified contaminated media. Public health would be protected by implementing and enforcing dust, odor, and organic vapor control and monitoring procedures included in the CAMP. The CAMP would include continuous perimeter monitoring of dust and organic vapor using DustTrak aerosol monitors and PIDs capable of recording data and calculating 15-minute

averages. Field personnel would monitor site perimeters for visible dust and odors. The environment would be protected by implementing and enforcing the appropriate soil erosion prevention measures.

3.3.2 Support of Excavation

An SOE system would be constructed to accommodate removal of petroleum-impacted soil across OU-2. Source area excavations extending beyond the 2-foot site-wide cut that do not adjoin site boundaries would be sloped at a maximum of 1:1 slope. Where sloping is not possible because excavation extends to the OU-2 boundary, soldier piles and timber lagging, or an equivalent system, would be constructed. Soldier piles and timber lagging are expected to be required in Area I and Area J along the adjoining public right of ways and properties. In Area I at the boundary of Block 1822, Lot 7, the SOE must be placed 2-feet inside of the OU-2 property boundary for the safety and protection of the neighboring property. Additional SOE to support petroleum-impacted soil excavation areas throughout OU-2 may be constructed, as necessary.

3.3.3 Dewatering

Bulk dewatering is not anticipated to be required to achieve Track 4 cleanup. Localized dewatering may be necessary to manage accumulated precipitation or elevated groundwater table conditions.

3.3.4 Groundwater Containment Cutoff Wall

Based on the presence of petroleum non-aqueous phase liquid (NAPL) on Block 1833 (Area J) and the possibility of migration from presumed sources to the east, a groundwater containment cutoff wall will be installed at least 2 feet above groundwater to at least 1 foot into the confining organic material/clay layer that exists across OU-2. Design groundwater elevation is el. 5 with seasonal fluctuation up to el. 6 on Block 1833 (Area J). At J-EP112, clay was encountered at about el. –8. As such, the groundwater containment cutoff wall will extend 25 feet bgs, corresponding to elevations between –11.5 and el. –15.. The wall would require an infiltration rate of 10^{-6} centimeter/second or less across the barrier to mitigate the potential for source material migration from an offsite source. To achieve the watertight performance requirement, a sheet pile wall with sealed seams (i.e., Adeka UltraSeal® P-201A hydrophilic sealant) will be installed along parts of the northern and eastern boundaries of Block 1833, Lots 155 and 172. The joint between the proposed groundwater containment cutoff wall and the existing OU-1 groundwater containment cutoff wall will be sealed with a grout bulb or other equivalent watertight method.

A groundwater flow model was generated using Groundwater Modeling System v10.4 software platform running MODFLOW2000 and particle tracking software MODPATH to estimate groundwater flow and therefore conservatively estimate, in the absence of a groundwater containment cutoff wall, LNAPL migration throughout OU-2 and from the adjoining properties.

Based on model results, a groundwater containment cutoff wall length of 300 feet along the northern boundary of Block 1833, Lots 155 and 172 (Area J), and 210 feet along the eastern boundary of Block 1833, Lot 155 (Area J), was determined to mitigate product migration onto OU-2. The approximate extents of the groundwater containment cutoff wall are shown on Figure 7F. The groundwater flow model is included in Appendix C.

3.3.5 In-Situ Groundwater Treatment

The remedy includes implementation of an in-situ remedy after source material excavation to achieve groundwater RAOs. The following section details the planned treatment areas and dosage calculations. The on-site groundwater treatment objective is plume containment/stabilization to prevent, to the extent feasible, the migration of groundwater plume, consistent with the NYSDEC Program Policy DER-10: Technical Guidance for Site Investigation and Remediation (DER-10).

In-Situ Treatment Area

Based on RI data, in-situ groundwater treatment will be required within the northern part of Area I, and in the eastern part of Area J to achieve the groundwater RAOs. The in-situ groundwater treatment areas represent the anticipated areas of residual impacts left in place following source material excavation. Residual impacts will be addressed by direct in-situ mixing of remediation products into the saturated soil and groundwater at the bottom of excavation. As described in previous sections of this report, source material excavation of grossly-impacted soil exhibiting petroleum-like impacts will extend to about 1 foot below the groundwater table in the two source area excavations in Area I and Area J. In Areas I and J, groundwater table depths ranged from about 3.30 to 11.89 feet bgs (groundwater table elevations ranged from about el 4.81 to 7.01 NAVD88). Excavation depths in the treatment areas will extend up to 8.5 bgs, depending on the depth at which the groundwater table is encountered. The proposed in-situ treatment areas are the 7,000 square foot base of the source removal excavation in Area I shown on Figure 8E and the 12,500 square foot base of the source removal excavation in Area J shown on Figure 8F.

Pre-Design Investigation, Reagent Selection and Demand

Concurrent with the waste characterization, a pre-design investigation was conducted between February 25 and March 4, 2022 that consisted of analysis of one soil sample and one groundwater sample per treatment area. The soil samples were analyzed for soil oxidant demand (SOD), TPH DRO, and TPH GRO. The groundwater samples were analyzed for TPH DRO and TPH GRO. Following the completion of a pre-design investigation, sample results were submitted to the remediation contractor (REGENESIS, of San Clemente, California) to finalize the design and dosage requirements for the in situ groundwater treatment.

Following excavation and collection of documentation soil samples, the remediation contractor will apply PetroFix™, a water-based suspension fluid of micron-scale activated carbon and

biostimulating electron acceptors, to the open excavations prior to backfilling. PetroFix™, developed by REGENESIS, remediates hydrocarbons from the dissolved phase by absorbing them to activated carbon particles and stimulating anaerobic hydrocarbon biodegradation with added electron acceptors. The in-situ groundwater treatment plan proposed by REGENESIS is included in Appendix D.

The remediation contractor will procure PetroFix™ in 2,000-pound (lb) (275-gallon) totes and/or 400-lb (55-gallon) poly drums. The electron acceptor blend is a powder that will be provided in 20-lb pails. Based on a proposal prepared by REGENESIS, 10,400 lbs of PetroFix™ and 520 lbs of electron acceptor blend will be applied to the open excavation to achieve a sustained reduction in dissolved-phase petroleum compounds. In Area I, the proposed dosage is 5.1 pounds per cubic yard (lbs/yd^3) of saturated soil. In Area J, the proposed dosage is 4.6 lbs/yd^3 of saturated soil.

Field Implementation

PetroFix™ will be either pumped into or sprayed across the excavation area base (about 1 to 2 feet below the groundwater table) in accordance with manufacturer specifications. Dilution is not required for application directly on standing groundwater, but a water source will be necessary to rinse the shipping containers to ensure all of the PetroFix™ liquid has been applied to the In-Situ Treatment Area. The electron acceptor blend will then be applied separately to the excavation base; the electron acceptor powder should not be directly mixed into the PetroFix™ liquid to avoid clumping and improper distribution of the powder. Application of the powdered electron acceptor should be done with care to avoid inhalation.

Once PetroFix™ and the powdered electron accepter have been applied, an excavator will be used to mechanically mix the products with standing groundwater and saturated soil within the upper one foot of the base of the excavation, using standard excavator attachments such as a bucket, auger, or rotary tool. Standing water must be present in the base of the excavation for this application method, or dilution of the PetroFix™ will be required as specified in the manufacturer specifications. The REGENESIS dosing calculations, excavation application guidance, Safety Data Sheets (SDS) for PetroFix™ and the electron acceptor blend are provided in Appendix D. The remediation contractor will provide product submittals prior to purchase and on-site implementation. The proposed excavation areas and in-situ treatment areas are provided on Figures 8E and 8F. The areas will be backfilled with imported material, subject to NYSDEC approval.

In the event that the remedial excavations and potential groundwater treatment do not achieve the groundwater RAOs, additional groundwater treatment measures would be considered.

Remedial Performance Monitoring

To document in-situ groundwater treatment performance, and following the anticipated groundwater treatment in Areas I and J, and completion of the LNAPL recovery IRM in Area E,

groundwater samples will be collected from the existing groundwater monitoring/recovery wells E-RW202, E-RW105, I-MW101, J-MW117, and J-MW118.

Prior to post-treatment sampling, the head space of each well will be monitored with a PID and an interface probe will be used to measure depth to water and thickness of LNAPL, if present. Post-treatment groundwater samples will be analyzed for Part 375 and Target Compound List (TCL)-listed VOCs and SVOCs. A duplicate, field blank, and trip blank sample will also be analyzed during each sampling event.

PetroFix™ may take a few weeks to a few months to fully attach to soils, and it is not recommended to begin post-treatment sampling until PetroFix™ concentrations in groundwater have dropped below 100 milligrams per liter (mg/L) in monitoring wells. If PetroFix™ concentrations have not subsided below this concentration, as determined by a colorimetric field test provided by REGENESIS, filtered and unfiltered groundwater samples will be collected.

Groundwater monitoring activities to assess the efficacy of the oxidant treatment and natural attenuation will continue, as determined by New York State Department of Health (NYSDOH) and NYSDEC, on a quarterly basis until residual groundwater concentrations are found to be below NYSDEC SGVs or have become asymptotic over an extended period. Monitoring will continue until permission to discontinue is granted in writing by NYSDEC and NYSDOH. Geochemical parameters (e.g., dissolved oxygen [DO], oxidation reduction potential [ORP], specific conductivity, pH, temperature, turbidity) will be recorded during sampling and results will be reported in quarterly monitoring reports. Additional detail regarding post-treatment groundwater monitoring will be outlined in the Site Management Plan (SMP). Data will be shared with NYSDEC to determine if additional treatment measures are required.

3.3.6 Fill and Soil Removal

VOCs, SVOCs, PCBs, and metals were detected at concentrations that exceed the RR SCOs. To achieve a Track 4 RR SCO cleanup, soil removal and disposal would extend from surface grade to depths of up to 8.5 feet bgs with a minimum excavation depth of 2 feet bgs (to support installation of a site-wide composite cover system). Excavation beyond 2 feet bgs and to a depth of up to 8.5 feet bgs is necessary to achieve a Track 4 cleanup in certain areas of OU-2 for the following reasons:

- Grossly contaminated soil/fill was identified and delineated during the RI and would be removed during the RAWP implementation, as depicted on Figures 7A through 7G. Excavation beyond the proposed remedial excavation extents shown on these figures, due to gross impacts observed during implementation, would be described in the Final Engineer Report (FER) as part of the remedy.

The estimated volume of soil/fill requiring removal and off-site disposal in areas being excavated to 2 feet bgs is about 46,900 cubic yards. The estimated volume of soil/fill requiring removal and off-site disposal beyond 2 feet bgs and to a depth of up to 8.5 feet bgs necessary to achieve a Track 4 cleanup in certain areas is about 14,900 cubic yards.

