REMEDIAL INVESTIGATION REPORT

for

WILLETS POINT DEVELOPMENT – OPERABLE UNIT 2 (PHASE 2)

126th STREET/WILLETS POINT BOULEVARD

QUEENS, NEW YORK

NYSDEC BCP Site No. C241146

Prepared For:

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LIST OF ACRONYMS

Acronym	Definition
AOC	Area of Concern
BCP	Brownfield Cleanup Program
bgs	Below Grade Surface
BTEX	Benzene, Toluene, Ethylbenzene, and Xylenes
CAMP	Community Air Monitoring Program
CEQR	City Environmental Quality Review
CVOC	Chlorinated Volatile Organic Compound
CSM	Conceptual Site Model
DER	Division of Environmental Remediation
DO	Dissolved Oxygen
DUSR	Data Usability Summary Report
EDC	NYC Economic Development Corporation
el	Elevation
ELAP	Environmental Laboratory Approval Program
EPH	Extractable Petroleum Hydrocarbons
ESA	Environmental Site Assessment
eV	Electron Volt
FEMA	Federal Emergency Management Agency
FID	Flame Ionization Detector
FWRIA	Fish and Wildlife Resources Impact Analysis
GPR	Ground Penetrating Radar
HASP	Health and Safety Plan
IEM	Independent Environmental Monitor
L/min	Liters per minute
LNAPL	Light nonaqueous-phase liquid
MCL	Maximum Contaminant Level
mg/kg	Milligrams per kilogram
mg/L	Milligrams per liter
MIP	Membrane Interface Probe
MS/MSD	Matrix Spike/Matrix Spike Duplicate
msl	Mean Sea Level
MTA	Metropolitan Transit Authority
NAVD88	North American Vertical Datum of 1988
NOVA	NOVA Geophysical Services
NYCDEP	New York City Department of Environmental Protection
NYCRR	New York Code Rules and Regulations
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
ORP	Oxygen Reduction Potential

Acronym	Definition
PBS	Petroleum Bulk Storage
PCB	Polychlorinated Biphenyls
PCE	Tetrachloroethene
PFAS	Perfluorinated Alkyl Substances
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctanesulfonic Acid
PFC	Perfluorinated Chemicals
PGW	Protection of Groundwater
PID	Photoionization Detector
ppb	Parts per billion
ppm	Parts per million
PVC	Polyvinyl Chloride
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
QDG	The Queens Development Group, LLC
RAWP	Remedial Action Work Plan
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
RIR	Remedial Investigation Report
RIWP	Remedial Investigation Work Plan
RL	Reporting Limit
RURR	Restricted Use Restricted-Residential
SCO	Soil Cleanup Objective
SGV	Standards and Guidance Values
SVOC	Semivolatile Organic Compound
TAL	Target Analyte List
TCE	Trichloroethene
TCL	Target Compound List
TCLP	Toxicity Characteristic Leaching Procedure
TOGS	Technical and Operational Guidance Series
TPH	Total Petroleum Hydrocarbons
UN/DOT	United Nations/Department of Transportation
USEPA	United Stated Environmental Protection Agency
USGS	United States Geological Survey
UST	Underground Storage Tank
UU	Unrestricted Use
µg/L	Micrograms per liter
$\mu g/m^3$	Micrograms per cubic meter
VOC	Volatile Organic Compound
York	York Analytical Laboratories Inc.

CERTIFICATION

I, Jason Hayes, certify that I am currently a Qualified Environmental Professional as defined in 6 NYCRR Part 375 and that this Remedial Investigation Report 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).

Jason Hayes, PE, LEED^{AP}

1.0 INTRODUCTION

Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C. (Langan) prepared this Remedial Investigation Report (RIR) 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). A site survey that depicts the OU-2 boundary and the Willets Point BCP Site boundary is included as Appendix A.

This RIR summarizes the findings of a Remedial Investigation (RI) conducted between September 3, 2021 and March 4, 2022. All RI activities were performed with an Independent Environmental Monitor (IEM) present and the RI was performed in accordance with the NYSDEC-approved August 10, 2021 Remedial Investigation Work Plan (RIWP) Addendum prepared by Langan. The 2014 RIWP was prepared for the entire 22.887-acre Willets Point Development BCP Site. The 7.803-acre part of the Willets Point Development BCP Site known as OU-1 was previously investigated in accordance with the 2014 RIWP. The RIWP Addendum addresses the OU-2 investigation.

Information presented in this RIR will be used to evaluate appropriate remedial action alternatives, which will be described in a Remedial Action Work Plan (RAWP).

This RIR is organized into the following sections:

- Section 2.0 describes the setting and physical characteristics of OU-2.
- Section 3.0 describes OU-2 background including results of previous investigations and identified areas of concern.

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[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.

- Section 4.0 presents the investigation field procedures.
- Section 5.0 describes the field observations and analytical results.
- Section 6.0 presents an assessment of the exposure risks of site contaminants to human, fish, and wildlife receptors.
- Section 7.0 presents the nature and extent of contamination in site media as determined through the field investigation and analysis of environmental samples.
- Section 8.0 summarizes the results of the investigation and presents conclusions based on field observations and analytical results.
- Section 9.0 presents the references used in preparation of this report.

2.0 SITE PHYSICAL CHARACTERISTICS

2.1 Site 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), OU-2 is zoned manufacturing (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.

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 buildings 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.

2.1.1 Description of Surrounding Properties

The following is a summary of property usage adjoining, adjacent and surrounding OU-2:

Direction	Adjoining and Adjacent Properties		Surrounding Properties
	Block and Lot No(s).	Description	
North	Block 1822, Lot 23 Block 1823, Lots 7, 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

Direction	Adjoining and Adjacent Properties		Surrounding Properties
	Block and Lot No(s).	Description	
East	Block 1833, Lot 1 Block 1832, Lots 1, 10 Block 1831, Lots 1, 10 Block 1822, Lots 21, 23, 33 Block 1821, Lots 1, 27, 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	Block 1833, Lots 200, part of 155 Block 1826, part of lots 5, 14, 18, 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	Block 1787, Lot 20 Block 1820, Lots 34, 108 Block 1822, Lots 7, 55 Block 1823, Lots 14, 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 850 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

Number	Name (Approximate distance from site)	Address
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
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

A map of the surrounding land uses is included as Figure 3.

2.1.2 Topography

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.

2.1.3 Surface Water and Drainage

OU-2 and its surrounding local area is characteristic of a low-lying drainage zone that was once covered by a tidally-influenced salt marsh. Foundations of existing or previously razed buildings are present. The remaining areas are either covered by patches of asphalt, gravel, sand, or vegetation. Surface runoff from OU-2 drains to stormwater management infrastructure in Seaver Way and then to Flushing Bay.

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.

2.1.4 Wetlands

Wetlands were evaluated by reviewing the National Wetlands Inventory and NYSDEC regulated wetlands map. There are no wetlands located on OU-2. The nearest wetlands are Flushing Bay and Flushing Creek to the north and east, respectively, and are classified as E1UBL wetlands.

2.2 Regional Geology and Hydrogeology

2.2.1 Regional Geology

Subsurface strata in the region generally consists of historic fill followed by native deposits of sand, silt, and gravel. Organic deposits including peat and clay are common beneath historic fill within the former tidally influenced salt marsh adjacent to Flushing Creek. According to the USGS Bedrock and Engineering Geologic Maps of Bronx County and Parts of New York and Queens Counties, New York, dated 1994, bedrock beneath the site is the Hartland Formation, Pelham Bay Member. The Pelham Bay Member typically consists of gray garnet-plagioclase-sillimanite gneiss, gray sillimanite-plagioclase-biotite gneiss, and gray biotite-hornblende gneiss. Langan completed a geotechnical investigation at the site in 2019 and 2020; bedrock was not encountered during the geotechnical investigation and bedrock is expected to be deeper than 200 feet below grade surface (bgs).

2.2.2 Regional Hydrogeology

Groundwater flow is typically topographically influenced, as shallow groundwater tends to originate in areas of topographic highs and flows toward areas of topographic lows, such as rivers, stream valleys, ponds, and wetlands. A broader, interconnected hydrogeologic network often governs groundwater flow at depth or in the bedrock aquifer. Groundwater depth and flow direction are also subject to hydrogeologic and anthropogenic variables such as precipitation, evaporation, extent of vegetation cover, coverage by impervious surfaces, and subsurface structures. Other factors influencing groundwater include depth to bedrock, the presence of anthropogenic fill, and variability in local geology and groundwater sources or sinks. Taking into consideration the OU-2 groundwater elevation contours (presented herein) and contours previously modeled for OU-1, the apparent overall flow direction is from east to west. Because of the lack of drainage systems, groundwater elevations are presumed to heavily depend on precipitation and infiltration.

Groundwater in New York City is not used as a potable water source. Potable water provided to the City of New York is derived from surface impoundments in the Croton, Catskill, and Delaware watersheds.

3.0 SITE BACKGROUND

This section describes the historical and proposed use of the Willets Point Development BCP Site, and discusses the findings from previous environmental investigations conducted across the Willets Point BCP Site. Areas of Concern (AOCs) were developed based on a review of the previous reports and findings from the RI; AOCs are summarized at the end of this section.

3.1 Historical Site Use

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 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 buildings exist on Block 1824.

3.2 Proposed Redevelopment Plan

Currently, plans for proposed development of OU-2 are 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 body shop will be evicted, and demolition of the structure will follow. Future proposed development will likely include multifamily housing and commercial uses.

3.3 Previous Environmental Reports and Documents

Previous investigation reports, including the 2014 RIWP, were reviewed as part of this RIR. These reports are summarized below and are included in Appendix B. The following limited environmental investigations were implemented on behalf of the NYC Economic Development Corporation (EDC) at the Willets Point BCP Development Site, including OU-2, between 2005 and 2011 (before its entry into the BCP):

- 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 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, peat, and gravel. Groundwater was encountered between about 5 and 10 feet 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 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 U.S. EPA 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.

3.4 Summary of Areas of Concern

AOCs were established in the RIWP Addendum prepared by Langan based on a review of the above-discussed previous environmental reports and site observations. This RIR further evaluates the AOCs using the OU-2 RI data.

3.4.1 AOC 1: Historic Fill

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 and general refuse from greater New York City. Fill from unknown sources may have been used as backfill during various phases of the development history of OU-2. Previous environmental investigations identified a historic fill layer consisting of sand with varying amounts of fine gravel and silt, brick, concrete, coal, coal ash, glass, slag, wood, ceramics, metal, plastic, rubber, copper wire, incinerator debris, and asphalt beneath OU-2 to depths up to 19 feet bgs. Contaminants associated with historic fill, including SVOCs, PCBs, and metals, were detected at concentrations above NYSDEC Part 375 Unrestricted Use (UU) and Protection of Groundwater (PGW) Soil Cleanup Objectives (SCO) and above the U.S. EPA Maximum Concentration of Contaminants for the Toxicity Characteristic (lead only) in soil samples collected from the historic fill layer. The filled in former marsh may be a source of methane and hydrogen sulfide gases in the subsurface.

3.4.2 AOC 2: Historical Site Uses

In addition to the historical use as a dumping ground for coal ash, 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 further developed with automotive uses, including small car repair shops, filling stations, and scrapyards. These automotive-centric industrial activities characterized OU-2 until about 2015 when they were largely shutdown.

3.4.3 AOC 3: Petroleum Bulk Storage and Other Chemical Storage

The 2014 RIWP identified petroleum bulk storage (PBS) and chemical storage throughout OU-2 including aboveground storage tanks (AST), underground storage tanks (UST), and drums. Evidence of impacts, including staining, odors, and elevated PID readings were observed at approximately 1.5 to 5 feet bgs during the 2019 limited site investigation. Similarly, the 2009 Phase II by HDR identified petroleum impacts to groundwater in two monitoring wells. The extent and source of these impacts is currently unknown.

3.4.4 AOC 4: Other Potential Off-Site Sources

The land use surrounding Willets Point Development BCP Site includes various automotive repair and wrecking facilities, junkyards, filling stations, small industrial facilities and other similar businesses.

4.0 FIELD INVESTIGATION

The 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 IEM present. Four AOCs were initially developed based on historical site review. The four AOCs 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. A sample summary is included as Table 1 and AOCs and sample locations are shown on Figure 4.