3.3.7 UST System Removal

Any USTs encountered during remedial excavation would be decommissioned in accordance with applicable NYSDEC tank closure requirements, including DER-10 Section 5.5, 6 NYCRR Part 613.9, and NYSDEC CP-51. USTs and/or associated appurtenances would be registered and administratively closed with the NYSDEC PBS unit. Petroleum-impacted soil, if encountered, would be excavated, stockpiled separately, characterized, and removed for off-site disposal at a permitted disposal facility in accordance with applicable regulations. If the remedial excavation does not extend beyond the bottom of the encountered tank, additional confirmation soil samples would be collected as required.

3.3.8 Documentation Soil Sampling

The proposed remedy would achieve a Track 4 cleanup. Per DER-10, documentation samples would be collected to document the soil levels achieved by the remedy and inform the SMP; confirmation endpoint soil samples are not required as part of the Track 4 cleanup. As approved by the NYSDEC in an April 28, 2022 email, documentation soil samples would be collected from the excavation base at a reduced sampling frequency of one sample per 2,000 square feet of excavation base, and one sample per 50 linear feet of sidewall. In petroleum LNAPL removal areas, documentation samples would be collected at a frequency of one sample per 900 square feet of excavation base, and one sample per 30 linear feet of sidewall. The NYSDEC correspondence is provided in Appendix E.

The sampling frequency for the OU-2 excavation areas (general excavation and petroleum source removal areas) is consistent with the NYSDEC-approved OU-1 RAWP and provided in the table below:

Sample Frequency			
Documentation Sample Type	**Number of Samples**	**Documentation Sample Type**	**Number of Samples**
General Excavation		**Petroleum LNAPL Removal Areas**	
Base of Excavation	315	Base of Excavation	44
1 Sample per 2,000 Square Feet		1 Sample per 900 Square Feet	
Excavation Sidewalls	0	Excavation Sidewalls	53
1 Sample per 50 Linear Feet		1 Sample per 30 Linear Feet	

An estimated 315 base documentation soil samples would be collected from the base remedial excavation areas (plus QA/QC samples) and an estimated 44 base documentation soil samples (plus QA/QC samples) would be collected from the petroleum LNAPL removal areas to document remedial performance. No sidewall documentation samples are expected because sidewall samples would not be collected in areas where the SOE or the contaminant cutoff wall obstructs access to sidewall soil, sidewall soil is off-site, or in areas where the slope of the excavation cut is 1:1 or less. Limited exposed vertical sidewalls that meet these criteria are anticipated based

on the current excavation plan; collection of sidewall samples is not anticipated in the base excavation areas or in petroleum source removal areas. Sidewall samples would not be collected along the OU-2 perimeter since excavations would only extend to about 2 feet and remaining soil would be outside the OU-2 boundary. Should the contractor slope down to the petroleum source removal areas (at slope greater than 1:1), then vertical sidewall samples would be collected. Collection of the sidewall samples would be determined in the field, coordinated with NYSDEC in advance, and would follow the above sampling frequency.

Documentation samples would be analyzed for the Part 375 list of VOCs, SVOCs, PCBs, pesticides, cyanide, metals (including hexavalent and trivalent chromium), 1,4-dioxane and PFAS compounds.

The proposed documentation sample locations are shown on Figures 8A through 8G.

3.3.9 Engineered Cover System and Excavation Backfill

An engineered cover system, consisting of a minimum of 2 feet of approved clean fill would be installed and left in place until potential redevelopment starts at a later date. For a soil cover system, the top 4 inches will consist of virgin ¾-inch crushed stone to serve as dust and vegetation suppression and to mitigate erosion. Imported fill for the cover system would consist of clean soil that meets the lower of PGW and RR SCOs or other acceptable fill such as virgin stone from a quarry or RCA from a properly licensed facility.

Imported fill for backfill in areas below the 2-foot cover system would consist of clean fill that meets the lower of PGW and RR SCOs or other acceptable fill such as virgin stone or RCA. RCA may not be used as general backfill without a Beneficial Use Determination (BUD).

3.3.10 Site Management Plan and Environmental Easement

An EE would be recorded that references ICs and ECs that are part of the selected remedy, which would be binding upon all subsequent owners and occupants of the property.

The ICs would:

- Restrict OU-2's use to restricted-residential, commercial, and industrial uses, although land use is subject to local zoning laws;
- Restrict the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYSDEC or NYSDOH;
- Require implementation of an NYSDEC-approved SMP;
- Require the completion and submission to the NYSDEC of a periodic certification of ICs and ECs in accordance with Part 375; and
- Include notice of use restrictions of OU-2's soil.

The ECs would be the engineered composite cover system described in this RAWP and any additional ECs established through the SMP under future site development (e.g., post groundwater monitoring and potential soil vapor intrusion mitigation measures associated with future building construction).

The SMP would identify all use restrictions, ECs, and long-term monitoring and maintenance requirements. The SMP provides a plan that, if followed, would ensure the ICs and/or ECs remain in place and are effective.

The SMP would include, but may not be limited to:

- An Excavation Work Plan, which details the provisions for management of future excavations in areas of remaining contamination;
- Descriptions of the EE provisions, including any land use, and/or groundwater use restrictions;
- Provisions for evaluation of the potential for soil vapor intrusion for any buildings developed on OU-2, including provision for implementing actions recommended to address exposures related to soil vapor intrusion (i.e., vapor barrier/waterproofing or sub-membrane depressurization system) under future site development;
- Provisions for the management and inspection of the identified ECs;
- Descriptions for maintaining site access controls and NYSDEC notification;
- The steps necessary for the periodic reviews and certification of the ICs and/or ECs; and
- A Monitoring Plan to assess the performance and effectiveness of the remedy, which includes, but may not be limited to:
    - Monitoring for vapor intrusion for any future buildings developed on OU-2, as may be required by the IC and EC Plan discussed above;
    - Monitoring for groundwater to assess the effectiveness of the remedy; and
    - A schedule of monitoring and frequency of submittals to NYSDEC.

3.4 Evaluation of Remedial Alternatives

This section is an evaluation of the proposed remedial alternatives based on the NYSDEC 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.

The criteria include:

- Overall protectiveness of the public health and the environment;
- Conformance with standards, criteria, and guidance;

- Long-term effectiveness and permanence;
- Reduction of toxicity, mobility, or volume of contamination through treatment;
- Short-term impact and effectiveness;
- Implementability;
- Cost effectiveness;
- Land use; and
- Community acceptance.

3.4.1 Overall Protectiveness of the Public Health and the Environment

Alternative I – The remedy would eliminate pathways of exposure from on-site contaminated media. A Track 1 cleanup would result in the removal of on-site soil with contaminant concentrations above UU SCOs. Excavation from 2 to 19 feet bgs would be required to remove contaminants in soil/fill above UU SCOs. Any encountered USTs would be decommissioned, removed and disposed off-site, and petroleum-impacted soil/fill, if encountered, would be excavated and disposed off-site. The RAOs for public health and environmental protection would be met through the removal of contaminated media, which would eliminate possible ingestion, inhalation, or dermal contact.

The groundwater containment cutoff wall would mitigate the risk of potential contaminated groundwater migration. Because no ECs or ICs would be required for this remedy to maintain OU-2 in the future, this remedy is the most protective of human health and the environment.

Alternative II – The remedy would mitigate pathways of exposure from on-site contaminated media. A Track 4 cleanup would result in the removal of on-site soil to the proposed remedial excavation depths shown on Figures 7A through 7G. Excavation beyond the remedial depths shown on Figures 7A through 7G would be performed if source or nuisance material is observed at the deepest planned excavation depth. An engineered cover system, consisting of a minimum of 2 feet of clean soil/fill, would be installed. Residual contaminants may remain in some areas, provided they are not a source of contamination. If needed, the dissolved- and sorbed-phase petroleum contamination in various parts of OU-2 would be remediated via in-situ groundwater treatment and the groundwater containment cutoff wall in Area J would mitigate migration of source material (NAPL). Exposure would be further limited by the establishment of an EE and 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). The potential for soil vapor intrusion would be evaluated for any potential future site structures and mitigation measures would be integrated into building design as required.

Public health would 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 would be protected by implementing and enforcing soil management controls when needed during future site excavation and any other institutional and engineering controls by implementation of the SMP and through enforcement of the EE.

3.4.2 Conformance with Standards, Criteria, and Guidance

Both Alternatives would comply with all applicable standards, criteria, and guidance listed in Section 3.1 by removing a majority of on-site sources of contamination to achieve the RAOs. During implementation of either remedy, protection of public health and the environment would be maintained by enforcing a site-specific CHASP and CAMP. Occupational Safety and Health Administration (OSHA) requirements for on-site construction safety would be followed by site contractors performing work.

3.4.3 Long-Term Effectiveness and Permanence

Alternative I – A Track 1 cleanup would remove contaminated media exceeding UU SCOs for soil from OU-2 and would meet the requirements of the NYSDOH soil vapor guidance for soil vapor. Groundwater in this area of New York City is not used for potable water. The long-term effectiveness of this remedy would eliminate risks and satisfy the objectives of this criterion.

Alternative II – A Track 4 cleanup would remove on-site soil to the proposed remedial excavation depths shown on Figures 7A through 7G. Excavation beyond the remedial depths shown on Figures 7A through 7G would be performed if source or nuisance material is observed at the deepest planned excavation depth and would include construction of an engineered cover system, in-situ groundwater treatment, and groundwater containment cutoff wall. The potential exposure pathways to residual contaminated soil and fill would be mitigated. Groundwater in this area of New York City is not used for potable water. Under the Track 4 cleanup, soil conditions would be documented and surveyed, and the long-term effectiveness and permanence of this alternative would be achieved through the implementation of the SMP and through enforcement of the EE.

3.4.4 Reduction of Toxicity, Mobility, or Volume of Contamination through Treatment

Both remedial alternatives would permanently and significantly reduce the toxicity, mobility, and volume of contamination through removal of contaminated fill and soil through excavation and off-site disposal. The groundwater containment cutoff wall would mitigate migration of source material (e.g., NAPL) from off-site sources as necessary.

3.4.5 Short-Term Impact and Effectiveness

Alternative I - The most significant short-term adverse impacts and risks to the community would include increased truck traffic relative to Alternative II and its effect on roadway and pedestrian traffic, and construction noise related to installation of SOE in areas that would not require SOE under Alternative II.

The volume of soil and fill above UU SCOs requiring excavation would require about 23,420 22-ton truck trips in addition to about 20,930 20-cubic-yard truck trips required to import clean backfill. Implementing Alternative I would require approximately 27 months of effort (assuming normal work hours). Truck traffic would be routed on the most direct course using major thoroughfares where possible and flaggers would 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 would be minimized by implementing the respective control plans.