The RI consisted of the following:

- 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 and developed. Due to the presence of light nonaqueous-phase liquid (LNAPL), 47 of the 48 wells were sampled. One additional two-inch groundwater monitoring well was installed to assess the presence of LNAPL but was not developed or sampled.
- 46 monitoring well locations were surveyed and synoptic depth to groundwater measurements were recorded.
- 44 temporary soil vapor points were installed, sampled and removed.
- 1 ambient air sample was collected.
- The Community Air Monitoring Plan (CAMP) was implemented during intrusive subsurface activities.

Langan completed the RI in accordance with Title 6 New York Codes, Rules, and Regulations (6 NYCRR) Part 375-3.8, NYSDEC DER-10 (May 2010), New York State Department of Health (NYSDOH) Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006 and subsequent updates), and the NYSDEC-approved RIWP Addendum.

The table below summarizes the sampling scheme described in the RIWP Addendum, which was followed to investigate AOCs and evaluate the nature and extent of contamination at OU-2.

Sample Type (Symbol Color on Figures)	Soil Sampling	Groundwater Sampling	Soil Vapor Sampling
Historic Fill Evaluation and Phase I Investigation REC/AOC (Blue)	Soil boring advanced to native soil. Up to three soil samples including 1) One sample of surficial historic fill , 2) One sample from the interval where the greatest evidence of environmental contamination is observed or the groundwater interface, and 3) One sample from the 1-foot interval below vertical extents of impacts (if encountered).	2-inch monitoring wells installed and sampled except where precluded by the presence of light nonaqueous-phase liquid	Temporary soil vapor probe installed and sampled, where not precluded by the presence of shallow groundwater
Soil/Fill Sample (Black)	Soil boring advanced to native soil. Up to three soil samples including 1) One sample of surficial historic fill, 2) One sample from the interval where the greatest evidence of environmental contamination is observed or the groundwater interface, and 3) One samples from the 1-foot interval below vertical extents of impacts (if encountered).	Monitoring wells not installed	Soil vapor probe not installed
Exploratory Probes (Pink)	Exploratory probes advanced to native soil. Delineation points defined based on real-time field screening observations.	Monitoring wells not installed	Soil vapor probe not installed
Exploratory Probes With Soil Samples (Green)	Exploratory probes advanced to native soil. Delineation points defined based on real-time field screening observations.	Monitoring wells not installed	Soil vapor probe not installed

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

The alphabetic labeling for each area is also detailed on the enclosed Table 1 - Sample Collection Summary.

4.1 Geophysical Investigation and Test Pit Excavation

On September 2, 3, 8, 21, 24, and 28, 2021, a geophysical survey was completed by NOVA Geophysical Services (NOVA). Langan field personnel oversaw NOVA and documented field observations. NOVA used ground penetrating radar (GPR), radio frequency, and electromagnetic detection equipment to delineate anomalies and identify subsurface structures. Supplemental to the geophysical investigation, two shallow test pits were excavated on December 13, 2021 to further evaluate two subsurface anomalies identified by the GPR. The geophysical report is included as Appendix C.

4.2 Soil Investigation

4.2.1 Investigation Methodology – Direct-Push Exploratory Probes

The objectives of exploratory probes were to (1) collect real-time field readings with a PID and asses for odors and staining to screen for potential VOC contaminant conditions vertically and horizontally, and (2) evaluate stratigraphy and groundwater depth.

Lakewood Environmental Services, Corp (Lakewood) of Smithtown, New York advanced 143 exploratory probes, using a Geoprobe 6610DT or a Geoprobe 6712DT, from September 3 to October 8, 2021, and on October 27 and 28, 2021. Exploratory probes were advanced to depths of up to 24 feet bgs. Langan field personnel documented drilling activities, logged soil characteristics, and collected soil samples for VOC and SVOC analysis only where evidence of petroleum-like contamination was observed. Obstructions were encountered between 4 and 10 feet bgs at the following eight exploratory probe locations: G-EP104, I-EP104, J-EP104, J-EP109, J-EP111, J-EP114, J-EP115, and J-EP116. Boring logs for all exploratory probes are included in Appendix D.

AARCO Environmental Services, Corp (AARCO) of Lyndhurst, New York advanced two exploratory probes (J-EP117 and J-EP118), using a Geoprobe 7822DT direct push drill rig or a Geoprobe 8140LS Sonic drill rig, on February 24, 2022. Exploratory probes were advanced to depths of up to 15 feet bgs. Langan field personnel documented drilling activities and logged soil characteristics.

CAMP was implemented during intrusive subsurface activities throughout the RI. CAMP data is provided as Appendix E.

4.2.2 Investigation Methodology – Direct-Push Soil Borings

Lakewood advanced 85 soil borings from September 3 to October 8, 2021, and on October 27 and 28, 2021. Langan field personnel documented drilling activities, logged soil characteristics, and collected soil samples for the full suite of analytes described in the RIWP. Soil boring locations are shown on Figure 4 and soil boring logs are included in Appendix D. The soil borings were advanced to depths of up to 20 feet bgs, using a Geoprobe 6610DT or a Geoprobe 6712DT. Soil samples were inspected for visual and olfactory evidence of contamination and screened for organic vapors with a PID.

4.2.3 Investigation Methodology – Delineation

In addition to the base scope soil borings/exploratory probes prescribed in the RIWP Addendum, delineation soil borings/exploratory probes were advanced around six locations (E-SB103, E-EP115, H-SB115, I-SB106, I-EP108, and J-EP101) to assess the vertical and horizontal extent of contamination.

- Petroleum-like product was observed at locations E-SB103, E-EP115, H-SB115, I-SB106, I-EP108, and J-EP101. Soil borings were advanced to delineate gross impacts around these locations from depths between 12 and 24 feet bgs. Samples were collected from the interval where the greatest evidence of contamination was observed within each boring, and in some borings from an underlying inferred non-contaminated layer.

4.2.4 Soil Sampling and Analysis

Langan collected 389 soil samples from both exploratory probes and soil borings (plus quality assurance/quality control [QA/QC] samples) for laboratory analysis. Soil samples were collected in laboratory-supplied containers, which were relinquished under standard chain-of-custody protocol and delivered via courier to York Analytical Laboratories Inc. (York). York is a NYSDOH Environmental Laboratory Approval Program (ELAP)-certified laboratory. As detailed in Table 1, samples were analyzed for one or more of the following: TCL VOCs, SVOCs, PCBs, pesticides, TAL metals, TCLP metals, TPH, DRO, GRO, 1,4-dioxane, and per- and polyfluoroalkyl substances (PFAS or perfluorinated chemicals [PFCs]).

During the RI, 30 field blanks, 20 field duplicate samples, 20 matrix spike/matrix spike duplicate (MS/MSD) sample sets, and 24 trip blanks were collected and submitted for laboratory analysis.

4.3 Groundwater Investigation

Groundwater monitoring wells were installed to investigate potential impacts to groundwater and to characterize groundwater conditions.

4.3.1 Monitoring Well Installation and Development Methodology

Lakewood installed 46 2-inch-diameter monitoring wells during the first mobilization, and 1 additional 2-inch-diameter monitoring well during the second mobilization. Well construction consisted of 2-inch-diameter polyvinyl chloride (PVC) riser pipe with 10- to 15-foot-long, 10-slot (0.01-inch) screens straddling the water table. Because of frequent flooding, all but four monitoring wells were finished with steel stick-up casing. Monitoring wells E-MW102, H-MW101, J-MW101, and J-MW102 were finished with steel flush-mount covers due to their location in areas of high traffic.

On February 24, 2022, AARCO installed two 2-inch diameter monitoring wells. Well construction consisted of 2-inch-diameter polyvinyl chloride (PVC) riser pipe with 10-foot-long, 10-slot (0.01-inch) screens straddling the water table. Monitoring well J-MW118 was finished with steel stick-up casing and monitoring well J-MW117 was finished with a steel flush-mount cover due to its location in a high traffic area. Monitoring well locations are shown on Figure 4. Wells were developed following installation using a submersible pump. During development, groundwater was purged until water became clear or the well ran dry. Monitoring well construction logs are included as Appendix F.

4.3.2 Groundwater Sampling and Analysis

Langan collected 47 groundwater samples (plus QA/QC samples) for laboratory analysis. Monitoring wells E-MW103 and J-MW112 were not sampled due to the presence of LNAPL in the well. Monitoring wells were sampled in accordance with the USEPA's low-flow groundwater sampling procedure ("Low Stress [low-flow] Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells", dated July 30, 1996 and revised September 19, 2017). Prior to sample collection, groundwater was purged from each well until pH, conductivity, turbidity, dissolved oxygen (DO), temperature, turbidity, and oxidation-reduction potential (ORP) stabilized, until the well ran dry, or for at least one hour. Groundwater sampling logs are included in Appendix G.

Langan collected groundwater samples in laboratory-supplied containers, which were relinquished under standard chain-of-custody protocol and delivered via courier to York. York analyzed groundwater for one or more of the following analyses: TCL VOCs, SVOCs, PCBs, pesticides, TAL metals (total and dissolved), 1,4-dioxane, and PFAS.

Eleven field blanks, three duplicate samples, three MS/MSD sample sets, and eleven trip blanks were collected and submitted for laboratory analysis.

4.3.3 Well Surveying and Synoptic Gauging

On October 13 and 14, 2021, Langan surveyed the monitoring wells installed during the RI. On October 15, 2021, Langan personnel collected monitoring well headspace PID readings and completed a synoptic groundwater gauging of 46 on-site monitoring wells. A second synoptic gauging event was conducted on December 7, 2021. Monitoring well construction details and a groundwater elevation summary is provided as Table 2, and groundwater elevation contours are shown on Figures 5A and 5B.

4.4 Soil Vapor Investigation

4.4.1 Soil Vapor Point Installation

On September 15, 16, 22, 28, and 29, 2021 and October 7 and 8, 2021, Lakewood installed 44 temporary soil vapor sample points. These points were co-located with monitoring wells. Lakewood attempted to install four additional soil vapor sample points at the other monitoring well locations (F-SV103, F-SV11, F-SV106, G-SV109); however, shallow groundwater (i.e., within one foot of the ground surface) prohibited soil vapor point installation. Two of these soil vapor points were moved to alternative locations (F-SV103 to F-EP103; G-SV109 to G-SB113).

Soil vapor points were installed to depths of 1 to 8 feet bgs. The probes were installed in accordance with the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York and consisted of a 1-7/8-inch-long polyethylene screen implant threaded into 3/16-inch-ID, ¼-inch-OD Teflon-lined polyethylene tubing. A sand filter pack was installed around the screen implant by pouring No. 1 sand into the soil vapor point annulus. The sand filter pack was placed to a depth of about 6 inches above the implant. The remainder of the annulus was sealed with a bentonite slurry. Soil vapor construction logs are provided as Appendix H.

As a QA/QC measure, an inert tracer gas (helium) was introduced into an above-grade sampling chamber to ensure that the sampling points were properly sealed above the target sampling depth, thereby preventing subsurface infiltration of ambient air. The tracer gas seal test was not conducted on 25 sampling points where methane was detected at greater than 0.5% because methane build-up in the helium shrouds could pose a safety risk to field personnel. Prior to sampling, three well volumes were purged from the point using a multi-gas monitor at a rate of less than 0.2 liters per minute. The multi-gas monitor was used to screen the soil vapor for the presence of VOCs.

4.4.2 Soil Vapor Sampling Methodology

Langan collected 44 soil vapor samples and 1 ambient air sample. Each soil vapor point was purged using a MultiRAE PGM multi-gas meter to record to the total VOC concentration of soil vapor and to evacuate a minimum of three sample tubing volumes prior to sample collection. The soil vapor samples were collected into 6-liter laboratory-supplied, batch-certified Summa® canisters fitted with a regulator calibrated for a sampling rate of about 0.04 liters per minute ([L/min] or about 120 minutes of sampling).

The labeled 6-Liter Summa® canisters were relinquished under standard chain-of-custody protocol and delivered via courier to York. York analyzed the soil vapor samples for VOCs by USEPA Method TO-15 and seven soil vapor samples were also analyzed for methane.

4.5 Quality Control Sampling

During the course of the investigation, QA/QC samples were collected for laboratory analysis in accordance with the Quality Assurance Project Plan (QAPP) and Emerging Contaminants QAPP. Collected QA/QC samples are detailed Table 1.

Soil samples

- One field duplicate sample per every 20 samples
- One MS/MSD sample per every 20 samples
- One field blank for PFAS per shipment
- One field blank (other analytes) sample per every 20 samples
- One trip blank sample per shipment

Groundwater samples

- One field duplicate sample per every 20 samples
- One MS/MSD sample per every 20 samples
- One field blank for PFAS per shipment

- One field blank (other analytes) sample per every 20 samples
- One trip blank sample per shipment

Soil Vapor Samples

- One field duplicate per every 20 samples

Field duplicates were collected to assess the precision of the analytical methods relative to the sample matrix. Soil duplicates were collected from the same soil as the primary sample by splitting the volume of homogenized sample collected in the field into two sample containers. Groundwater duplicates were collected from the same groundwater as the primary sample by alternating the two sample containers during collection. The air sample duplicate was collected by co-locating two summa canisters and collecting air over the similar time intervals. Similarly, soil MS/MSD samples were collected from the same soil as the primary sample by splitting the volume of homogenized sample collected in the field into three sample containers. MS/MSD samples were collected to assess the effect of the sample matrix on the recovery of target compounds or target analytes.

Field blanks were collected to determine the cleanliness of unused tubing, nitrile gloves and acetate liners used to collect groundwater and/or soil samples. Field blank samples consisted of deionized, distilled water provided by the laboratory that was passed through the sampling apparatus. Field blank samples were analyzed for the same list of analytes as the corresponding sampling event and sample matrix.

Trip blank samples were collected to assess the potential for contamination of the sample containers and samples during the trip from the laboratory, to the field, and back to the laboratory for analysis. Trip blanks contained about 40 milliliters of acidic water (doped with hydrochloric acid) that were sealed by the laboratory when the empty sample containers were shipped to the field, and unsealed and analyzed by the laboratory when the sample shipment was received from the field. The trip blank samples were analyzed for VOCs.

4.6 Data Validation

Analytical data was validated in accordance with EPA and NYSDEC validation protocols. Copies of the data usability summary reports (DUSR) and the data validator's credentials are provided in Appendix I.

A DUSR was prepared for each sampling matrix. The DUSR presents the results of data validation, including a summary assessment of laboratory data packages, sample preservation and chain-of-custody procedures, and a summary assessment of precision, accuracy, representativeness, comparability, and completeness for each analytical method. For the soil, groundwater, and soil vapor samples, the following items were assessed:

- Hold times;
- Sample preservation;
- Sample extraction and digestion;
- Laboratory blanks;
- Laboratory control samples;
- System monitoring compounds;
- MS/MSD recoveries; and
- Field duplicate, trip blank, and field blank sample results.

Based on the results of data validation, the following qualifiers may be assigned to the data in accordance with the EPA's guidelines and best professional judgment:

R – The sample results are unusable because certain criteria were not met when generating the data. The analyte may or may not be present in the sample.

J – The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample.

UJ – The analyte was not detected at a level greater than or equal to the reporting limit; however, the reported reporting limit is approximate and may be inaccurate or imprecise.

U – The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the RL or the sample concentration for results impacted by blank contamination.

NJ – The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.

After data validation was complete, validated data were used to update the tables and figures included in this report.

4.7 Field Equipment Decontamination

Downhole drilling equipment was decontaminated between each boring by washing with an Alconox-based solution. Decontamination wastewater was contained in a wash pan and containerized in 55-gallon drums for disposal. Handheld sampling equipment was decontaminated by hand in an Alconox-based solution and triple rinsed with deionized water. Decontamination liquids were temporarily contained in 5-gallon buckets and then added to drums at the end of each work day.

4.8 Investigation-Derived Waste Management

Investigation-derived waste generated during the RI was properly handled and containerized. Soil cuttings from boring advancement, groundwater from monitoring well development and purging, and decontamination water were placed into 11 United Nations/Department of Transportation (UN/DOT)-approved 55-gallon steel drums with sealed tops. Soil cuttings, which constituted than 2 drums, was bulked with soil stockpiles on OU-1 and exported to the approved disposal facility, Hazleton Creek Properties facility located in Hazleton, Pennsylvania, on March 7, 2022. Nine drums of groundwater we pumped into the OU-1 groundwater treatment system and treated prior to discharge. A copy of the soil disposal manifest is included in Appendix J.

4.9 Scope Deviations

The following deviations from the NYSDEC-approved RIWP Addendum were made to the proposed scope of work:

1. The NYSDEC-approved August 10, 2021 RIWP Addendum proposed 120 exploratory probes would be advanced, and a total of 145 were completed during the RI. Additional exploratory probes were advanced due to the presence of odors, staining, and/or PID readings above background in a greater number of exploratory probes than expected and to attempt to delineate areas where gross impacts were observed.

2. During the RI, a total of 72 samples were collected from exploratory probes that were analyzed for 6 NYCRR Part 375 compound list and TCL VOCs, TCL SVOCs, PCBs, pesticides, TAL metals (including hexavalent chromium), total cyanide, and emerging contaminants including 1,4-dioxane and per- and PFAS. The RIWP proposed collection of 69 full-suite soil samples from exploratory probs.

3. An additional 62 soil samples, not proposed in the RIWP, were collected from exploratory probes and analyzed for VOCs and SVOCs based on field observations (odors, staining, and/or PID readings) of petroleum-like impacts.

4. The RIWP Addendum proposed up to 45 groundwater monitoring wells would be installed and sampled. During the RI, a total of 49 monitoring wells were installed and 47 groundwater samples were collected. Two of the additional groundwater monitoring wells, E-MW115 in Area E and J-MW112 in Area J, were installed due to the presence of gross petroleum-like impacts observed in the associated soil borings. The other two additional wells, J-MW117 and J-MW118, were installed during the third RI mobilization to gather additional groundwater data from the southeastern part of Area J and to further

document petroleum-like impacts in Area J. Monitoring wells J-MW112 and E-MW103 were unable to be sampled due to the presence of LNAPL.

5. The RIWP Addendum proposed up to 45 soil vapor samples and a total of 44 soil vapor samples were collected. Four soil vapor points, F-SV103, F-SV106, F-SV111, and G-SV109 were not installed at the proposed locations in the RIWP due to the shallow groundwater table precluding soil vapor sampling in these areas. Two of these points, F-SV103 and G-SV109 were relocated and collected outside of the area impacted by shallow groundwater. F-SV103 was relocated west and co-located with F-EP103 instead of F-SB103, and G-SV109 was relocated west and co-located with G-EP109 instead of G-SB109. The proposed F-SV106 and F-SV111 were not installed or collected. One additional soil vapor point, E-SV115 was installed and co-located with groundwater monitoring well E-MW115.

5.0 FIELD OBSERVATIONS AND ANALYTICAL RESULTS

5.1 Geophysical Investigation Findings

The geophysical survey identified several anomalies consistent with the size or shape of USTs, hydraulic lifts, oil/water separators and potential active and/or abandoned utility conduits. The following anomalies were identified in the survey:

- Five anomalies resembling USTs were identified in the western part of Block 1826/1827 (Area E). The anomalies were investigated further via test pit excavation on December 13, 2021 and determined to be two hydraulic lifts and a utility vault.
- Two anomalies resembling hydraulic lifts and one gasoline fill port were identified in the northwestern part of Block 1825 (Area F).
- Two vent pipes were identified in the western part of Block 1823 (Area H).
- Anomalies resembling three hydraulic lifts, one oil/water separator, and one UST, as well as a fill port and vent pipe within close vicinity of the suspected UST were identified on Area I. The suspected UST anomaly and fill port/vent pipe were further investigated on December 13, 2021. A UST was not found, but three dry wells presumably used for storm water management were identified.
- Various public and private utilities including storm and sanitary manholes, sewer drains, electric conduits and cables, water mains and services, and gas mains and services were identified site-wide.
- Various anomalies resembling subsurface piping that did not appear to connect to known utilities were identified in Block 1822 (Area I) and Block 1820 (Area K).

The geophysical survey report is included in Appendix C.

5.2 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.

5.2.1 <u>Historic Fill</u>

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

5.2.2 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 peat. 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.

5.2.3 Hydrogeological Conditions

Groundwater was observed between about 2.01 and 11.44 feet bgs (which correlates to el 1.24 and el 7.49[2]). Groundwater elevation contours were modeled, as shown on Figures 5A and 5B, 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.

5.3 Soil Findings

5.3.1 Field Observations

Distinct layers of coal ash were observed in 59 of the 228 RI soil borings and exploratory probes. Petroleum-related conditions, including odors, staining, and/or PID readings above background and odorous peat/organic material were observed in 104 RI soil borings/exploratory probes. The

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

depth interval, maximum PID measurement, and observations (i.e., odors and staining) for the soil boring locations are summarized in the following table:

Block (Sampling Area)	Soil Boring ID	Depth Interval (feet bgs)	Maximum PID Reading (ppm)	Observations
Block 1826/1827 (E)	E-SB101	2.5 to 8	70.4	petroleum-like odor
	E-SB103	0 to 1.5	6.2	petroleum-like odor
		6 to 12	7.0	petroleum-like odor, staining, product
	E-SB106	6 to 8	10.0	petroleum-like odor
	E-SB107	2.5 to 3	2.3	petroleum-like odor
	E-SB109	2.5 to 8	0.1	petroleum-like odor
	E-EP101	6 to 11	103.1	petroleum/chemical-like odor and purple colored staining/liquid
	E-EP105	1 to 10	7.1	petroleum-like odor
	E-EP106	5 to 10	4.3	petroleum-like odor
	E-EP108	6.5 to 11	2.8	petroleum-like odor
	E-EP109	3 to 11	46.5	petroleum-like odor
	E-EP110	2 to 4	35.6	petroleum-like odor
		7 to 8	180.6	petroleum-like odor and staining
	E-EP112	0 to 11	0.2	petroleum-like odor
	E-EP113	0 to 11	30.1	petroleum-like odor
	E-EP115	6 to 15	79.7	petroleum-like odor, staining, and sheen
	E-EP118	6.5 to 8	18.9	petroleum-like odor
	E-EP119	1 to 6.5	24.2	petroleum-like odor
	E-EP120	2 to 11	12.0	petroleum-like odor
Block 1825 (F)	F-SB103	1 to 1.5	18.6	petroleum-like odor
	F-SB106	6 to 7	22.9	petroleum-like odor and sheen
	F-SB110	0.5 to 1	4.7	petroleum-like odor and staining
	F-SB111	1.5 to 2.5	26.7	petroleum-like odor
	F-SB114	0.5 to 1	20.1	petroleum-like odor
	F-SB115	2 to 10	49.5	petroleum-like odor, sheen, and staining
	F-SB116	5.5 to 6	11.7	petroleum-like odor
	F-SB122	0.5 to 1	1.5	petroleum-like odor
	F-EP101	6.5 to 8	477.3	petroleum-like odor, staining, and sheen
	F-EP102	3 to 6.5	2.2	Petroleum-like odor, sheen, and staining
	F-EP103	7 to 9	9.4	petroleum-like odor, sheen, and staining
	F-EP104	1 to 1.5	5.7	petroleum-like odor and staining
	F-EP108	6.5 to 8	28.1	petroleum-like odor and sheen
	F-EP109	2 to 2.5	23.5	petroleum-like odor
	F-EP112	5 to 6	5.7	petroleum-like odor