Alternative II - Alternative II would result in similar short-term adverse impacts and risks to the community for a shorter duration than Alternative I. The excavated soil and fill would require approximately 4,495 22-ton truck trips in addition to 4,017 20-cubic yard truck trips to import clean backfill – approximately 81% fewer truck trips than Alternative I. Implementing the Alternative II concept would require approximately 15 months of effort (assuming normal work hours). The shorter implementation period would mean fewer impacts to the community, such as less truck traffic and less potential for exposure to contaminated media.

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

3.4.6 Implementability

Alternative I – Implementing a Track 1 cleanup would be technically challenging because of SOE and dewatering requirements associated with the extended excavation and protection of neighboring properties and streets. Further disruptions to the community are anticipated because completing the Alternative I remediation would likely require street and sidewalk closures and increase traffic congestion. Alternative I excavation would be conducted primarily with standard bucket excavators, and local contractors, personnel, and equipment suitable to working in a structurally challenging environment are available high due to the frequency of this type of remediation in the region. Schedule extensions and additional costs associated with removing contaminants above UU SCOs, implementing an in-situ groundwater treatment plan, and extensive dewatering are expected. Additional coordination between trades, above and beyond what is normally required for remediation, may be required. This alternative is considered feasible, but impractical and challenging to implement.

Alternative II – The technical feasibility of implementing the Alternative II remedy is greater than that of Alternative I, as an SOE system may only be required in limited areas and no dewatering

and significantly less excavation would be required to remove petroleum-impacted soil. This alternative would consist mostly of excavation with standard bucket excavators and installation of an engineered composite cover system. The availability of local contractors, personnel, and equipment suitable to working in a structurally challenging environment is high due to the frequency of this type of remediation in the region. Additional coordination between trades, above and beyond what is normally required for remediation, may be required. This alternative is considered feasible, and more practical than Alternative I.

3.4.7 Cost Effectiveness

Alternative I – The estimated remediation cost of a Track 1 cleanup is about $156.6 million (excluding additional lending and financial carrying costs incurred under this alternative). Because OU-2 would be remediated to UU SCOs, there would be no long-term operation, maintenance, or monitoring costs associated with the proposed remedy. This alternative is the most costly because of the additional time and costs associated with handling and disposal of fill and soil above UU SCOs, installation of SOE, dewatering, and importing and placing additional backfill. Table 8 details the individual cost components used to arrive at this cost estimate. The amount of deep contamination above UU SCOs would add costs and delays that would outweigh the benefit of achieving an unrestricted use remediation and elimination of long-term ECs and ICs.

Alternative II – The estimated remediation cost of a Track 4 cleanup is about $36.0 million. This alternative is 77% less expensive over the long term than a Track 1 cleanup because the costs for handling and disposal of soil, SOE, dewatering, and importing and placing backfill are significantly reduced. Alternative II is the most cost-effective alternative available to meet the applicable SCGs. Table 9 details the individual cost components used to arrive at this cost estimate.

3.4.8 Land Use

The current, intended, and reasonably anticipated future land use of OU-2 and its surroundings are compatible with either of the Alternatives. Subsequent to the Willets Point Development Plan Rezoning (CEQR Number: 07DME014Q), OU-2 is zoned commercial (C4-4) and is located within the Special Willets Point District, designed to accommodate development of a mixed-use community including residential, commercial (office, retail), hotels and convention center development

The objectives for the Special Willets Point District are intended to:

- Transform Willets Point into a diverse and sustainable community that enhances connections to its surroundings through a unique combination of uses;
- Create a retail and entertainment destination that catalyzes future growth and strengthens Flushing's role as a nexus of economic, social, and cultural activity;

- Encourage a mix of uses that complement sporting venues within Flushing Meadows-Corona Park;
- Maximize utilization of mass transit, reducing the automobile dependency of the redevelopment;
- Create a livable community combining housing, retail, and other uses throughout the district;
- Create a walkable, urban streetscape environment with publicly accessible open spaces;
- Encourage the pedestrian orientation of ground-floor uses;
- Build upon the diversity of the Borough of Queens as well as the proximity of regional transportation facilities, including the Van Wyck and Whitestone Expressways, LaGuardia and JFK Airports, and the Long Island Railroad;
- Provide flexibility of architectural design within limits established to assure adequate access of light and air to the street, and thus to encourage more attractive and economic building forms; and
- Promote the most desirable use of land and building development in accordance with the District Plan and Urban Renewal Plan for Willets Point and thus improve the value of land and buildings and thereby improve the City's tax revenues.

3.4.9 Community Acceptance

Both remedial Alternatives are expected to be acceptable to the community because the potential exposure pathways to on-site contamination would be eliminated, mitigated or significantly reduced upon completion of the remedial action. The selected remedy will be subject to a 45-day public comment period and will consider substantive public comments before being approved.

3.5 Selection of Preferred Remedy

Both alternatives would be protective of human health and the environment and meet the remedy selection criteria. Alternative II achieves all of the remedial action goals established for the redevelopment project with less short-term impacts on the community and at a lower cost. Alternative II effectively reduces contaminant mobility and toxicity and is a similarly effective in the reduction 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, engineering controls, an EE, and associated future costs that would be required under Alternative II; however, the technical challenges and additional costs associated with SOE, groundwater treatment, deep excavation, the need for an engineering control to manage on-site migration of contamination

from off-site, and short-term nuisances such as greater truck traffic make this Alternative less feasible than Alternative II.

Alternative II is the selected remedy. Figures 7A through 7G depict the Alternative II cleanup plan.

3.5.1 Zoning

According to the New York City Planning Commission Zoning Maps 10a and 10b, OU-2 is located within the Special Willets Point District zoning area, as described above in Section 3.4.8. The surrounding land uses include parks, vacant land, commercial and industrial uses, and transportation easements.

3.5.2 Surrounding Property Uses

The current, intended, and reasonably anticipated future land use of OU-2 and its surroundings are compatible with the selected remedy.

3.5.3 Citizen Participation

The Citizen Participation Plan (CPP) is discussed in Section 4.1.8.

3.5.4 Environmental Justice Concerns

OU-2 is in a Potential Environmental Justice area. NYSDEC's Office of Environmental Justice acts as an advocate on behalf of these areas, which are disproportionately affected by environmental burdens. Environmental Justice issues are incorporated into the CPP, discussed in Section 4.1.8.

3.5.5 Land Use Designations

There are no federal or state land use designations.

3.5.6 Population Growth Patterns

Any proposed land use will support the population growth patterns and projections.

3.5.7 Accessibility to Existing Infrastructure

Existing infrastructure is not sufficient to support future development. During any future development, new infrastructure may be proposed. The property is near New York City subway and bus routes.

3.5.8 Proximity to Cultural Resources

There are no City Landmarks and National Register listed sites within ½-mile of OU-2. The proposed remedy is not anticipated to adversely impact cultural resources within or beyond this radius.

3.5.9 Proximity to Natural Resources

Potential wetlands on or near OU-2 were evaluated by reviewing the National Wetlands Inventory and NYSDEC regulated wetlands. No wetlands exist on OU-2, but Flushing Creek is located approximately 500 feet to the east.

3.5.10 Off-Site Groundwater Impacts

Municipal water supply wells are not present in this area of New York City; therefore, groundwater from OU-2 cannot affect municipal water supply wells or recharge areas.

3.5.11 Proximity to Flood Plains

According to the Effective National Flood Insurance Rate Map for the City of New York published by the Federal Emergency Management Agency ([FEMA] Community Panel Nos. 3604970113F and 3604970114F, dated September 5, 2007), the majority of OU-2 is located within a Zone AE special flood hazard, which is subject to inundation by the 1% annual chance flood. Several zones within the northern portion of OU-2 fall within Zone X, which is defined as 0.2% annual chance flood areas.

3.5.12 Geography and Geology of OU-2

OU-2 geology is described in Section 2.2.

3.5.13 Current Institutional Controls

OU-2 was assigned an E-Designation for air quality, hazardous materials, and noise (E-214), pursuant to a City Environmental Quality Review (CEQR No. 07DME014Q). The New York City Mayor's Office of Environmental Remediation (NYCOER) is aware of the project's proposed development plans and involvement in the BCP, and has indicated that implementation of a BCP remedy will satisfy the substantive requirements of the hazardous materials E-Designation.

3.6 Summary of Selected Remedial Actions

The preferred remedy, a Track 4 cleanup, will include the following tasks:

- Implementation of plans for the protection of on-site workers, the community, and the environment including a CHASP and CAMP during remediation and construction activities
- Establishment of Track 4 SCOs, which include NYSDEC Part 375-list RR SCOs
- Implementation of a preliminary waste characterization, including delineation of hazardous chromium and lead soil, to facilitate off-site disposal of excavated soil/fill
- As a pre-requisite to site remediation, abatement of hazardous building materials (including ACM, LBP, or other universal waste), demolition and removal of remnant foundation and roadways, clearing and grubbing of vegetation, and surface debris/refuse

removal by the contractor as hazardous waste or C&D debris in accordance with Part 360 and 361 regulations - Review and certification of hazardous building materials and C&D and refuse transport and disposal methodologies is not a requirement of the RE. The RE is responsible for documenting that C&D debris and refuse is not comingled with contaminated site soil and fill.