Block (Sampling Area)	**Soil Boring ID**	**Depth Interval (feet bgs)**	**Maximum PID Reading (ppm)**	**Observations**
	F-EP114	6.5 to 8	44.3	petroleum-like odor and staining
	F-EP116	0.5 to 1.5	75.0	chemical-like odor
	F-EP119	1.5 to 2	0.7	petroleum-like odor
	F-EP122	1.5 to 2	0.6	petroleum-like odor
	F-EP123	0 to 0.5	4.4	petroleum-like odor
	F-EP127	10 to 10.5	5.8	sheen
	F-EP130	1 to 6	72.7	petroleum-like odor and sheen
	F-EP131	0 to 8	277.3	petroleum-like sheen
Block 1824 (G)	G-SB102	1.5 to 2	30.1	petroleum-like odor
		6.5 to 7	6.5	petroleum-like odor
	G-SB104	6 to 8	191.0	petroleum-like odor, sheen and staining
	G-SB106	7 to 8	11.7	petroleum-like odor and sheen
	G-SB110	5.5	11.3	N/A
	G-SB115	2.5	12.5	N/A
	G-EP102	6.5 to 8	0.0	petroleum-like odor and staining
	G-EP103	0 to 2	193.7	petroleum-like odor
	G-EP107	6 to 7.5	6.7	petroleum-like odor and sheen
	G-EP109	0.5 to 10.5	83.6	petroleum-like odor and staining
	G-EP114	6.5 to 7.5	105.2	N/A
	G-EP115	7.5 to 8	4.5	petroleum-like odor
	G-EP117	0 to 3	38.7	petroleum-like odor
	G-EP118	0.5	12.8	N/A
	G-EP120	6.5 to 8.5	603.5	petroleum-like odor, staining, and sheen
	G-EP122	6.5 to 7	63.5	petroleum-like odor and staining
	G-EP124	0.5 to 1	24.1	petroleum-like odor
Block 1823 (H)	H-SB102	1.5 to 5	40.0	N/A
	H-SB103	0 to 0.5	17.6	N/A
	H-SB104	8 to 10	52.8	sheen
	H-SB106	8 to 9	40.7	N/A
	H-SB111	2 to 3.5	7.4	petroleum-like odor
	H-SB112	3 to 10	17.7	petroleum-like odor, sheen, and staining
	H-SB113	1.5 to 3	16.1	petroleum like odor
	H-SB115	1 to 9	68.0	petroleum-like odor, sheen, and staining
	H-SB115SW	0.5 to 1	18.7	petroleum-like odor
	H-SB115SE	7 to 8	108.9	petroleum-like odor, staining, and sheen
	H-SB115SE2	6.5 to 9	87.0	petroleum-like odor, staining, and sheen
	H-SB115SE3	6.5 to 9	180.9	petroleum-like odor and staining

Block (Sampling Area)	Soil Boring ID	Depth Interval (feet bgs)	Maximum PID Reading (ppm)	Observations
	H-SB115SE4	6 to 8	6.5	petroleum-like odor, staining, and sheen
	H-EP101	2 to 3.5	118.6	petroleum-like odor, tar-like substance
	H-EP103	1 to 2	7.3	petroleum-like odor
	H-EP105	2.5 to 3	18.8	N/A
	H-EP107	3 to 3.5	143.3	petroleum-like odor, staining, and sheen
	H-EP109	7 to 8	61.6	petroleum-like odor, staining, and sheen
	H-EP111	0.5 to 3.5	56.0	N/A
	H-EP113	1 to 1.5	99.4	N/A
	H-EP117	7.5 to 9.5	15.6	petroleum-like odor and staining
Block 1822 (I)	I-SB101	5 to 8	324	petroleum-like odor
	I-SB103	0 to 8	160	petroleum-like odor, sheen, and staining
	I-SB106	6.5 to 10	110	petroleum-like odor, sheen, and staining
	I-SB106NE	2.5 to 8.5	832.2	petroleum-like odor, staining, and sheen
	I-SB106SE	2 to 8	30.1	petroleum-like odor and sheen
	I-SB106SW	2 to 8	69.3	petroleum-like odor
	I-SB106NE2	6 to 10	797	petroleum-like odor, staining, and sheen
	I-EP101	1.5 to 3	11.5	petroleum-like odor
	I-EP102	0 to 2	52.2	N/A
	I-EP103	1.5 to 8	76.0	petroleum-like odor, sheen, staining , and tar-like substance
	I-EP104	7 to 8	250	petroleum-like odor, staining, sheen, and tar-like substance
	I-EP105	3	13.3	N/A
	I-EP107	0 to 1	254	petroleum-like odor
	I-EP108	7 to 9	63.3	petroleum-like odor, staining, and sheen
	I-EP108E	7 to 10	86	petroleum-like odor, staining, and sheen
	I-EP108N	7 to 9.5	16.5	petroleum-like odor and staining
	I-EP108W	7 to 9.5	225.4	petroleum-like odor, staining, and sheen
Block 1833 (J)	J-SB101	0.5 to 1.5	23.0	N/A
		6 to 6.5	17.6	N/A
	J-SB102	7 to 7.5	30.6	petroleum-like odor and staining
	J-SB103	16 to 19.5	17.1	petroleum-like odor and staining
	J-EP101	10 to 18	199.6	petroleum-like odor, sheen, and product
	J-EP102	6 to 7	1.1	petroleum-like odor
	J-EP103	6 to 12	126	petroleum-like odor
	J-EP105	4 to 10	256.8	petroleum-like odor
	J-EP106	7.5 to 10	17.6	N/A
	J-EP107	3 to 8	64.5	petroleum-like odor

Block (Sampling Area)	Soil Boring ID	Depth Interval (feet bgs)	Maximum PID Reading (ppm)	Observations
Block 1833 (J)		15 to 17	33.1	petroleum-like odor
	J-EP108	5 to 6	70.4	petroleum-like odor
		15.5 to 18	12.4	petroleum-like odor, staining, and sheen
	J-EP109	2.5 to 10	657.3	petroleum-like odor, paint/lacquer-like odor
	J-EP110	1 to 1.5	18.4	petroleum-like odor
		13 to 14.5	142.8	petroleum-like odor
		18 to 22	6.7	petroleum-like odor, staining, and sheen
	J-EP111	0.5 to 5	1,591	petroleum-like odor
	J-EP112	11 to 18	36.9	petroleum-like odor, staining, and sheen
	J-EP113	11 to 12	245.3	petroleum-like odor, staining, and sheen
		16 to 19.5	14.1	sheen
	J-EP114	2	25.0	N/A
	J-EP115	2.5 to 8	14.1	petroleum-like odor
	J-EP116	2 to 3	132.5	petroleum-like odor
	J-EP117	4 to 9.5	218.3	petroleum-like odor
	J-EP118	9.5 to 15	425	N/A
Block 1820 (K)	K-SB103	0.5 to 1.5	21.8	petroleum-like odor
	K-SB107	0.5 to 1.5	2.6	petroleum-like odor
	K-EP105	1.5 to 2	47.3	petroleum-like odor
	K-EP108	5.5 to 6	4.4	petroleum-like odor

5.3.2 Analytical Results

Soil samples were collected and analyzed for one or more of the following: TCL VOCs, SVOCs, PCBs, pesticides, herbicides, TAL metals, TCLP metals, 1,4-dioxane, and PFAS. A summary of laboratory detections for soil samples collected during the RI is provided in Tables 3A-G and 4A-F; results are compared to NYSDEC Part 375 UU, Restricted Use Restricted-Residential (RURR), and Restricted Use Commercial (CU) SCOs and the U.S. EPA Maximum Concentration of Contaminants for the Toxicity Characteristic. Soil sample analytical results maps are provided as Figures 7A through 7K with results compared to NYSDEC Part 375 RURR SCOs and the U.S. EPA Maximum Concentration of Contaminants for the Toxicity Characteristic. Laboratory analytical reports are included in Appendix K.

As described below, VOCs, SVOCs, PCBs, metals, and TCLP metals exceeded UU and/or RURR SCOs, the U.S. EPA Maximum Concentration of Contaminants for the Toxicity Characteristic, or NYSDEC Guidance Values. Emerging contaminants (PFAS) were detected in soil. 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 June 2021 – herein referred to as PFAS Guidance Values). PFOA and PFOS sample results are compared to the UU and RURR soil guidance values outlined in the Part 375 Remedial Programs Guidelines for Sampling and Analysis of PFAS guidance. Analytes detected below the described comparison criteria are not discussed in the analytical results section below.

At least one soil sample was collected for TCLP metals on each sampling area except for Area K. During the first few days of the investigation, TCLP analysis was immediately performed on the pre-determined 20% of samples as described in the RIWP. However, after reviewing the first few preliminary lab reports, all TCLP analyses were placed on hold to allow time to review total metal results. Based on the preliminary total metal results, the 20% of samples with the highest RCRA 8 metal concentrations were run for TCLP analysis. Because Area K had lower RCRA 8 metal concentrations as compared to the rest of OU-2, no TCLP metals were run on samples collected from this Area K. The total number of samples run for TCLP metals by Area are as follows:

Area	Number Samples Run for TCLP metals
E	9
F	18
G	7
H	7
I	1
J	4
K	0
Total	46

<u>Analytical Results Soil</u>

Area E

Analytical results discussed in the following section include all samples collected from Area E during the RI, plus four samples from two borings installed within this section of OU-2 as a part of previous investigations to provide additional data in the northeast section of Area E. D-SB202 was installed in April 2019 as part of the OU-1 RIR, and E-SB04 was installed in October 2019 as part of the 2019 limited site investigation on OU-2.

VOCs

Eight VOCs exceeded the UU SCOs. Minimum and maximum SCO exceedances are shown in the table below. The applicable SCO for each compound is shown in the column on the right. No detections exceeded the RURR SCOs (PGW SCOs exceedances are shown underlined):

Analyte	**Minimum SCO Exceedance (mg/kg)**		**Maximum SCO Exceedance (mg/kg)**		**UU SCOs (mg/kg)**	**PGW SCOs (mg/kg)**	**RURR SCOs (mg/kg)**
1,2,4-Trimethylbenzene	9	E-SB102_0-2	13	E-EP118_6-8	3.6	3.6	52
1,2-Dichloroethane	0.49	E-SB102_0-2	0.49	E-SB102_0-2	0.02	0.02	3.1
Acetone	0.052	E-EP102_9-11 E-SB105_6-8	0.71	E-SB102_0-2	0.05	0.05	100
Benzene	4.7	E-SB102_0-2	4.7	E-SB102_0-2	0.06	0.06	4.8
Ethylbenzene	3.8	E-EP118_6-8	4.9	E-SB102_0-2	1	1	41
Methyl Ethyl Ketone (2-Butanone)	0.31	E-EP101_6-8	0.53	E-SB102_0-2	0.12	0.12	100
Toluene	12	E-SB102_0-2	12	E-SB102_0-2	0.7	0.7	100
Total Xylenes	1.6	E-SB103_6-8	20	E-EP118_6-8 E-SB102_0-2	0.26	1.6	100

SVOCs

Ten SVOCs exceeded the UU and/or RURR SCOs. Minimum and maximum SCO exceedances are shown in the table below. The applicable SCO for each compound is shown in the column on the right (RURR SCOs exceedances are shown in **bold**, PGW SCOs exceedances are shown underlined):

Analyte	**Minimum SCO Exceedance (mg/kg)**		**Maximum SCO Exceedance (mg/kg)**		**UU SCOs (mg/kg)**	**PGW SCOs (mg/kg)**	**RURR SCOs (mg/kg)**
Benzo(a)anthracene	**1.36**	**E-EP110_7-8**	**66**	**E-SB104_0-2**	1	1	1
Benzo(a)pyrene	**1.2**	**E-EP110_7-8**	**54**	**E-SB104_0-2**	1	22	1
Benzo(b)fluoranthene	**1.05**	**E-SB104_4-6**	**46.2**	**E-SB104_0-2**	1	1.7	1

Analyte	Minimum SCO Exceedance (mg/kg)		Maximum SCO Exceedance (mg/kg)		UU SCOs (mg/kg)	PGW SCOs (mg/kg)	RURR SCOs (mg/kg)
Benzo(k)fluoranthene	1.1	D-SB202_2-3	**37.2**	**E-SB104_0-2**	0.8	1.7	3.9
Chrysene	1.4	E-EP110_7-8	**51.7**	**E-SB104_0-2**	1	1	3.9
Dibenz(a,h)anthracene	**0.686**	**E-EP115_6.5-7.5**	**12.7**	**E-SB104_0-2**	0.33	1,000	0.33
Fluoranthene	**219**	**E-SB104_0-2**	**219**	**E-SB104_0-2**	100	1,000	100
Indeno(1,2,3-cd)pyrene	**0.518**	**E-EP110_7-8**	**34.6**	**E-SB104_0-2**	0.5	8.2	0.5
Phenanthrene	**147**	**E-SB104_0-2**	**147**	**E-SB104_0-2**	100	1,000	100
Pyrene	**166**	**E-SB104_0-2**	**166**	**E-SB104_0-2**	100	1,000	100

Pesticides

No pesticides exceeded the UU SCOs.

Herbicides

No herbicides exceeded the UU SCOs.