- Implementation of soil erosion, pollution, and sediment control measures in compliance with applicable laws and regulations
- Protection of monitoring and recovery wells to be retrofitted to remediation grade, or decommissioning and reinstallation of monitoring and recovery wells
- Protection or decommissioning/removal/abandonment of above- and below-grade telecommunication, electrical, stormwater collection, and potable water utilities
- Construction of SOE systems to facilitate the Track 4: RR SCO cleanup in source area excavation areas
- Construction of a groundwater containment cutoff wall consisting of sealed-seam steel sheet piles along the northern and eastern boundaries of Block 1833, Lots 155 and 172 to mitigate recontamination from off-site sources
- Completion of in-situ groundwater treatment via direct mixing in the northern part of Area I and the eastern part of Area J
- Excavation and stockpiling of fill and soil contamination source areas (fill and soil creating nuisance conditions or that is grossly-impacted)in the following areas:
    - Area E: approximately 3,500 cubic yards to be removed
    - Area G: approximately 500 cubic yards to be removed
    - Area H: approximately 1,800 cubic yards to be removed
    - Area I: approximately 3,800 cubic yards to be removed
    - Area J: approximately 5,300 cubic yards to be removed
- Excavation and stockpiling of all soil and fill exceeding RR SCOs in the upper 2 feet across the entire site
- Removal, decommissioning, and off-site disposal of any encountered USTs and/or associated appurtenances (e.g., fill lines, vent line, and electrical conduit) in accordance with DER-10, 6 NYCRR Part 613.9, NYSDEC CP-51, and other applicable NYSDEC UST closure requirements
- Screening for indications of contamination (by visual means, odor, and monitoring with PIDs) of excavated soil/fill during intrusive site work
- Appropriate off-site disposal of excavated soil/fill in accordance with federal, state, and local rules and regulations for handling, transport, and disposal

- Collection and analysis of documentation soil samples from the excavation base and, to the extent possible, sidewalls of the excavation in accordance with DER-10, to document post-excavation conditions in relation to Track 4 RR SCOs
- Placement of a physical demarcation layer where contamination remains, consisting of orange snow fencing or equivalent material at the excavation bottom prior to backfilling.
- Post-excavation groundwater monitoring to assess the effectiveness of the remedy in five monitoring/recovery wells (recovery wells E-RW202 and E-RW105 in Area E, monitoring well I-MW101 in Area I, and monitoring wells J-MW117 and J-MW118 in Area J) and in the in-situ groundwater treatment area discussed above.
- Backfilling of areas requiring more than 2 feet of remedial excavation with certified-clean fill (i.e., fill meeting the lower of PGW and RR SCOs), RCA, or virgin crushed stone
- Capping of site-wide excavated areas with an engineered composite cover system consisting of at least 2 feet of certified-clean fill (i.e., fill meeting the lower of PGW and RR SCOs), with the top 4 inches composed of ¾-inch virgin crushed stone
- Establishment of an NYSDEC-approved SMP to provide for long-term management of ECs and ICs, including the performance of periodic inspections and certification that the controls are performing as they were intended, and inclusion of a requirement in the SMP to evaluate future proposed structures on OU-2 for soil vapor intrusion
- Recording of an Environmental Easement to establish use restrictions including prohibitions on the use of groundwater and to memorialize the ECs and ICs to mandate that future owners of OU-2 continue to maintain these controls as required

The Alternative II remediation extent is shown on Figures 7A through 7G.

4.0 REMEDIAL ACTION PROGRAM

4.1 Governing Documents

The primary documents governing the remedial action are summarized in this section. Where referenced, copies of the full plans are provided in the appendices.

4.1.1 Site Specific Construction Health & Safety Plan

The RE prepared a site-specific CHASP, which is included as Appendix F. The CHASP will address site-specific contaminants and will apply only to remedial and construction-related work on-site. Contractors operating on OU-2 are required to adhere to their own plans that, at a minimum, meet the requirements of the CHASP. Remedial work performed under this plan will be in compliance with governmental requirements, including site and worker safety requirements mandated by the Federal Occupational Safety and Health Administration (OSHA). The CHASP provides a mechanism for establishing on-site safe working conditions, safety organization, procedures, and PPE requirements during implementation of the remedy. The CHASP meets the requirements of 29 CFR 1910 and 29 CFR 1926 (which includes 29 CFR 1910.120 and 29 CFR 1926.65).

The CHASP 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;
- Work zone descriptions;
- Personal safety equipment and protective clothing requirements;
- Decontamination requirements;
- Standard operating procedures;
- Protective measure plan;
- CAMP; and
- Safety Data Sheets.

The Volunteer, associated parties preparing the remedial documents submitted to the State, and those performing the construction work, are responsible for preparation of an appropriate CHASP and for the appropriate performance of work according to that plan and applicable laws.

The CHASP and requirements defined in this RAWP pertain to all remedial and invasive work performed at OU-2 until the issuance of a Certificate of Completion. The Langan Site Safety Coordinator will be William Bohrer. Each contractor completing work on-site will identify and establish their own Site Safety Coordinator. If required for site workers, confined space entry will comply with all OSHA requirements to address the potential risk posed by combustible and toxic gasses. Langan personnel will not enter confined spaces.

4.1.2 Quality Assurance Project Plan

The RE prepared a Quality Assurance Project Plan (QAPP) that describes the quality control components that support the proposed remedy in accomplishing the remedial goals and remedial action objectives. The QAPP supports completion of the remedy in accordance with the design specifications.

The QAPP is provided as Appendix G 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; and
- 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.

4.1.3 Construction Quality Assurance Plan

The RE prepared a Construction Quality Assurance Plan (CQAP) that describes the quality control components that support the proposed remedy in accomplishing the remedial goals and remedial action objectives. The CQAP supports completion of the remedy in accordance with the design specifications.

A list of engineering personnel involved in implementation of the CQAP and procedures that will be carried out by the remedial engineering team are identified below. Project personnel résumés are provided in Appendix H.

Role	Name
NYSDEC Regional Remediation Engineer	Jane O'Connell
NYSDEC Project Manager	Wendi Zheng
NYSDOH Project Manager	Harolyn Hood
Independent Environmental Monitor (if needed)	Matrix New World
Queens Development Group, LLC Representatives	James Strobel Aaron Lipman Sam Bernstein
Remedial Engineer (RE):	Jason Hayes, P.E.

Role	Name
Project Manager:	Elizabeth Burgess, P.E.
Langan Health & Safety Officer:	Tony Moffa, ASP, CHMM, COSS
Langan Site Safety Coordinator:	William Bohrer, PG
Qualified Environmental Professional (QEP):	Michael Burke, PG, CHMM
Field Team Leader:	Luke McCartney
Quality Assurance Officer:	Gerald Nicholls, P.E., CHMM
Remediation Contractor Project Manager	To be determined
Remediation Contractor Site Superintendent	To be determined

The Qualified Environmental Professional (QEP) or RE will directly supervise field personnel that will be on-site during the remedial action to monitor particulates and organic vapor in accordance with the CAMP. Daily reports will be submitted to the NYSDEC and NYSDOH and will include reporting of any CAMP results that exceed the specified action levels.

The QEP or RE will directly supervise field personnel who will meet with the Construction Superintendent on a daily basis to discuss the plans for that day and schedule upcoming activities. The field personnel will document remedial activities in the daily report. This document will be forwarded to the Field Team Leader, Project Manager and RE on a daily basis.

The QEP or RE will directly supervise field personnel who will screen the excavation with a PID during intrusive activities. PID readings will be noted in the record. PID readings that exceed action levels will be reported to the NYSDEC and NYSDOH in the daily reports. The field personnel will collect the post-excavation soil samples in accordance with this RAWP.

A photo log will be kept to document construction activities by still photos. The photo log may also be used to record activities recorded in the daily report.

The project field book will be used to document sample collection and how it corresponds to the RAWP. Observations, field and/or 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, or photographs.

The Field Team Leader will maintain the current field book and original field paperwork during the performance of work. The Project Manager will maintain the field paperwork after completion and will maintain all submittal document files.

4.1.4 Soil/Materials Management Plan

The RE prepared a Soil/Materials Management Plan (SMMP), which includes detailed plans for managing soil/fill that are disturbed at OU-2, including excavation, handling, storage, transport, and disposal. It also includes controls that will be applied to these efforts to assure effective, nuisance-free performance in compliance with applicable federal, state, and local laws and regulations. The SMMP is further described in Section 5.4.

4.1.5 Stormwater Pollution Prevention Plan

Because this project involves soil disturbance of more than one acre, a Stormwater Pollution Prevention Plan (SWPPP) is required. A SWPPP was prepared for this scope of work and is included as Appendix I. Erosion and sediment controls for OU-2 will be designed in conformance with requirements presented in the New York State Standards and Specifications for Erosion and Sediment Control. Best Management Practices (BMP) will be employed to mitigate erosion and prevent the migration of sediment off site throughout construction. Erosion and sediment control measures will be implemented as described in Section 5.4.10. Bulk dewatering activities are not anticipated; however, localized dewatering may be necessary to manage accumulated precipitation or elevated groundwater table conditions. Should dewatering become necessary, it will be permitted under an NYCDEP Discharge Permit, and an individual NYSDEC SPDES permit, as required.

4.1.6 Community Air Monitoring Plan

Community air monitoring will be conducted in accordance with the CAMP discussed in the CHASP, which is in accordance with the NYSDOH Generic CAMP included as Appendix 1A in DER-10 and Appendix J in this RAWP. Section 5.4.12 describes the site-specific CAMP in further detail.

4.1.7 Contractor's Site Operations Plan

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

4.1.8 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, and will be mailed to select persons on the approved site contact list. Langan will provide a certification of the mailings and certify that the repository was inspected (on specific date) and that it contains all applicable project documents.

Additional Fact Sheets will be distributed to announce:

- The completion of the Remedial Action with a summary of the FER; and
- The issuance of the Certificate of Completion (COC).

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 CPP for this project is included in Appendix K.

Document repositories have been established at the following locations and contain all applicable project documents:

Queens Community Board 7
30-50 Whitestone Expressway
Flushing, NY 11354
Phone: 718-359-2800
Email: qn07@cb.nyc.gov
Website: www.nyc.gov/queenscb7

Queens Library – Jamaica Branch
89-11 Merrick Boulevard
Queens, New York, 11432
Phone: (718) 990 - 0700

NYSDEC Online Info Locator:
Access to projects documents is available through the DECinfo Locator at: https://www.dec.ny.gov/data/DecDocs/C241146/

4.1.9 Remedial Design and Green Remediation Principles

A remedial design program will be implemented to provide the details necessary for the construction, operation, optimization, maintenance, and monitoring of the remedial program. 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 include:

- 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; and
- Integrating the remedy with the end use where possible and encouraging green and sustainable re-development.

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 the RAWP. Information regarding the organization/personnel and their associated responsibilities is provided below. Resumes of key personnel involved in the Remedial Action are included in Appendix H.

4.2.2 Remedial Engineer

The RE for this project will be Jason 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 for the Willets Point Development – Operable Unit 2 (Phase 2) redevelopment project. The RE will certify in the FER[7] that the remedial activities were observed by qualified environmental staff under his supervision and that the remediation requirements set forth in the RAWP and any other relevant provisions of ECL 27-1419 have been achieved in full conformance with the RAWP. Other RE certification requirements are listed later in this RAWP.

The RE will document the work of remediation contractors and subcontractors involved in all aspects of remedial construction, including soil excavation, stockpiling, characterization, removal and disposal, air monitoring, construction of ECs, emergency spill response services, import of backfill, and management of waste transport and disposal. Deviations from the procedures identified in the RAWP that are observed by Langan will be brought to the attention of the contractor, who will remedy the deviation. The RE will be responsible for all appropriate communication with NYSDEC and NYSDOH, included noted deviations.

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

[7] OU-1 remedial activities will be documented in a separate, comprehensive Construction Completion Report. The FER will address OU-2.

4.2.3 Independent Environmental Monitor

The September 28, 2014 amendment to the Brownfield Cleanup Agreement established the requirement for an IEM during implementation of the RIWP, IRMWP and RAWP. The Volunteer requests a waiver for the IEM requirement during RAWP implementation.

The IEM requirement was based on the understanding that multiple investigation or remediation activities would be ongoing simultaneously across the BCP Site. As established during implementation of the RIWP within OU-2, the nature of site activities within one contiguous area can be overseen by NYSDEC personnel and documented by the RE. The area subject to this RAWP for the OU-2 is 15.084 acres, about two thirds of the full BCP Site area.

A minimum of one full-time field personnel will be on-site during ground intrusive activities; additional personnel will be added during periods of high activity. If multiple remedial activities occur across separate areas of OU-2 or if remedial activities occur simultaneously on OU-1 and OU-2, an IEM will be present.

4.2.4 Remedial Action Construction Schedule

The remedial action construction schedule is discussed below in Section 10 and is provided in Appendix L. The NYSDEC will be promptly notified of proposed changes, delays, and/or deviations to the schedule.

4.2.5 Work Hours

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

4.2.6 Site Security

The OU-2 perimeter will be secured with gated, signed, plywood fencing with points of entry and exit in accordance with 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.

4.2.7 Traffic Control

Site traffic will be controlled through designated points of access as determined by the remediation contractor. 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.

4.2.8 Contingency Plan

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

4.2.8.1 Discovery of Additional USTs

Two subsurface anomalies indicative of tanks were identified during the geophysical survey. They were investigated via test pits on December 13, 2021, and evidence of USTs was not observed. As a contingency, if a UST is discovered via exploratory test pit or excavation, it will be decommissioned in accordance with 6 NYCRR Part 612.2 and 613.9, and DER-10 Section 5.5. Once the tank and its contents are removed, post-excavation soil samples would be collected per DER-10 requirements. If encountered, petroleum-contaminated soils would be removed and appropriate post-excavation soil samples collected to confirm removal of all grossly contaminated soil. UST closure documentation, such as contractor affidavits, bills of lading for sludge disposal, and tank disposal receipts, would be provided as appendices in the FER. The NYSDEC PBS registration would be updated as necessary, depending on the type, number, and capacity of discovered tanks.

4.2.8.2 Discovery of Additional Contaminated Soil

During remediation and construction activities, the soil will be continuously monitored by the RE's field representatives using a PID as well as visual and olfactory field screening techniques to identify additional soil that may not be suitable for the current disposal facility(ies). If discovered, this soil/fill would be segregated and sampled in accordance with disposal facility requirements. If the facility is not permitted to receive the suspect soil/fill, the soil/fill would be disposed of off-site at a permitted facility able to receive the soil/fill based on the characterization data.

If other previously unidentified contaminant sources are found during on-site remedial excavation, sampling would be performed. Chemical analytical work would be for Part 375/TCL/TAL VOCs, SVOCs, PCBs, pesticides, and metals (including hexavalent chromium and cyanide). Analyses would not be otherwise limited without NYSDEC approval.

4.2.9 Worker Training and Monitoring

Worker training and monitoring will be conducted in accordance with the OU-2-specific CHASP, included as Appendix F.

4.2.10 Agency Approvals

OU-2 is E-Designated for hazardous materials, noise, and air quality (CEQR Number 07DME014Q). The scope of work proposed in this RAWP fulfills requirements with NYCOER for hazardous materials and NYCOER has indicated that implementation of a BCP remedy will satisfy

the substantive requirements of the hazardous materials E-Designation. The noise and air quality E-Designations do not impact the RAWP and will be addressed during future building development and coordinated with NYCOER. Permits or government approvals required for remedial construction will be obtained prior to the start of remedial construction. In addition to NYCOER approval, the following agency approvals are anticipated:

- NYCDOB for review and approval of excavation shoring and sheeting, fencing, construction safety, and other applicable filings
- NYCDEP Sewer Discharge Permit
- NYCDEP for the SWPPP
- USEPA for an Underground Injection Control Permit, if in-situ groundwater remediation is required

The above list of permits and agency approvals is not exhaustive; additional permits for construction will be obtained by the contractor, as necessary. The planned end use for OU-2 will conform to zoning for the property as determined by New York City Department of Planning. A Certificate of Completion will not be issued for the project unless conformance with zoning designation is demonstrated.

4.2.11 Pre-Construction Meeting with NYSDEC

Prior to the onset of 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 the NYSDEC-approved RAWP. Notice will be provided to the NYSDEC seven days prior to site mobilization.

4.2.12 Emergency Contact Information

An emergency contact sheet with names and phone numbers is included as Figure 9 as well as in the CHASP, which is included as Appendix F. That document will define the specific project contacts for use by NYSDEC and NYSDOH in the case of a day or night emergency.

4.3 Site Preparation

4.3.1 Mobilization

Prior to commencing the remedial excavation, the remediation contractor will mobilize to OU-2 and prepare for remedial activities. The RE will provide a minimum of 5 business day notice to NYSDEC prior to site mobilization.

Descriptions of mobilization and site preparation activities may include the following:

- Identifying the location of all aboveground and underground utilities (e.g., power, gas, water, sewer, communications), equipment, and structures (as necessary to implement the remediation);
- Mobilizing necessary remediation personnel, equipment, and soil/fill to OU-2;
- Constructing one or more stabilized construction entrances consisting of nonhazardous soil/fill capped with a gravel roadway at or near the OU-2 exit, which takes into consideration the OU-2 setting and perimeter;
- Constructing an equipment decontamination pad for trucks, equipment, and personnel that come into contact with impacted soil/fill and liquids during remedial activities;
- Installing erosion and sedimentation control measures, as necessary; and
- Installing temporary fencing or other temporary barriers to limit unauthorized access to areas where remediation activities will be conducted.

4.3.2 Erosion and Sedimentation Controls

Based on the size of OU-2 and the planned excavation, select common erosion and sedimentation control practices (i.e., perimeter silt fencing, inlet protection, stabilized construction entrances, dust control via water sprinkling, etc.) will be necessary and will be performed in accordance with the project-specific SWPPP, provided in Appendix I. Best management practices for soil erosion will be selected to minimize erosion and sedimentation off site from the start of the remediation to the completion of development.

4.3.3 Monitoring Wells

Existing groundwater monitoring and recovery wells will be protected during site excavation and retrofitted to match remediation grades. If monitoring wells are damaged during excavation, they will be properly decommissioned in accordance with NYSDEC policy CP-43 Groundwater Monitoring Well Decommissioning Policy. If required, well decommissioning and reinstallation will be performed by an experienced driller and logged by the driller and Langan field personnel. If conducted, decommissioning documentation will be provided in the FER. The groundwater monitoring well network is shown on Figure 10.

4.3.4 Temporary Gravel Construction Entrance(s)

At a minimum, a temporary gravel construction entrance and exit will be installed on each area of OU-2 for all vehicles exiting the BCP site. The gravel pads will be graded so that runoff water will be directed back into OU-2. Additional stabilized construction entrances may be added depending on the sequencing and location of remedial excavations. This will be detailed in the

Contractors Site Operations/Site Logistics Plan. The remediation contractor will protect and maintain the sidewalks and roadway at site access and existing points.

4.3.5 Utility Marker and Easements Layout

The Volunteer and its contractors are solely responsible for identifying utilities that might be affected by the remedial work and implementation of all required, appropriate, or necessary health and safety measures under this RAWP. The Volunteer and its contractors are solely responsible for safe execution of all invasive and other work performed under this RAWP. The Volunteer and its contractors must obtain any local, state, or federal permits or approvals pertinent to such work that may be required to implement this RAWP. Approval of this RAWP by NYSDEC does not constitute satisfaction of these requirements.

The presence of utilities and easements on OU-2 has been investigated by the RE. A geophysical survey identified multiple underground utilities within former 36th Avenue and former 37th Avenue, but decommissioning and removal of these utilities is underway. It has been determined that no impediment to the planned work under this RAWP is posed by utilities or easements on OU-2.

4.3.6 Sheeting and Shoring

Appropriate management of structural stability of on-site or off-site structures during remedial activities, including excavation, is the sole responsibility of the Volunteer and its contractors. The Volunteer and its contractors are solely responsible for safe execution of all invasive and other work performed under this RAWP. The Volunteer and its contractors must obtain any local, state, or federal permits or approvals that may be required to perform work under this RAWP. Further, the Volunteer and its contractors are responsible for the implementation of all required, appropriate, or necessary health and safety measures during performance of work under the approved RAWP.

4.3.7 Equipment and Material Staging

The remediation contractor will notify the RE and the Volunteer, in writing with receipt confirmed, of pending site mobilization at least 30 calendar days in advance. During mobilization, construction equipment will be delivered to OU-2, temporary facilities constructed, and temporary utilities installed. The remediation contractor will place and maintain temporary toilet facilities within the work areas for use by all site personnel. The remediation contractor will provide drinking water for all site personnel.

4.3.8 Truck Inspection/Decontamination Station

Outbound-truck inspection stations will be set up at or near the OU-2 exits. Before exiting OU-2, trucks will be required to stop at a truck inspection station and will be examined for evidence of contaminated soil on the undercarriage, body, and wheels. If observed, soil and debris will be

removed. Brooms, shovels, and potable water will be utilized for the removal of soil from vehicles and equipment, as necessary. The remediation contractor is responsible for collecting soil that is tracked immediately off site and returning the soil to OU-2. The RE's on-site representative will document that trucks leaving OU-2 are properly decontaminated.

4.3.9 Site Fencing

The OU-2 perimeter will be secured with gated, signed, plywood fencing. 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 is completed, the remediation contractor will be responsible for demobilizing labor, equipment, and materials not designated for off-site disposal.

The RE will document that the remediation contractor performs follow-up coordination and maintenance for the following activities:

- Removal of sediment and erosion control measures and disposal of soil/fill in accordance with applicable rules and regulations;
- Removal of remaining contaminated soil/fill or waste;
- Equipment decontamination; and
- General refuse disposal.

4.4 Reporting

Periodic reports as required, and an FER[8] upon completion of the RAWP implementation, will be submitted to the NYSDEC to document the remedial action. The RE responsible for certifying all reports will be an individual licensed to practice engineering in the State of New York. Jason Hayes, P.E. of Langan, will have this responsibility. Should Mr. Hayes become unable to fulfill this responsibility, another suitably qualified Professional Engineer will take his place. In addition to the periodic reports and the FER, copies of all relevant contractor documents will be submitted to the NYSDEC. All daily and monthly reports will be included in the FER.

[8] OU-1 remedial activities will be documented in a separate, comprehensive Construction Completion Report. The FER will address OU-2.

4.4.1 Daily Reports

Daily reports will be submitted to NYSDEC and NYSDOH Project Managers during on-site remedial construction activities by the end of each day following the reporting period and will include:

- An update of progress made during the reporting day;
- Locations of work and quantities of soil/fill imported and exported from OU-2;
- 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 trigger action levels; and
- An explanation of notable site conditions.