PCBs

Total PCBs exceeded the UU SCOs in four RI soil samples from two borings collected from 0 to 2 and 6 to 8 feet bgs. Minimum and maximum SCO exceedances are shown in the table below. The applicable SCO for each compound is shown in the column on the right. No detections exceeded the RURR or PGW SCOs:

Analyte	Minimum SCO Exceedance (mg/kg)		Maximum SCO Exceedance (mg/kg)		UU SCOs (mg/kg)	PGW SCOs (mg/kg)	RURR SCOs (mg/kg)
Total PCBs	0.219	E-SB106_0-2	0.495	E-SB103_6-8	0.1	1	1

Metals

Twelve metals exceeded the UU and/or RURR SCOs. Minimum and maximum SCO exceedances are shown in the table below. The applicable SCO for each compound is shown in the column on the right (RURR SCOs exceedances are shown in **bold**, PGW SCOs exceedances are shown underlined):

Analyte	Minimum SCO Exceedance (mg/kg)		Maximum SCO Exceedance (mg/kg)		UU SCOs (mg/kg)	PGW SCOs (mg/kg)	RURR SCOs (mg/kg)
Arsenic	13.8	D-SB202_2-3	**24.4**	**E-SB04_0-2**	13	16	16
Barium	356	E-SB104_0-2	**1,970**	**E-EP109_6-8**	350	820	400
Cadmium	3.77	E-SB108_7.5-8.5	**64.7**	**E-SB102_0-2**	2.5	7.5	4.3
Chromium, Trivalent	30.8	E-SB106_6-8	103	E-EP101_0-2	30	NS	180
Copper	51.4	E-SB101_6-8	**1,730**	**E-SB102_0-2**	50	1,720	270
Lead	73.7	E-SB101_0-2	**2,790**	**E-EP109_6-8**	63	450	400
Manganese	**2,140**	**E-EP102_5-7**	**2,140**	**E-EP102_5-7**	1,600	2,000	2,000
Mercury	0.196	E-EP101_6-8	**2.78**	**E-SB102_0-2**	0.18	0.73	0.81
Nickel	33.6	E-SB101_11-12	83.9	E-SB102_0-2	30	130	310
Selenium	12.6	E-SB107_0-2	12.6	E-SB107_0-2	3.9	4	180
Silver	3.46	E-SB102_0-2	3.46	E-SB102_0-2	2	8.3	180
Zinc	172	D-SB202_0-2	7,420	E-SB102_0-2	109	2,480	10,000

NS = No Standard

TCLP Metals

Nine samples were analyzed for the RCRA 8 metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver) in accordance with the RIWP Addendum. The table below provides a summary of the RCRA 8 metals that exceeded the U.S. EPA Maximum Concentration of Contaminants for the Toxicity Characteristic:

Analyte	Minimum SCO Exceedance (mg/L)		Maximum SCO Exceedance (mg/L)		U.S. EPA Maximum Concentration of Contaminants for the Toxicity Characteristic (mg/L)
Chromium, Total	6.01	E-SB104_0-2	6.01	E-SB104_0-2	5

Emerging Contaminants – PFAS and 1,4-Dioxane

PFOS exceeded the UU SCO. Minimum and maximum SCO exceedances are shown in the table below. The applicable SCO for each compound is shown in the column on the right. No detections exceeded the RURR or PGW SCOs:

Analyte	Minimum SCO Exceedance (mg/kg)		Maximum SCO Exceedance (mg/kg)		UU SCOs (mg/kg)	PGW SCOs (mg/kg)	RURR SCOs (mg/kg)
PFOS	0.000973	E-EP102_5-7	0.00106	E-EP109_6-8	0.00088	0.0037	0.044

Area F

VOCs

Eight VOCs exceeded the UU and/or RURR SCOs. Minimum and maximum SCO exceedances are shown in the table below. The applicable SCO for each compound is shown in the column on the right (RURR SCOs exceedances are shown in **bold**, PGW SCOs exceedances are shown underlined):

Analyte	Minimum SCO Exceedance (mg/kg)		Maximum SCO Exceedance (mg/kg)		UU SCOs (mg/kg)	PGW SCOs (mg/kg)	RURR SCOs (mg/kg)
Acetone	0.052	F-SB108_10-12	1.2	F-EP116_0-2	0.05	0.05	100
Benzene	0.51	F-EP131_4-6	**32**	**F-EP131_0-2**	0.06	0.06	4.8
Ethylbenzene	14	F-EP131_0-2	14	F-EP131_0-2	1	1	41
Methyl Ethyl Ketone (2-Butanone)	0.17	F-SB112_9-11	0.33	F-SB115_0-2	0.12	0.12	100
Methylene Chloride	0.057	F-EP130_9-11	0.057	F-EP130_9-11	0.05	0.05	100
n-Propylbenzene	4.2	DUP03_091621 (Parent Sample: F-EP101_6-8)	14	F-EP131_0-2	3.9	3.9	100
Toluene	1.1	F-EP131_0-2	1.1	F-EP131_0-2	0.7	0.7	100
Total Xylenes	0.71	F-SB115_0-2	8.9	F-EP131_0-2	0.26	1.6	100

SVOCs

Eight SVOCs exceeded the UU and/or RURR SCOs. Minimum and maximum SCO exceedances are shown in the table below. The applicable SCO for each compound is shown in the column on the right (RURR SCOs exceedances are shown in **bold**, PGW SCOs exceedances are shown underlined):

Analyte	Minimum SCO Exceedance (mg/kg)		Maximum SCO Exceedance (mg/kg)		UU SCOs (mg/kg)	PGW SCOs (mg/kg)	RURR SCOs (mg/kg)
Benzo(a)anthracene	**1.24**	**F-SB119_0-2**	**7.53**	**F-SB102_0-2**	1	1	1
Benzo(a)pyrene	**1.18**	**F-EP105_6-8**	**6.48**	**F-SB102_0-2**	1	22	1
Benzo(b)fluoranthene	**1.06**	**F-SB113_0-2**	**5.75**	**F-SB102_0-2**	1	1.7	1
Benzo(k)fluoranthene	0.827	F-SB119_0-2	**5.3**	**F-SB102_0-2**	0.8	1.7	3.9
Chrysene	1.31	F-SB113_0-2 F-SB119_0-2	**6.51**	**F-SB102_0-2**	1	1	3.9
Dibenz(a,h)anthracene	**0.362**	**F-EP107_6-8**	**1.73**	**F-SB102_0-2**	0.33	1,000	0.33
Hexachlorobenzene	0.465	F-SB104_6-8	0.465	F-SB104_6-8	0.33	3.2	1.2
Indeno(1,2,3-cd)pyrene	**0.504**	**F-SB101_0-2**	**5.21**	**F-SB102_0-2**	0.5	8.2	0.5

Pesticides

Four pesticides exceeded the UU SCOs. Minimum and maximum SCO exceedances are shown in the table below. The applicable SCO for each compound is shown in the column on the right. No detections exceeded the RURR or PGW SCOs:

Analyte	Minimum SCO Exceedance (mg/kg)		Maximum SCO Exceedance (mg/kg)		UU SCOs (mg/kg)	PGW SCOs (mg/kg)	RURR SCOs (mg/kg)
4,4'-DDD	0.00675	F-SB116_5-7	0.454	F-SB115_6-8	0.0033	14	13
4,4'-DDE	0.00574	F-SB116_0-2	0.269	F-SB115_6-8	0.0033	17	8.9
4,4'-DDT	0.542	F-SB115_6-8	0.542	F-SB115_6-8	0.0033	136	7.9
Dieldrin	0.00713	SODUP11_100421 (Parent Sample: F-SB113_0-2)	0.00795	F-EP101_0-2	0.005	0.1	0.2

Herbicides

No herbicides exceeded the UU SCOs.

PCBs

Total PCBs exceeded the UU SCOs in two soil samples collected from 0 to 2 feet bgs. Minimum and maximum SCO exceedances are shown in the table below. The applicable SCO for each compound is shown in the column on the right. No detections exceeded the RURR or PGW SCOs:

Analyte	**Minimum SCO Exceedance (mg/kg)**		**Maximum SCO Exceedance (mg/kg)**		**UU SCOs (mg/kg)**	**PGW SCOs (mg/kg)**	**RURR SCOs (mg/kg)**
Total PCBs	0.23	F-EP109_0-2	0.628	F-SB111_0-2	0.1	3.2	1

Metals

Thirteen metals exceeded the UU and/or RURR SCOs. Minimum and maximum SCO exceedances are shown in the table below. The applicable SCO for each compound is shown in the column on the right (RURR SCOs exceedances are shown in **bold**, PGW SCOs exceedances are shown underlined):

Analyte	**Minimum SCO Exceedance (mg/kg)**		**Maximum SCO Exceedance (mg/kg)**		**UU SCOs (mg/kg)**	**PGW SCOs (mg/kg)**	**RURR SCOs (mg/kg)**
Arsenic	14.6	F-SB103_6-8	**58.7**	**F-EP106_4-6**	13	16	16
Barium	387	F-SB112_9-11	**3,960**	**F-SB118_6-8**	350	820	400
Cadmium	2.73	F-EP131_4-6	**66**	**F-EP107_6-8**	2.5	7.5	4.3
Chromium, Hexavalent	3.8	F-SB106_6-8	3.8	F-SB106_6-8	1	19	110
Chromium, Trivalent	30.7	F-SB101_0-2 F-SB107_10-12	164	F-SB119_0-2	30	NS	180
Copper	52.8	F-SB103_0-2	**33,900**	**F-SB122_0-2**	50	1,720	270
Lead	68.9	F-EP102_0-2	**6,660**	**F-SB118_6-8**	63	450	400
Manganese	1,620	F-SB119_5-7	1,820	F-SB117_0-2	1,600	2,000	2,000
Mercury	0.183	F-SB118_9-11	**11.2**	**DUP03_091621**	0.18	0.73	0.81

Analyte	Minimum SCO Exceedance (mg/kg)		Maximum SCO Exceedance (mg/kg)		UU SCOs (mg/kg)	PGW SCOs (mg/kg)	RURR SCOs (mg/kg)
				(Parent Sample: F-EP101_6-8)			
Nickel	30.1	F-SB118_9-11	195	F-SB122_0-2	30	130	310
Selenium	5.57	F-SB115_0-2	15.3	F-SB121_0-2	3.9	4	180
Silver	3.5	F-EP107_0-2	3.5	F-EP107_0-2	2	8.3	180
Zinc	114	F-SB105_10-12	**15,200**	**F-EP107_6-8**	109	2,480	10,000

TCLP Metals

Eighteen samples were analyzed for the RCRA 8 metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver) in accordance with the RIWP Addendum. The table below provides a summary of the RCRA 8 metals that exceed the U.S. EPA Maximum Concentration of Contaminants for the Toxicity Characteristic:

Analyte	Minimum SCO Exceedance (mg/L)		Maximum SCO Exceedance (mg/L)		U.S. EPA Maximum Concentration of Contaminants for the Toxicity Characteristic (mg/L)
Lead	**10**	**DUP03_091621** (Parent Sample: F-EP101_6-8)	**57.2**	**F-SB118_6-8**	5

Emerging Contaminants – PFAS and 1,4-Dioxane

PFOS exceeded the UU SCO. Minimum and maximum SCO exceedances are shown in the table below. The applicable SCO for each compound is shown in the column on the right. No detections exceeded the RURR SCOs (PGW SCOs exceedances are shown underlined):

Analyte	Minimum SCO Exceedance (mg/kg)		Maximum SCO Exceedance (mg/kg)		UU SCOs (mg/kg)	PGW SCOs (mg/kg)	RURR SCOs (mg/kg)
PFOS	0.00092	F-SB103_0-2	0.00777	F-SB101_6-8	0.00088	0.0037	0.044

Area G

VOCs

Seven VOCs exceeded the UU and/or RURR SCOs. Minimum and maximum SCO exceedances are shown in the table below. The applicable SCO for each compound is shown in the column on the right (RURR SCOs exceedances are shown in **bold**, PGW SCOs exceedances are shown underlined):