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

Daily Reports will reference the NYSDEC-assigned project number and include a description of daily activities keyed to an alpha-numeric map that identifies work areas. The alpha-numeric map is included as Figure 11. These reports will include a summary of air monitoring results, odor and dust problems and corrective actions, and complaints received from the public.

4.4.2 Monthly Reports

Monthly reports will continue to be submitted to NYSDEC and NYSDOH Project Managers by the 10th day of the month following the reporting period and will include the following information, as well as the information required in the BCA:

- Activities relative to OU-2 during the previous reporting period and those anticipated for the next reporting period, including a quantitative presentation of work performed (i.e., tons of soil/fill 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; and
- 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 OU-2 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.

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	To manage environmental complaints from the community regarding construction or remediation.
Implementation Strategy/Mitigation Measures	All complaints will be documented on a complaint register. The register will be maintained as an ongoing record. The entry will include following information: • Time, date and nature of complaint; • Type of communication (telephone, letter, personal, etc.); • Name, contact address, and contact number; and • Response and investigation undertaken as a result of the complaint; and action taken and signature of responsible person. Each complaint will be investigated as soon as practical in relation to requirements.
Monitoring	A representative of the Volunteers or the RE will follow up on the complaint within two weeks of receipt to confirm it is resolved.
Reporting	Upon receipt of the complaint, NYSDEC will be notified. Following investigation and resolution of the complaint, NYSDEC will also be notified. Complaint resolutions will be documented in daily reports.
Corrective Action	Should an incident or 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; and/or • Investigate complaint and action follow-up 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; and
- Effect of the deviations on the overall remedy.

5.0 REMEDIAL ACTION: MATERIAL REMOVAL FROM SITE

5.1 Soil Cleanup Objectives

The Track 4 SCOs are listed in Table 7 and include RR SCOs. Any exposed soil areas that exceed these SCOs will be capped with 2 feet of clean fill that meets the lower of PGW and RR SCOs. Areas requiring backfill below the 2-foot site composite cover system will meet the lower of PGW and RR SCOs across the OU-2 footprint.

Soil, fill and contaminated liquids management on-site and off-site has been, and will continue to be, conducted in accordance with the SMMP as described below.

5.2 Remedial Performance Evaluation (Documentation Sampling)

5.2.1 Soil Sampling Frequency and Methodology

The proposed remedy will achieve a Track 4 cleanup; per DER-10, documentation samples will be collected to document the soil levels achieved by the remedy and inform the SMP; confirmation endpoint soil samples are not required as part of the Track 4 cleanup. Consistent with the approval by the NYSDEC in an April 28, 2022 email, documentation soil samples will be collected from the excavation base at a reduced sampling frequency of one sample per 2,000 square feet of excavation base, and one sample per 50 linear feet of sidewall. In petroleum source soil/fill removal areas, documentation samples will be collected at a frequency of one sample per 900 square feet of excavation base, and one sample per 30 linear feet of sidewall.

The sampling frequency for the remedial excavation areas (general excavation and petroleum source removal areas) is provided in the table below:

Sample Frequency			
Documentation Sample Type	**Number of Samples**	**Documentation Sample Type**	**Number of Samples**
General Excavation		**Petroleum Source Removal Areas**	
Base of Excavation 1 Sample per 2,000 Square Feet	315	Base of Excavation 1 Sample per 900 Square Feet	44
Excavation Sidewalls 1 Sample per 50 Linear Feet	0	Excavation Sidewalls 1 Sample per 30 Linear Feet	0

An estimated 315 base documentation soil samples will be collected from the base remedial excavation areas (plus QA/QC samples) and an estimated 44 base documentation soil samples (plus QA/QC samples) will be collected from the petroleum source removal areas to document remedial performance. Sidewall samples are not anticipated to be collected.

Sidewall samples will not be collected in areas where the SOE or the groundwater containment cutoff wall obstructs access to sidewall soil, sidewall soil is off-site, or in areas where the slope

of the excavation cut is 1:1 or less. Sidewall samples will not be collected along the OU-2 perimeter since excavations will only extend to about 2 feet and remaining soil will be outside the OU-2 boundary. Limited exposed vertical sidewalls that meet these criteria are anticipated based on the current excavation plan; collection of sidewall samples is not anticipated in the base excavation areas or in petroleum source removal areas. Should the contractor slope down to the petroleum source removal areas (at slope great than 1:1) then vertical sidewall samples will be collected. Collection of the sidewall samples will be determined in the field, coordinated with NYSDEC in advance, and will follow the above sampling frequency.

The total quantity of anticipated documentation samples is summarized in the below table:

Total Proposed Documentation Samples	
Documentation Sample Type	**Number of Samples**
Base of Excavation	359
Excavation Sidewalls	0

Documentation samples will be analyzed for the Part 375 list of VOCs, SVOCs, PCBs, pesticides, cyanide, metals (including hexavalent and trivalent chromium), 1,4-dioxane and PFAS compounds.

The proposed documentation sample locations are shown on Figures 8A through 8G.

5.2.2 QA/QC

Quality control procedures for confirmation soil sampling are included in the QAPP (refer to Appendix G). 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 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.

5.2.3 DUSR

ASP Category B deliverables will be prepared for all remedial performance samples collected during implementation of this RAWP. Data Usability Summary Reports (DUSR) will be prepared by a qualified data validator and the findings will be reported in the FER.

5.2.4 Reporting

Analytical laboratories that analyze confirmation soil samples, prepare results, and perform contingency sampling analysis will be NYSDOH Environmental Laboratory Approval Program (ELAP)-certified laboratories.

5.3 Estimated Soil/Fill Removal and Backfill Quantities

The estimated volume of soil requiring removal and off-site disposal for the Track 4 cleanup is about 61,800 cubic yards (in-situ volume; does not consider soil bulking or expansion); considering a density of about 1.6 tons per cubic yard, the disposal weight is estimated at 98,880 tons. The placed and compacted volume to fill excavation areas and install the site cap for OU-2 is about 61,800 cubic yards; considering an estimated compaction factor of 30 percent, this equates to roughly 80,340 cubic yards of backfill to import. Soil/fill is not anticipated to be reused/relocated on OU-2; however, if reuse is proposed, it will adhere to the requirements outlined in Section 5.4.6 of this RAWP.

5.4 Soil/Materials Management Plan

This section presents the approach to management, disposal, and reuse of soil, fill, and contaminated liquids removed from OU-2. This plan is based on the current knowledge of site conditions and will be augmented, as necessary, using additional data collected during remediation. Field personnel, under the direction of the RE will monitor and document the handling and transport of contaminated soil/fill and liquids removed from OU-2 for disposal as a regulated solid waste. Field personnel, under the direction of the RE, will assist the remediation contractor in identifying impacted soil/fill during remediation, determining soil/fill 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 soil/fill to be excavated or generated, with the intent to most efficiently manage and characterize the soil/fill and to avoid comingling impacted soil/fill with non-impacted soil.

The following material types are reasonably anticipated to be encountered during remediation:

- Nonhazardous Historic Fill – This refers to historic fill that contains contaminants above the lower of PGW and RR SCOs and will not be reused on-site. It will be excavated across the footprint of OU-2 from a depth of 2 feet bgs to depths of up to 8.5 feet bgs and transported off-site for disposal at a facility permitted to accept the fill. Characterization sampling will be completed in conformance with the requirements of the disposal facility. Documentation samples will be collected from the base of the excavation to document residual impacts left onsite. A proposed documentation sample location plan is provided as Figures 8A through 8G.

- Petroleum-Impacted Soil – This refers to soil that contains petroleum-related conditions, including elevated PID readings, odors, and/or staining. It will be excavated across the OU-2 footprint at depths ranging from 2 to 8.5 feet bgs.
- CVOC-Impacted Soil – This refers to soil that contains elevated concentrations of CVOCs. Although CVOCs were not detected above the Track 4 SCOs in soil during the RI, CVOC-impacted soil may exist at OU-2 based on the concentrations detected in groundwater and soil vapor.
- Hazardous Metals – This refers to soil where hazardous concentrations of lead or chromium were identified in Areas E, F, G, and J at varying depths ranging between 0 and 12 feet bgs, and ash within the historic fill that was placed during historical uses as a dumping ground for coal ash.
- Remnant Foundations, Concrete, and Asphalt – This refers to construction and demolition debris (C&D), including concrete and asphalt, that will be segregated from soil/fill and recycled or disposed separately.

5.4.1 Soil Screening Methods

Visual, olfactory, and PID soil screening and assessment will be performed by field personnel under the direct supervision of a PE or QEP during all remedial and development excavations into known or potentially contaminated soil/fill and liquids. Soil screening is performed regardless of when the invasive work is done and includes all excavation and invasive work performed during the remedy, including excavations for utility work, prior to issuance of the Certificate of Completion.

5.4.2 Excavated Soil/Fill Stockpile Methods

Stockpiles will be constructed as necessary to separate and stage excavated soil/fill pending loading or characterization sampling. Separate stockpile areas will be constructed to avoid comingling soil/fill 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 soil/fill types are different (e.g., petroleum-impacted soil/fill 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 runoff.
- 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 OU-2, and made available for inspection by the NYSDEC.

5.4.3 Materials Excavation and Load Out

Field personnel under the supervision of the RE will monitor ground-intrusive work and the excavation and load-out of excavated soil/fill.

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 OU-2 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., NYSDOT and NYCDOT requirements). Trucks hauling soil/fill will not be lined unless free liquids are present or the soil/fill is grossly impacted.

Vehicles leaving OU-2 will not be overloaded. The RE's representative will make reasonable efforts to document that vehicles are not loaded beyond their NYSDOT weight rating and that all soil/fill is secured beneath the truck bed cover.

The RE's on-site representative will document that trucks leaving OU-2 are properly decontaminated and that the engineered outbound-truck inspection station(s) are maintained in accordance with Section 4.3.8.

The RE will be responsible for documenting that egress points for truck and equipment transport from OU-2 will be clean of dirt and other soil/fill derived from OU-2 during remediation and development. The remediation contractor will clean adjacent streets as necessary to maintain a clean condition with respect to site-derived soil/fill.

The Volunteer and associated parties preparing the remedial documents submitted to New York State, and the parties performing this work, are solely 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.

If identified, hotspots and/or structures to be remediated (USTs, vaults and associated piping, transformers, etc.) will be removed and documentation sampling completed.

Development-related grading cuts and fills are not anticipated. If proposed, they 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. Mechanical screening, if proposed, must meet the following conditions:

- Screening equipment can be a source of dust; dedicated dust suppression methods will be in place (i.e., spraying water) during mechanical screening.
- Screening equipment will be centrally located and no closer than 50 feet from the OU-2 boundary.
- Field personnel will consider and document the materials that are separated such as the screen overs (the material larger than the screen openings) and unders (the material smaller than the screen openings; the fines).
- If fill is screened, screening must consider the fill constituents established during the RI. The unders generated from screened fill are not soil but rather finer-grained fill that might resemble soil. Screened fill unders must be managed as a regulated solid waste unless specifically determined otherwise to be beneficially used (i.e., BUD or request to import request).
- If the overs contain material other than recognizable, uncontaminated concrete, asphalt, rock or brick, these materials (e.g., ash, coal, slag, or similar) would need to be defined prior to off-site disposal. Recognizable, uncontaminated concrete, asphalt, rock or brick must be separated from the fine material and then sorted/segregated to comply with the acceptable criteria at the receiving registered or permitted Part 360 facility.

Primary contaminant sources (including, but not limited to, tanks and hotspots) identified during 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. Under a Track 4 cleanup, the final excavation subgrade (e.g., demarcation layer) will be surveyed.

5.4.4 Materials Transport Off-Site

Transport of soil/fill and contaminated liquids 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 will enter and exit OU-2 using Willets Point Boulevard. All trucks loaded with site soil/fill and contaminated liquids exit the vicinity of OU-2 using only approved truck routes. Truck routes are shown on Figure 12.

Trucks loaded with site soil/fill and contaminated liquids will exit the vicinity of OU-2 using approved truck routes. These routes are the most appropriate routes to and from OU-2 and take into account:

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

Trucks will be prohibited from excessive stopping and idling in the neighborhood outside of OU-2.

Egress points for truck and equipment transport from OU-2 will be kept clean of dirt and other soil/fill during remediation and development.

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

Soil/fill transported by trucks exiting OU-2 will be secured with tight-fitting covers. Loose-fitting canvas-type truck covers will be prohibited. If loads contain wet soil/fill capable of producing free liquid, truck liners will be used.

Before exiting OU-2, trucks will be required to stop at the truck inspection station and will be examined for evidence of contaminated soil on the undercarriage, body, and wheels. If observed, soil and debris will be removed. Brooms, shovels, and potable water will be utilized for the removal of soil from vehicles and equipment, as necessary. Truck wash waters will be collected and disposed of offsite in an appropriate manner.

5.4.5 Soil/Fill Disposal Off-Site

Soil/fill/solid waste excavated and removed from OU-2 will be handled, transported, and disposed in accordance with local, State (including 6 NYCRR Part 360) and Federal regulations. If disposal of soil/fill from this site is proposed for unregulated disposal (i.e., clean native 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 soil/fill and contaminated liquids from this site is prohibited without formal NYSDEC approval.

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 soil/fill derived from OU-2 conforms to applicable laws:

- A letter from the RE to the receiving facility describing the soil/fill to be disposed and requesting formal written acceptance of the soil/fill. This letter will state that soil/fill to be disposed is contaminated soil/fill generated at an environmental remediation site 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 all chemical data for the soil/fill being transported (including waste characterization data).
- A letter from all receiving facilities stating it is in receipt of the correspondence (above) and is approved to accept the soil/fill.

These documents will be included in the FER.

Non-hazardous historic fill and contaminated soil transported offsite will be handled, at a minimum, as a solid waste per 6 NYCRR Part 360. Historic fill and contaminated soil excavated from OU-2 are prohibited from being disposed of at Part 360-15 Registration Facilities (also known as Soil Recycling Facilities).

Soil that is contaminated but non-hazardous and is removed from OU-2 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 issued 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 soil/fill is prohibited from being sent or redirected to a New York Part 360-15 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 soil/fill is derived from an NYSDEC DER remediation site, that the soil/fill is contaminated, and that the soil/fill 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 soil/fill being transported.

The FER will include an accounting of the destination of soil/fill and contaminated liquids removed from OU-2 during implementation of the remedy, including excavated soil, contaminated soil, historic fill, solid waste, hazardous waste, non-regulated soil/fill, and fluids. Documentation associated with disposal of each soil/fill and contaminated liquids type must also include records and approvals for receipt of the soil/fill and contaminated liquids. 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 OU-2, if any, will be stored, transported, and disposed of in 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 soil/fill and contaminated liquids removed from this site.

A waste characterization study will be performed for soil intended 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 soil/fill 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 onsite if the requirements in this section are met. Non-hazardous historic fill or native soil that is not grossly impacted and meets the lower of the 6 NYCRR Part 375 PGW or RR SCOs (see DER-10 Section 5.4[e]4) may be reused at the discretion of the RE and upon approval of NYSDEC. Fill will be used as backfill for the excavation from which the fill was taken from without additional analytical testing, assuming no grossly-impacted soil/fill is observed. Reused soil must be non-hazardous in accordance with the predetermined beneficial use listed in 6 NYCRR 360.13. Reuse of soil will be coordinated in advance with the NYSDEC project manager. Soil/fill intended for reuse on-site will be stockpiled separately from soil/fill designated for off-site disposal.

Acceptable demolition material proposed for reuse onsite, if any, will be sampled for asbestos.

Concrete crushing or processing on-site is prohibited, unless NYSDEC has specifically approved onsite processing and reuse of acceptable demolition material.

Organic matter (wood, roots, stumps, etc.) or other solid waste derived from clearing and grubbing of OU-2 is prohibited for reuse onsite.

Contaminated onsite historic fill and contaminated soil, 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. This will be expressed in the final SMP.

A "Request to Import/Reuse Fill Material" form will be filed with the NYSDEC project manager for review and approval prior to import to OU-2. A copy of the form is presented in Appendix M.

5.4.7 Fluids Management

Bulk dewatering is not anticipated during this remedial action. Localized dewatering may be necessary to manage accumulated precipitation or elevated groundwater table conditions.

5.4.8 Demarcation

After the completion of soil removal and any other invasive remedial activities and prior to backfilling, a land survey will be performed by a New York State licensed surveyor. The survey will define the top elevation of residual contaminated soils. A physical demarcation layer, consisting of orange snow material or equivalent material will be placed on this surface to provide a visual reference. This demarcation layer will constitute the top of the 'Residuals Management Zone', the zone that requires adherence to special conditions for disturbance of contaminated residual soils defined in the SMP. The survey will measure the grade covered by the demarcation layer before the placement of cover soils, pavement, structures, or other materials. This survey and the demarcation layer placed on this grade surface will constitute the physical and written record of the upper surface of the 'Residuals Management Zone' in the SMP. A map showing the survey results will be included in the Final Engineering Report and the SMP.

5.4.9 Backfill from Off-Site Sources

Fill proposed for import onto OU-2 will be approved by the NYSDEC project manager and RE and will be in compliance with the provisions in this RAWP prior to receipt at OU-2. Imported soil for backfill must meet the lower of PGW and RR SCOs or other acceptable fill such as virgin, native stone from a quarry or RCA. Fill from industrial sites, spill sites, other environmental remediation sites, or other potentially contaminated sites will not be imported to OU-2. Solid waste will not be imported onto OU-2.

Backfill will consist of clean fill (as described in the following paragraph) or other acceptable fill such as virgin stone from a quarry or RCA. RCA may not be used as general backfill without a BUD. If a BUD is granted and RCA is imported to OU-2, it will be from a NYSDEC-registered facility in compliance with 6 NYCRR Part 360-15 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 or unless the fill contains more than 10% fines passing the No. 80 sieve as determined via sieve testing. RCA imported to OU-2 must be derived from recognizable and uncontaminated concrete and must conform to Section 304 of the New York State Department of Transportation Standard Specifications Construction and Materials Volume 1 (2002). RCA is not acceptable for and will not be used as cover or drainage fill.

Imported soil (i.e., clean fill) will meet the lower of PGW and RR SCOs. Non-compliant soils will not be imported to OU-2. 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 DER-10, Table 5.4(e)10. The samples will be analyzed for Part 375 VOCs, SVOCs, pesticides/herbicides, PCBs, cyanide, metals including trivalent and hexavalent chromium, and emerging contaminants including PFAS by a NYSDOH ELAP-certified

laboratory. Upon meeting these criteria, the certified-clean fill will be transported to OU-2 and segregated from impacted soil/fill, as necessary, on plastic sheeting until it is used as backfill.

Soils that meet 'general' fill requirements under 6 NYCRR Part 360-13, but do not meet backfill or cover soil objectives for this site, will not be imported onto OU-2 without prior approval by the NYSDEC. The contents of this RAWP and NYSDEC approval of this RAWP will not be construed as an approval for this purpose.

A "Request to Import/Reuse Fill Material" form will be filed with the NYSDEC project manager for review and approval prior to import to OU-2. A copy of the form is presented in Appendix M.

5.4.10 Stormwater Pollution Prevention

The RE will document that the remediation contractor performs stormwater pollution prevention measures in accordance with the project-specific SWPPP, provided in Appendix I.

5.4.11 Contingency Plan

If USTs or other previously unidentified contaminant sources are found during on-site remedial excavation, sampling will be performed on product, if encountered, and surrounding subsurface soil/fill (e.g., soil, stone, etc.). Chemical analyses will be for full scan parameters (TCL VOCs and SVOCs, TAL metals, PCBs, pesticides, and PFAS). 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, as outlined below. Based on the area of OU-2, we anticipate maintaining a minimum of three CAMP stations based on wind direction and potential receptors.

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 (e.g., remedial excavation, grading) and handling. 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 field personnel 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 OU-2 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/m³ 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/m³ 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."

5.4.13.1 Odor Control Plan

This odor control plan is capable of controlling emissions of nuisance odors off-site. Specific odor control methods to be used on a routine basis will include application of foam suppressants or tarps over the odor or VOC source areas, if encountered. If nuisance odors are identified, work will be halted and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. NYSDEC and NYSDOH will be notified of all odor events and of all other complaints about the project. Implementation of all odor controls, is the responsibility of the Volunteers' contractors. Immediately notifying contractors of exceedances, will be the responsibility of the Volunteers' RE staff; the RE is responsible for certifying the FER. Immediate application of odor controls is the responsibility of the remediation contractor.

All 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 mitigate odor nuisances will include: (a) direct load-out of soils to trucks for off-site disposal; (b) use of chemical odorants in spray or misting systems; and, (b) use of staff to monitor odors in surrounding neighborhoods.

Although not anticipated, 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.

5.4.13.2 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 or on-site water truck for road wetting. The truck will be equipped with a water cannon capable of spraying water directly onto off-road areas including excavations and stockpiles.
- Gravel will be used on roadways 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 truck sprinkling.

5.4.13.3 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.

6.0 RESIDUAL CONTAMINATION TO REMAIN ON-SITE

Because residual contaminated soil, groundwater, and/or soil vapor will exist beneath OU-2 after the remedy is complete, Engineering and Institutional Controls (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 (OU-2) will have two primary EC systems: These are: (1) a composite cover system consisting of at least two feet of certified clean fill and/or concrete and asphalt caps and (2) a containment cut-off wall.