Analyte	Minimum SCO Exceedance (mg/kg)		Maximum SCO Exceedance (mg/kg)		UU SCOs (mg/kg)	PGW SCOs (mg/kg)	RURR SCOs (mg/kg)
1,2,4-Trimethylbenzene	3.8	G-SB102_0-2	**87**	**G-EP103_0-2**	3.6	3.6	52
1,3,5-Trimethylbenzene (Mesitylene)	16	DUP06_092321 (Parent Sample: G-EP103_0-2)	25	G-EP103_0-2	8.4	8.4	52
Acetone	0.052	G-SB103_9-11	0.17	G-SB105_6-8 G-SB111_5-7	0.05	0.05	100
Benzene	0.39	G-EP103_0-2	0.39	G-EP103_0-2	0.06	0.06	4.8
Ethylbenzene	3.9	DUP06_092321 (Parent Sample: G-EP103_0-2)	8.4	G-EP103_0-2	1	1	41
n-Propylbenzene	6.5	G-EP103_0-2	6.5	G-EP103_0-2	3.9	3.9	100
Total Xylenes	0.34	G-EP103_5-7	47	G-EP103_0-2	0.26	1.6	100

SVOCs

Eight SVOCs exceeded the UU and/or RURR SCOs. Minimum and maximum SCO exceedances are shown in the table below. The applicable SCO for each compound is shown in the column on the right (RURR SCOs exceedances are shown in **bold**, PGW SCOs exceedances are shown underlined):

Analyte	Minimum SCO Exceedance (mg/kg)		Maximum SCO Exceedance (mg/kg)		UU SCOs (mg/kg)	PGW SCOs (mg/kg)	RURR SCOs (mg/kg)
Benzo(a)anthracene	**1.16**	**DUP05_092321** (Parent Sample: G-SB111_0-2)	**14**	**G-SB118_6-8**	1	1	1
Benzo(a)pyrene	**1.23**	**DUP05_092321** (Parent Sample: G-SB111_0-2)	**10.7**	**G-SB118_6-8**	1	22	1

Analyte	Minimum SCO Exceedance (mg/kg)		Maximum SCO Exceedance (mg/kg)		UU SCOs (mg/kg)	PGW SCOs (mg/kg)	RURR SCOs (mg/kg)
Benzo(b)fluoranthene	**1.22**	**DUP05_092321** (Parent Sample: G-SB111_0-2)	**8.05**	**G-SB118_6-8**	1	1.7	1
Benzo(k)fluoranthene	1.14	DUP05_092321 (Parent Sample: G-SB111_0-2)	**7.1**	**G-SB118_6-8**	0.8	1.7	3.9
Chrysene	1.32	DUP05_092321 (Parent Sample: G-SB111_0-2)	**12.7**	**G-SB118_6-8**	1	1	3.9
Dibenz(a,h)anthracene	**0.333**	**G-SB114_6.5-8.5**	**2.27**	**G-SB118_6-8**	0.33	1,000	0.33
Indeno(1,2,3-cd)pyrene	**0.62**	**G-SB111_0-2**	**6.92**	**G-SB118_6-8**	0.5	8.2	0.5
Phenol	0.508	G-SB114_6.5-8.5	0.508	G-SB114_6.5-8.5	0.33	0.33	100

Pesticides

Four pesticides exceeded the UU SCOs. Minimum and maximum SCO exceedances are shown in the table below. The applicable SCO for each compound is shown in the column on the right. No detections exceeded the RURR or PGW SCOs:

Analyte	Minimum SCO Exceedance (mg/kg)		Maximum SCO Exceedance (mg/kg)		UU SCOs (mg/kg)	PGW SCOs (mg/kg)	RURR SCOs (mg/kg)
4,4'-DDD	0.00455	G-SB113_0-2	0.0267	G-EP122_5-7	0.0033	14	13
4,4'-DDE	0.00594	G-EP103_0-2	0.0161	G-SB117_0-2	0.0033	17	8.9
4,4'-DDT	0.0173	G-SB113_0-2	0.0614	G-SB117_0-2	0.0033	136	7.9
Dieldrin	0.035	G-SB111_0-2	0.035	G-SB111_0-2	0.014	0.06	11

Herbicides

No herbicides exceeded the UU SCOs.

PCBs

Total PCBs exceeded the UU SCOs in three RI soil samples from two borings collected from 0 to 2 and 6 to 8 feet bgs. Minimum and maximum SCO exceedances are shown in the table below. The applicable SCO for each compound is shown in the column on the right. No detections exceeded the RURR or PGW SCOs:

Analyte	Minimum SCO Exceedance (mg/kg)		Maximum SCO Exceedance (mg/kg)		UU SCOs (mg/kg)	PGW SCOs (mg/kg)	RURR SCOs (mg/kg)
Total PCBs	0.147	G-SB117_0-2	0.413	G-SB114_0-2	0.1	3.2	1

Metals

Twelve metals exceeded the UU and/or RURR SCOs. Minimum and maximum SCO exceedances are shown in the table below. The applicable SCO for each compound is shown in the column on the right (RURR SCOs exceedances are shown in **bold**, PGW SCOs exceedances are shown underlined):

Analyte	Minimum SCO Exceedance (mg/kg)		Maximum SCO Exceedance (mg/kg)		UU SCOs (mg/kg)	PGW SCOs (mg/kg)	RURR SCOs (mg/kg)
Arsenic	15.3	G-SB105_0-2	**52.7**	**G-SB119_6-8**	13	16	16
Barium	385	G-SB113_0-2	**1,890**	**G-SB114_6.5-8.5**	350	820	400
Cadmium	2.52	G-SB109_5-7	**61.9**	**G-SB105_6-8**	2.5	7.5	4.3
Chromium, Trivalent	30.1	G-SB104_6-8	170	G-SB119_0-2	30	NS	180
Copper	50.6	G-SB103_9-11	**7,230**	**G-SB119_0-2**	50	1,720	270
Lead	65.5	G-EP122_10-12	**17,500**	**G-SB117_0-2**	63	450	400
Manganese	**2,660**	**G-SB105_6-8**	**2,660**	**G-SB105_6-8**	1,600	2,000	2,000
Mercury	0.183	G-SB119_6-8	**18.2**	**G-SB117_7-9**	0.18	0.73	0.81
Nickel	32.1	G-EP101_0-2	167	G-SB119_0-2	30	130	310
Selenium	4.66	G-SB116_8-10	11	G-SB119_0-2	3.9	4	180
Silver	2.9	G-SB119_6-8	73.4	G-SB117_7-9	2	8.3	180
Zinc	125	G-EP102_0-2	**16,100**	**G-SB105_6-8**	109	2,480	10,000

TCLP Metals

Seven samples were analyzed for the RCRA 8 metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver) in accordance with the RIWP Addendum. The table below provides a summary of the RCRA 8 metals that exceed the U.S. EPA Maximum Concentration of Contaminants for the Toxicity Characteristic:

Analyte	Minimum SCO Exceedance (mg/L)		Maximum SCO Exceedance (mg/L)		U.S. EPA Maximum Concentration of Contaminants for the Toxicity Characteristic (mg/L)
Lead	**13.5**	**G-SB105_6-8**	**13.5**	**G-SB105_6-8**	5

Emerging Contaminants – PFAS and 1,4-Dioxane

Minimum and maximum SCO exceedances are shown in the table below. The applicable SCO for each compound is shown in the column on the right. No detections exceeded the RURR SCOs (PGW SCOs exceedances are shown underlined):

Analyte	Minimum SCO Exceedance (mg/kg)		Maximum SCO Exceedance (mg/kg)		UU SCOs (mg/kg)	PGW SCOs (mg/kg)	RURR SCOs (mg/kg)
PFOS	0.000923	G-SB103_9-11	0.00484	G-SB117_7-9	0.00088	0.0037	0.044

Area H

VOCs

Five VOCs exceeded the UU SCOs. Minimum and maximum SCO exceedances are shown in the table below. The applicable SCO for each compound is shown in the column on the right. No detections exceeded the RURR SCOs (PGW SCOs exceedances are shown underlined):

Analyte	Minimum SCO Exceedance (mg/kg)		Maximum SCO Exceedance (mg/kg)		UU SCOs (mg/kg)	PGW SCOs (mg/kg)	RURR SCOs (mg/kg)
1,2,4-Trimethylbenzene	6.8	H-EP111_1.5-2.5	12	H-EP107_2-4	3.6	3.6	52
Acetone	0.05	H-SB103_0-2	1.2	DUP17_100721 (Parent Sample: H-SB111_0-2)	0.05	0.05	100

Analyte	Minimum SCO Exceedance (mg/kg)		Maximum SCO Exceedance (mg/kg)		UU SCOs (mg/kg)	PGW SCOs (mg/kg)	RURR SCOs (mg/kg)
Ethylbenzene	3.5	H-EP111_1.5-2.5	3.5	H-EP111_1.5-2.5	1	1	41
Total Xylenes	1.6	H-EP107_2-4	2.4	H-EP111_1.5-2.5	0.26	1.6	100
Vinyl Chloride	0.024	H-SB115SE4_6-8	0.024	H-SB115SE4_6-8	0.02	0.02	0.9

SVOCs

Seven SVOCs exceeded the UU and/or RURR SCOs. Minimum and maximum SCO exceedances are shown in the table below. The applicable SCO for each compound is shown in the column on the right (RURR SCOs exceedances are shown in **bold**, PGW SCOs exceedances are shown underlined):

Analyte	Minimum SCO Exceedance (mg/kg)		Maximum SCO Exceedance (mg/kg)		UU SCOs (mg/kg)	PGW SCOs (mg/kg)	RURR SCOs (mg/kg)
Benzo(a)anthracene	**1.14**	**H-SB108_0-2**	**4.66**	**H-SB112_0-2**	1	1	1
Benzo(a)pyrene	**1.04**	**H-SB115_0-2**	**3.02**	**H-SB114_0-2**	1	22	1
Benzo(b)fluoranthene	**1.1**	**H-SB108_0-2** **H-SB110_7-9**	**2.71**	**H-SB114_0-2**	1	1.7	1
Benzo(k)fluoranthene	0.95	H-SB115_0-2	2.95	H-SB114_0-2	0.8	1.7	3.9
Chrysene	1.33	H-SB115_0-2	**4.79**	**H-SB112_0-2**	1	1	3.9
Dibenz(a,h)anthracene	**0.35**	**H-SB116_0-2**	**0.646**	**H-SB114_0-2**	0.33	1,000	0.33
Indeno(1,2,3-cd)pyrene	**0.57**	**H-SB110_7-9**	**1.62**	**H-SB114_0-2**	0.5	8.2	0.5

Pesticides

Four pesticides exceeded the UU SCOs. Minimum and maximum SCO exceedances are shown in the table below. The applicable SCO for each compound is shown in the column on the right. No detections exceeded the RURR or PGW SCOs:

Analyte	Minimum SCO Exceedance (mg/kg)		Maximum SCO Exceedance (mg/kg)		UU SCOs (mg/kg)	PGW SCOs (mg/kg)	RURR SCOs (mg/kg)
4,4'-DDD	0.0061	H-SB117_0-2	0.0202	H-SB113_0-2	0.0033	14	13

Analyte	Minimum SCO Exceedance (mg/kg)		Maximum SCO Exceedance (mg/kg)		UU SCOs (mg/kg)	PGW SCOs (mg/kg)	RURR SCOs (mg/kg)
4,4'-DDE	0.0058	H-SB109_0-2	0.0209	DUP13_100521 (Parent Sample: H-SB117_0-2)	0.0033	17	8.9
4,4'-DDT	0.0043	DUP15_100621 (Parent Sample: H-EP102_0-2)	0.0299	H-SB109_0-2	0.0033	136	7.9
Dieldrin	0.0066	DUP16_100621 (Parent Sample: H-SB108_0-2)	0.0141	H-SB106_0-2	0.005	0.1	0.2

Herbicides

No herbicides exceeded the UU SCOs.