Remaining contamination left on site after implementation of the selected Track 4 remedy will be managed in place using IC/ECs and an NYSDEC-approved SMP to be included in the FER. 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.

7.0 ENGINEERING CONTROLS

Following completion of the Track 4 cleanup, it is anticipated that residual contamination will remain on OU-2. Therefore, an engineered composite cover system will be installed. For future site buildings, the potential for soil vapor intrusion will be evaluated. As required, ECs in the form of vapor mitigation measures for new buildings will be added to OU-2's list of ECs.

7.1 Composite Cover System

Exposure to residual soil/fill will be prevented by an engineered, composite cover system to be built on OU-2. This composite cover system will consist of a minimum of 2 feet of clean fill or gravel imported from an approved facility/source. For a soil cover system, the top 4 inches will consist of virgin ¾-inch crushed stone to serve as dust and vegetation suppression and mitigate erosion. Imported soil (i.e., clean fill) will meet the lower of PGW and RR SCOs. RCA is not acceptable for use in the composite cover system.

The composite cover system will be a permanent EC. It will be inspected and its performance certified at specified intervals as required by 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. A physical demarcation layer consisting of orange snow fencing or equivalent soil/fill will be placed below the composite cover system and clean fill placed in remedial excavations as a visual reference layer. A site survey will also be conducted to document the location of residual contamination.

7.2 Groundwater Containment Cutoff Wall

Based on the presence of petroleum non-aqueous phase liquid (NAPL) on Block 1833 (Area J) and the possibility of migration, a groundwater containment cutoff wall will be installed from about 2 feet above groundwater to at least 1 foot into the confining peat layer that exists across OU-2. The wall will require an infiltration rate of 10^{-6} centimeter/second or less across the barrier to mitigate the potential for source material migration from an offsite source. To achieve this, a sheet pile wall with sealed seams (i.e., Grace swell hydrophilic seals) will be installed along parts of the northern and eastern boundaries of Block 1833, Lots 155 and 172. A groundwater flow model was generated using Groundwater Modeling System v10.4 software platform running MODFLOW2000 and particle tracking software MODPATH to estimate groundwater flow and therefore conservatively estimate, in the absence of a groundwater containment cutoff wall, LNAPL migration throughout OU-2 and from the adjoining properties. Based on model results, a groundwater containment cutoff wall length of 300 feet along the northern boundary of Block 1833, Lots 155 and 172 (Area J), and 210 feet along the eastern boundary of Block 1833, Lot 155 (Area J), was determined to mitigate product migration onto OU-2. The groundwater containment cutoff wall will be a permanent EC. It will be inspected and its performance certified at specified intervals as required by 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 groundwater containment cutoff wall is disturbed after the remedial action is complete. The approximate extents of the groundwater containment cutoff wall are shown on Figure 7F.

7.3 Criteria for Completions of Remediation/Termination of Remedial System

Composite Cover System

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

Groundwater Containment Cutoff Wall

The groundwater containment cutoff wall is a permanent control and the quality and integrity of the system will be inspected prior to the installation of the composite cover system and at defined, regular intervals in perpetuity.

Groundwater Monitoring

Groundwater monitoring activities to assess the performance of the remedy, or natural attenuation following the removal of contaminant sources, will continue, as determined by NYSDOH and NYSDEC, until the groundwater RAOs are achieved. Monitoring will continue until permission to discontinue is granted in writing by NYSDEC and NYSDOH. Monitoring activities will be outlined in the Monitoring Plan of the SMP.

8.0 INSTITUTIONAL CONTROLS

Two institutional control elements have been designed to ensure continual and proper management of residual contamination in perpetuity: an EE and SMP. These elements are described in this section.

A site-specific EE will be recorded with the NYC Office of the City Register, Queens Borough, 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 OU-2 will have residual contamination after completion of the Remedial Action, then an EE is required. As part of this remedy, an EE approved by NYSDEC will be filed and recorded with the New York City Register's Office, Queens Borough. The EE will be submitted as part of the FER.

The EE renders OU-2 a Controlled Property. The EE must be recorded with the City Register, Queens Borough, before the Certificate of Completion can be issued by NYSDEC. A series of ICs are required under this remedy to implement, maintain and monitor these EC systems, prevent future exposure to residual contamination by controlling disturbances of the subsurface soil and restricting the use of OU-2 to restricted-residential, commercial, and industrial use(s) only (subject to applicable zoning). These ICs are requirements or restrictions placed on OU-2 that are listed in, and required by, the Environmental Easement. 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 cleanup, the ECs will be a composite cover system and a groundwater containment cutoff wall. The ICs that support the ECs are:

- 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 must be inspected, certified and maintained as required in the SMP;
- Groundwater and soil vapor and other environmental or public health monitoring must be performed as defined in the SMP;
- On-site environmental monitoring devices, including but not limited to, groundwater monitoring wells, must be protected and replaced as necessary to ensure proper functioning in the manner 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;
- 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; and
- ECs may not be discontinued without an amendment or extinguishment of the EE - The Environmental Easement 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 OU-2 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 soil/fill, 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(s) only, 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 residential use without an amendment or extinguishment of this EE; and
- 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 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[9]

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 Environmental Easement 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 OU-2 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 EC/IC Plan for implementation and management of EC/ICs; (2) a Monitoring Plan for implementation of site monitoring; (3) an Operation and Maintenance Plan for implementation of remedial collection, containment, treatment, and recovery systems; 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.

Site management, reporting, and EC/IC 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 the certifying period relative to the date of issuance of the COC. The first

[9] The Site Management Plan will address OU-2. Site management obligations for OU-1 will be addressed in the OU-1 Interim Site Management Plan.

submission will be due 16 months after the issuance of the COC, and annually (or at another frequency as approved by NYSDEC) thereafter.

The SMP in the FER will include a monitoring plan for groundwater on-site to evaluate site wide performance of the remedy. The proposed monitoring well network is provided on Figure 10.

No exclusions for handling of residual contaminated soils will be provided in the SMP. All handling of residual contaminated soil/fill will be subject to provisions contained in the SMP.

9.0 FINAL ENGINEERING REPORT

An FER[10] will be submitted to NYSDEC following implementation of the Remedial Action defined in this RAWP. The FER will be prepared in conformance with 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 soil/fill removed from OU-2 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 soil/fill and contaminated liquids characterization results and other sampling and chemical analysis 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;
- A thorough summary of remaining contamination that exceeds the Track 4 SCOs – A table and a map that shows remaining contamination in excess of the SCOs will also be included;
- An accounting of the destination of soil/fill and contaminated liquids removed from OU-2, including excavated contaminated soil, historical fill, solid waste, hazardous waste, non-regulated soil/fill, and fluids – Documentation associated with disposal of material must also include records and approvals for receipt by the destination facility of the material; and
- An accounting of the origin and chemical quality of fill imported onto OU-2.

The FER will provide test results as appropriate to demonstrate that all mitigation and remedial systems are functioning properly.

Where determined to be necessary by NYSDEC, a Financial Assurance Plan will be required to ensure the sufficiency of revenue to perform long-term operations, maintenance and monitoring

[10] OU-1 remedial activities will be documented in a separate, comprehensive Construction Completion Report. The FER will address OU-2.

tasks defined in the SMP and EE. This determination will be made by NYSDEC in the context of the FER review.

This RAWP proposes to achieve a Track 4 cleanup. As such, the FER will provide a summary of all residual contamination left on OU-2 after the remedy is complete. Residual contamination includes all contamination that exceeds Track 4 SCOs. A table and a map depicting concentrations above applicable SCOs for all soil/fill remaining at OU-2 after the remedial action will be included in the FER.

Before approval of an FER and issuance of a Certificate of Completion, all project reports must be submitted in digital form on electronic media (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 Willets Point Development (NYSDEC BCA Index No. C241146-10-13 Site No. C241146).

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 Seaver Way (formerly 126th Street)/Willets Point Development site and related amendments.

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 staff 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 all use restrictions, Institutional Controls, Engineering Controls, and all operation and maintenance requirements applicable to the Site are contained in an Environmental Easement created and recorded pursuant ECL 71-3605 and that all affected local governments, as defined in ECL 71-3603, have been notified that such easement has been recorded. A Site Management Plan has been submitted by the Volunteer for the continual and proper operation, maintenance, and monitoring of all Engineering Controls employed at the Site, including the proper maintenance of all remaining monitoring wells, and that such plan has been approved by the NYSDEC.

I certify that the export of contaminated soil, fill, water, or other contaminated material associated with Remedial Action Work Plan implementation (excluding that generated through demolition of site structures and general refuse) from the property was performed in accordance with the Remedial Action Work Plan, and were taken to facilities licensed to accept the stated waste 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 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.

10.0 SCHEDULE

Remedial activities are anticipated to take about 13 months. Within 90 days of completion of all remedial activities at OU-2, an FER will be submitted to NYSDEC as detailed in Section 9.0. A Gantt chart showing a detailed project schedule is included in Appendix L.

11.0 REFERENCES

1. Phase II Environmental Site Assessment (Final), prepared by HDR|LMS, dated December 2005.
2. Limited Phase II Site Investigation Report, prepared by HDR, dated February 2009.
3. Site Investigation Report Willets Point Infrastructure Improvements, prepared by EPM, dated March 7, 2011.
4. Willets Point Development Remedial Investigation Work Plan, prepared by Integral P.C., dated September 2004.
5. Remedial Investigation Work Plan Addendum, prepared by Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C., dated August 2021.
6. Draft Remedial Investigation Report, prepared by Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C., dated January 2022.
7. New York State Department of Health, Final Guidance for the Evaluation of Soil Vapor Intrusion in the State of New York, dated October 2006.
8. New York State Department of Environmental Conservation, Division of Environmental Remediation, Draft Brownfield Cleanup Program Guide, dated May 2004.
9. New York State Department of Environmental Conservation, DER-10 Technical Guidance for Site Investigation and Remediation, dated May 3, 2010; effective June 18, 2010.
10. New York State Department of Environmental Conservation, Part 375 of Title 6 of the New York Compilation of Codes, Rules, and Regulations, Effective December 14, 2006.
11. New York State Department of Environmental Conservation, Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS), dated June 2021.
12. New York State Division of Water Technical and Operational Guidance Series (TOGS) (1.1.1) dated June 1998.
13. New York State Division of Water Technical and Operational Guidance Series (TOGS) 5.1.8 New York State Stormwater Management Design Manual, dated June 2008.
14. United States Environmental Protection Agency, Region I, Low Stress (low flow) Purging and Sampling Procedure for the Collection of Groundwater Sampling From Monitoring Wells, EQASOP-GW4, dated July 30, 1996 and revised September 19, 2017.