PCBs

Total PCBs exceeded the UU SCOs in eight RI soil samples from seven borings collected from 0 to 4 feet bgs. Minimum and maximum SCO exceedances are shown in the table below. The applicable SCO for each compound is shown in the column on the right. No detections exceeded the RURR or PGW SCOs:

Analyte	Minimum SCO Exceedance (mg/kg)		Maximum SCO Exceedance (mg/kg)		UU SCOs (mg/kg)	PGW SCOs (mg/kg)	RURR SCOs (mg/kg)
Total PCBs	0.13	H-SB104_0-2	0.802	H-EP101_2-4	0.1	3.2	1

Metals

Eleven metals exceeded the UU and/or RURR SCOs. Minimum and maximum SCO exceedances are shown in the table below. The applicable SCO for each compound is shown in the column on the right (RURR SCOs exceedances are shown in **bold**, PGW SCOs exceedances are shown underlined):

Analyte	Minimum SCO Exceedance (mg/kg)		Maximum SCO Exceedance (mg/kg)		UU SCOs (mg/kg)	PGW SCOs (mg/kg)	RURR SCOs (mg/kg)
Arsenic	13.2	H-SB113_0-2	**64.9**	**H-EP101_6-8**	13	16	16
Barium	355	H-SB105_6-8	**1,600**	**H-SB102_7.5-9.5**	350	820	400

Analyte	Minimum SCO Exceedance (mg/kg)		Maximum SCO Exceedance (mg/kg)		UU SCOs (mg/kg)	PGW SCOs (mg/kg)	RURR SCOs (mg/kg)
Cadmium	2.77	H-SB105_6-8	**44.5**	**H-EP101_2-4**	2.5	7.5	4.3
Chromium, Trivalent	32.1	H-EP101_0-2	161	H-EP101_2-4	30	NS	180
Copper	52.1	H-SB109_0-2	**1,180**	**H-SB104_7-9**	50	1,720	270
Lead	69.3	H-SB111_5-7	**3,920**	**H-SB104_7-9**	63	450	400
Mercury	0.19	H-SB111_5-7	**7.68**	**H-SB105_6-8**	0.18	0.73	0.81
Nickel	31.8	H-SB115_0-2	99.2	H-EP101_2-4	30	130	310
Selenium	4.23	H-SB104_0-2	4.58	H-SB102_0-2	3.9	4	180
Silver	12.4	H-EP102_6.5-8.5	17	H-SB104_7-9	2	8.3	180
Zinc	112	H-SB111_5-7	**12,900**	**H-EP101_2-4**	109	2,480	10,000

TCLP Metals

No RCRA 8 metals exceeded the U.S. EPA Maximum Concentration of Contaminants for the Toxicity Characteristic.

Emerging Contaminants – PFAS and 1,4-Dioxane

PFOS exceeded the UU SCOs. Minimum and maximum SCO exceedances are shown in the table below. The applicable SCO for each compound is shown in the column on the right. No detections exceeded the RURR SCOs (PGW SCOs exceedances are shown underlined):

Analyte	Minimum SCO Exceedance (mg/kg)		Maximum SCO Exceedance (mg/kg)		UU SCOs (mg/kg)	PGW SCOs (mg/kg)	RURR SCOs (mg/kg)
PFOS	0.00091	DUP13_100521 (Parent Sample: H-SB117_0-2)	0.00542	H-SB115_6-8	0.00088	0.0037	0.044

Area I

VOCs

Ten VOCs exceeded the UU SCOs. Minimum and maximum SCO exceedances are shown in the table below. The applicable SCO for each compound is shown in the column on the right. No detections exceeded the RURR SCOs (PGW SCOs exceedances are shown underlined):

Analyte	Minimum SCO Exceedance (mg/kg)		Maximum SCO Exceedance (mg/kg)		UU SCOs (mg/kg)	PGW SCOs (mg/kg)	RURR SCOs (mg/kg)
1,2,4-Trimethylbenzene	41	I-EP104_6-8 I-SB101_5.7	41	I-EP104_6-8 I-SB101_5.7	3.6	3.6	52
1,3,5-Trimethylbenzene (Mesitylene)	9.1	I-SB101_5.7	14	I-EP104_6-8	8.4	8.4	52
Acetone	0.054	I-SB102_10-12	0.12	I-SB105_7-9	0.05	0.05	100
Benzene	0.43	I-SB106NE_6.5-8.5	0.64	I-EP107_0-2	0.06	0.06	4.8
Ethylbenzene	9.3	I-EP104_6-8	17	I-EP107_0-2	1	1	41
n-Butylbenzene	36	I-SB106NE2_6-8	36	I-SB106NE2_6-8	12	12	100
n-Propylbenzene	6.6	I-EP104_6-8	51	I-SB106NE2_6-8	3.9	3.9	100
Sec-Butylbenzene	13	I-SB106NE2_6-8	13	I-SB106NE2_6-8	11	11	100
Toluene	5.1	I-EP104_6-8	5.1	I-EP104_6-8	0.7	0.7	100
Total Xylenes	2.7	I-EP107_0-2	58	I-EP104_6-8	0.26	1.6	100

SVOCs

Seven SVOCs exceeded the UU and/or RURR SCOs. Minimum and maximum SCO exceedances are shown in the table below. The applicable SCO for each compound is shown in the column on the right (RURR SCOs exceedances are shown in **bold**, PGW SCOs exceedances are shown underlined):

Analyte	Minimum SCO Exceedance (mg/kg)		Maximum SCO Exceedance (mg/kg)		UU SCOs (mg/kg)	PGW SCOs (mg/kg)	RURR SCOs (mg/kg)
Benzo(a)anthracene	**1.41**	**I-SB104_5.5-7.5**	**6.45**	**I-EP102_0-2**	1	1	1
Benzo(a)pyrene	**1.84**	**I-SB104_5.5-7.5**	**4.58**	**I-EP102_0-2**	1	22	1

Analyte	Minimum SCO Exceedance (mg/kg)		Maximum SCO Exceedance (mg/kg)		UU SCOs (mg/kg)	PGW SCOs (mg/kg)	RURR SCOs (mg/kg)
Benzo(b)fluoranthene	**1.21**	**I-SB104_5.5-7.5**	**3.81**	**I-EP102_0-2**	1	1.7	1
Benzo(k)fluoranthene	0.927	I-SB104_5.5-7.5	3.44	I-EP102_0-2	0.8	1.7	3.9
Chrysene	1.26	I-SB104_5.5-7.5	**6.62**	**I-EP102_0-2**	1	1	3.9
Dibenz(a,h)anthracene	**1.25**	**I-EP102_0-2**	**1.25**	**I-EP102_0-2**	0.33	1,000	0.33
Indeno(1,2,3-cd)pyrene	**1.23**	**I-SB104_5.5-7.5**	**3**	**I-EP102_0-2**	0.5	8.2	0.5

Pesticides

Three pesticides exceeded the UU SCOs. Minimum and maximum SCO exceedances are shown in the table below. The applicable SCO for each compound is shown in the column on the right. No detections exceeded the RURR or PGW SCOs:

Analyte	Minimum SCO Exceedance (mg/kg)		Maximum SCO Exceedance (mg/kg)		UU SCOs (mg/kg)	PGW SCOs (mg/kg)	RURR SCOs (mg/kg)
4,4'-DDD	0.0133	I-SB103_0-2	0.0279	I-SB104_0-2	0.0033	14	13
4,4'-DDE	0.0079	I-SB103_0-2	0.0515	I-EP101_0-2	0.0033	17	8.9
4,4'-DDT	0.0058	I-SB103_6-8	0.12	I-EP101_0-2	0.0033	136	7.9

Herbicides

No herbicides exceeded the UU SCOs.

PCBs

Total PCBs exceeded the UU and/or RURR SCOs in six RI soil samples from four borings collected from 0 to 2 and 6 to 8.5 feet bgs. Minimum and maximum SCO exceedances are shown in the table below. The applicable SCO for each compound is shown in the column on the right. No detections exceeded the PGW SCOs (RURR SCOs exceedances are shown in **bold**, PGW SCOs exceedances are shown underlined):

Analyte	Minimum SCO Exceedance (mg/kg)		Maximum SCO Exceedance (mg/kg)		UU SCOs (mg/kg)	PGW SCOs (mg/kg)	RURR SCOs (mg/kg)
Total PCBs	0.26	I-EP101_0-2	**2.05**	**I-SB106_0-2**	0.1	3.2	1

Metals

Nine metals exceeded the UU and/or RURR SCOs. Minimum and maximum SCO exceedances are shown in the table below. The applicable SCO for each compound is shown in the column on the right (RURR SCOs exceedances are shown in **bold**, PGW SCOs exceedances are shown underlined):

Analyte	Minimum SCO Exceedance (mg/kg)		Maximum SCO Exceedance (mg/kg)		UU SCOs (mg/kg)	PGW SCOs (mg/kg)	RURR SCOs (mg/kg)
Arsenic	**23.7**	**I-EP101_7-9**	**23.7**	**I-EP101_7-9**	13	16	16
Barium	**702**	**I-EP101_7-9**	**708**	**I-EP101_0-2**	350	820	400
Cadmium	**4.49**	**I-SB104_0-2**	**10.2**	**I-EP101_0-2**	2.5	7.5	4.3
Chromium, Trivalent	32.9	I-SB103_9-11	49.2	I-EP101_7-9	30	NS	180
Copper	76.1	I-EP102_9-11	**523**	**I-EP101_7-9**	50	1,720	270
Lead	67.2	I-EP101_10-12	**1850**	**I-EP101_7-9**	63	450	400
Mercury	0.19	I-SB104_0-2	**8.47**	**I-EP101_7-9**	0.18	0.73	0.81
Nickel	31.4	I-EP102_9-11	61.5	I-EP101_0-2	30	130	310
Zinc	118	I-SB101_0-2	2,260	I-EP101_0-2	109	2,480	10,000

TCLP Metals

No RCRA 8 metals exceeded the U.S. EPA Maximum Concentration of Contaminants for the Toxicity Characteristic.

Emerging Contaminants – PFAS and 1,4-Dioxane

PFOS and PFOA exceeded the UU SCOs. The applicable SCO for each compound is shown in the column on the right. No detections exceeded the RURR or PGW SCOs:

Analyte	Minimum SCO Exceedance (mg/kg)		Maximum SCO Exceedance (mg/kg)		UU SCOs (mg/kg)	PGW SCOs (mg/kg)	RURR SCOs (mg/kg)
PFOS	0.00089	DUP10_092921 (Parent Sample: I-SB107_0-2)	<u>0.00548</u>	<u>I-SB106_0-2</u>	0.00088	0.0037	0.044
PFOA	0.00076	I-EP102_9-11	0.000759	I-EP102_9-11	0.00066	0.0011	0.033

Area J

<u>VOCs</u>

Thirteen VOCs exceeded the UU and/or RURR SCOs. Minimum and maximum SCO exceedances are shown in the table below. The applicable SCO for each compound is shown in the column on the right (RURR SCOs exceedances are shown in **bold**, PGW SCOs exceedances are shown <u>underlined</u>):

Analyte	Minimum SCO Exceedance (mg/kg)		Maximum SCO Exceedance (mg/kg)		UU SCOs (mg/kg)	PGW SCOs (mg/kg)	RURR SCOs (mg/kg)
1,2,4-Trimethylbenzene	<u>5.8</u>	<u>J-EP101_10-11</u>	**<u>430</u>**	**<u>J-EP109_6-8</u>**	3.6	3.6	52
1,2-Dichlorobenzene	<u>1.9</u>	<u>J-SB102_7-8</u>	<u>2</u>	<u>J-EP112_17-18</u>	1.1	1.1	100
1,3,5-Trimethylbenzene (Mesitylene)	<u>17</u>	<u>J-EP107_6-7</u>	**<u>190</u>**	**<u>J-EP109_6-8</u>**	8.4	8.4	52
Acetone	<u>0.055</u>	<u>J-EP108_12-13</u>	<u>3.7</u>	<u>J-EP106_19-20</u>	0.05	0.05	100
Benzene	<u>0.22</u>	<u>J-EP106_7-8</u>	**<u>16</u>**	**<u>J-EP109_6-8</u>**	0.06	0.06	4.8
Cis-1,2-Dichloroethene	<u>1.1</u>	<u>J-EP112_17-18</u>	<u>1.1</u>	<u>J-EP112_17-18</u>	0.25	0.25	100
Ethylbenzene	<u>1.1</u>	<u>J-EP101_10-11</u>	**<u>150</u>**	**<u>J-EP109_6-8</u>**	1	1	41
n-Butylbenzene	<u>26</u>	<u>J-EP109_6-8</u>	<u>26</u>	<u>J-EP109_6-8</u>	12	12	100
n-Propylbenzene	<u>4.5</u>	<u>J-EP105_5-6</u>	<u>56</u>	<u>J-EP109_6-8</u>	3.9	3.9	100
Tert-Butyl Methyl Ether	<u>1.8</u>	<u>J-EP106_19-20</u> <u>J-EP106_7-8</u>	<u>2.2</u>	<u>J-EP109_6-8</u>	0.93	0.93	100
Toluene	<u>3.5</u>	<u>J-EP112_17-18</u>	<u>55</u>	<u>J-EP109_6-8</u>	0.7	0.7	100
Total Xylenes	0.91	J-EP105_11-12	**<u>740</u>**	**<u>J-EP109_6-8</u>**	0.26	1.6	100
Trichloroethene (TCE)	<u>0.62</u>	<u>J-EP112_17-18</u>	<u>0.62</u>	<u>J-EP112_17-18</u>	0.47	0.47	21

SVOCs

Eleven SVOCs exceeded the UU and/or RURR SCOs. Minimum and maximum SCO exceedances are shown in the table below. The applicable SCO for each compound is shown in the column on the right (RURR SCOs exceedances are shown in **bold**, PGW SCOs exceedances are shown underlined):

Analyte	Minimum SCO Exceedance (mg/kg)		Maximum SCO Exceedance (mg/kg)		UU SCOs (mg/kg)	PGW SCOs (mg/kg)	RURR SCOs (mg/kg)
2-Methylphenol (o-Cresol)	0.394	J-EP105_11-12	0.394	J-EP105_11-12	0.33	0.33	100
3 & 4 Methylphenol (m&p Cresol)	0.456	J-EP112_17-18	1.15	J-EP105_11-12	0.33	0.33	100
Benzo(a)anthracene	**1.21**	**J-EP109_6-8**	**4.3**	**J-EP107_6-7**	1	1	1
Benzo(a)pyrene	**1.35**	**J-SB103_17-18**	**4.27**	**J-EP107_6-7**	1	22	1
Benzo(b)fluoranthene	**1.15**	**J-SB103_17-18**	**3.64**	**J-EP107_6-7**	1	1.7	1
Benzo(k)fluoranthene	0.877	J-SB103_17-18	2.29	J-EP107_6-7	0.8	1.7	3.9
Chrysene	1.15	J-EP109_6-8	3.77	J-EP107_6-7	1	1	3.9
Dibenz(a,h)anthracene	**0.39**	**J-EP101_10-11**	**0.849**	**J-EP107_6-7**	0.33	1,000	0.33
Indeno(1,2,3-cd)pyrene	**0.578**	**J-EP105_11-12**	**2.59**	**J-EP107_6-7**	0.5	8.2	0.5
Naphthalene	19.6	J-EP109_6-8	19.6	J-EP109_6-8	12	12	100
Phenol	6.56	J-EP105_11-12	6.56	J-EP105_11-12	0.33	0.33	100

Pesticides

Four pesticides exceeded the UU SCOs. Minimum and maximum SCO exceedances are shown in the table below. The applicable SCO for each compound is shown in the column on the right. No detections exceeded the RURR or PGW SCOs:

Analyte	Minimum SCO Exceedance (mg/kg)		Maximum SCO Exceedance (mg/kg)		UU SCOs (mg/kg)	PGW SCOs (mg/kg)	RURR SCOs (mg/kg)
4,4'-DDD	0.0149	J-SB101_0-2	0.0149	J-SB101_0-2	0.0033	14	13

Analyte	Minimum SCO Exceedance (mg/kg)		Maximum SCO Exceedance (mg/kg)		UU SCOs (mg/kg)	PGW SCOs (mg/kg)	RURR SCOs (mg/kg)
4,4'-DDE	0.0224	SBDUP01_090721 (Parent Sample: J-SB102_0-2)	0.0239	J-SB101_0-2	0.0033	17	8.9
4,4'-DDT	0.0234	SBDUP01_090721 (Parent Sample: J-SB102_0-2)	0.0234	SBDUP01_090721 (Parent Sample: J-SB102_0-2)	0.0033	136	7.9
Dieldrin	0.00891	J-SB102_0-2	0.0163	J-SB101_0-2	0.005	0.1	0.2

Herbicides

No herbicides exceeded the UU SCOs.

PCBs

Total PCBs exceeded the UU and/or RURR SCOs in eight RI soil samples from five borings collected from 0 to 2, 2 to 4, 10 to 12, and 17 to 18 feet bgs. Minimum and maximum SCO exceedances are shown in the table below. The applicable SCO for each compound is shown in the column on the right (RURR SCOs exceedances are shown in **bold**, PGW SCOs exceedances are shown underlined):

Analyte	Minimum SCO Exceedance (mg/kg)		Maximum SCO Exceedance (mg/kg)		UU SCOs (mg/kg)	PGW SCOs (mg/kg)	RURR SCOs (mg/kg)
Total PCBs	0.109	J-EP116_2-4	**13.9**	**J-EP113_10-12**	0.1	3.2	1

Metals

Nine metals exceeded the UU and/or RURR SCOs. Minimum and maximum SCO exceedances are shown in the table below. The applicable SCO for each compound is shown in the column on the right (RURR SCOs exceedances are shown in **bold**, PGW SCOs exceedances are shown underlined):

Analyte	Minimum SCO Exceedance (mg/kg)		Maximum SCO Exceedance (mg/kg)		UU SCOs (mg/kg)	PGW SCOs (mg/kg)	RURR SCOs (mg/kg)
Barium	356	J-EP101_10-11	**1,110**	**J-EP113_10-12**	350	820	400
Cadmium	2.58	J-SB102_0-2 J-SB102_7-8	**35.6**	**J-EP113_10-12**	2.5	7.5	4.3

Analyte	Minimum SCO Exceedance (mg/kg)		Maximum SCO Exceedance (mg/kg)		UU SCOs (mg/kg)	PGW SCOs (mg/kg)	RURR SCOs (mg/kg)
Chromium, Trivalent	34.9	J-SB102_7-8	**191**	**J-EP101_10-11**	30	NS	180
Copper	63.3	J-EP116_2-4	**787**	**J-EP101_10-11**	50	1,720	270
Lead	73.3	J-EP113_0-2	**2,740**	**J-EP101_10-11**	63	450	400
Mercury	0.181	SBDUP01_090721 (Parent Sample: J-SB102_0-2)	**3.61**	**J-EP101_10-11**	0.18	0.73	0.81
Nickel	170	J-EP101_10-11	254	J-EP113_10-12	30	130	310
Selenium	4.43	J-EP116_2-4	9.4	J-EP101_0-2	3.9	4	180
Zinc	114	J-SB101_11-12	**38,800**	**J-EP101_10-11**	109	2,480	10,000

TCLP Metals

Four samples were analyzed for the RCRA 8 metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver) in accordance with the RIWP Addendum. The table below provides a summary of the RCRA 8 metals that exceed the U.S. EPA Maximum Concentration of Contaminants for the Toxicity Characteristic:

Analyte	Minimum SCO Exceedance (mg/L)		Maximum SCO Exceedance (mg/L)		U.S. EPA Maximum Concentration of Contaminants for the Toxicity Characteristic (mg/L)
Lead	5.42	J-EP113_10-12	5.42	J-EP113_10-12	5

Emerging Contaminants – PFAS and 1,4-Dioxane

PFOS and PFOA exceeded the UU SCOs. Minimum and maximum SCO exceedances are shown in the table below. The applicable SCO for each compound is shown in the column on the right. No detections exceeded the RURR SCOs (PGW SCOs exceedances are shown underlined):

Analyte	Minimum SCO Exceedance (mg/kg)		Maximum SCO Exceedance (mg/kg)		UU SCOs (mg/kg)	PGW SCOs (mg/kg)	RURR SCOs (mg/kg)
PFOS	0.00115	J-SB103_0-2	0.00435	J-EP101_10-11	0.00088	0.0037	0.044
PFOA	0.00109	J-EP113_10-12	0.0015	J-EP116_2-4	0.00066	0.0011	0.033

Area K

VOCs

One VOC exceeded the UU SCOs. Minimum and maximum SCO exceedances are shown in the table below. The applicable SCO is shown in the column on the right. No detections exceeded the RURR or PGW SCOs:

Analyte	Minimum SCO Exceedance (mg/kg)		Maximum SCO Exceedance (mg/kg)		UU SCOs (mg/kg)	PGW SCOs (mg/kg)	RURR SCOs (mg/kg)
Acetone	0.06	K-SB107_0-2	0.16	K-SB105_6-8	0.05	0.05	100

SVOCs

Six SVOCs exceeded the UU and/or RURR SCOs. Minimum and maximum SCO exceedances are shown in the table below. The applicable SCO for each compound is shown in the column on the right (RURR SCOs exceedances are shown in **bold**, PGW SCOs exceedances are shown underlined):

Analyte	Minimum SCO Exceedance (mg/kg)		Maximum SCO Exceedance (mg/kg)		UU SCOs (mg/kg)	PGW SCOs (mg/kg)	RURR SCOs (mg/kg)
Benzo(a)anthracene	**2.29**	**DUP07_092421** (Parent Sample: K-SB107_0-2)	**2.29**	**DUP07_092421** (Parent Sample: K-SB107_0-2)	1	1	1
Benzo(a)pyrene	**2.24**	**DUP07_092421** (Parent Sample: K-SB107_0-2)	**2.24**	**DUP07_092421** (Parent Sample: K-SB107_0-2)	1	1	1
Benzo(b)fluoranthene	**1.34**	**DUP07_092421** (Parent Sample: K-SB107_0-2)	**1.34**	**DUP07_092421** (Parent Sample: K-SB107_0-2)	1	1	1
Benzo(k)fluoranthene	1.88	DUP07_092421 (Parent Sample: K-SB107_0-2)	1.88	DUP07_092421 (Parent Sample: K-SB107_0-2)	0.8	1.7	3.9
Chrysene	2.15	DUP07_092421 (Parent Sample:	2.15	DUP07_092421 (Parent Sample:	1	1	3.9

Analyte	Minimum SCO Exceedance (mg/kg)		Maximum SCO Exceedance (mg/kg)		UU SCOs (mg/kg)	PGW SCOs (mg/kg)	RURR SCOs (mg/kg)
		K-SB107_0-2)		K-SB107_0-2)			
Indeno(1,2,3-cd)pyrene	**0.56**	**K-SB107_0-2**	**0.751**	**DUP07_092421** (Parent Sample: K-SB107_0-2)	0.5	0.5	0.5

Pesticides

Four pesticides exceeded the UU SCOs. Minimum and maximum SCO exceedances are shown in the table below. The applicable SCO for each compound is shown in the column on the right. No detections exceeded the RURR SCOs (PGW SCOs exceedances are shown underlined):

Analyte	Minimum SCO Exceedance (mg/kg)		Maximum SCO Exceedance (mg/kg)		UU SCOs (mg/kg)	PGW SCOs (mg/kg)	RURR SCOs (mg/kg)
4,4'-DDD	0.0079	K-SB104_5-7	0.00921	K-SB104_0-2	0.0033	14	13
Alpha Chlordane	0.233	K-EP102_0-2	0.233	K-EP102_0-2	0.094	2.9	4.2
Delta Bhc (Delta Hexachlorocyclohexane)	0.261	K-SB104_5-7	0.261	K-SB104_5-7	0.04	0.25	100
Dieldrin	0.0074	K-SB102_0-2	0.00741	K-SB102_0-2	0.005	0.1	0.2

Herbicides

No herbicides exceeded the UU SCOs.

PCBs

Total PCBs exceeded the UU SCOs in one RI soil sample from one boring collected from 0 to 2 feet bgs. Minimum and maximum SCO exceedances are shown in the table below. The applicable SCO is shown in the column on the right. No detections exceeded the RURR or PGW SCOs:

Analyte	Minimum SCO Exceedance (mg/kg)		Maximum SCO Exceedance (mg/kg)		UU SCOs (mg/kg)	PGW SCOs (mg/kg)	RURR SCOs (mg/kg)
Total PCBs	0.117	K-SB102_0-2	0.117	K-SB102_0-2	0.1	3.2	1

Metals

Seven metals exceeded the UU SCOs. Minimum and maximum SCO exceedances are shown in the table below. The applicable SCO for each compound is shown in the column on the right. No detections exceeded the RURR SCOs (PGW SCOs exceedances are shown underlined):

Analyte	Minimum SCO Exceedance (mg/kg)		Maximum SCO Exceedance (mg/kg)		UU SCOs (mg/kg)	PGW SCOs (mg/kg)	RURR SCOs (mg/kg)
Chromium, Trivalent	30.1	K-EP101_6-8	67.8	K-EP102_0-2	30	NS	180
Copper	66.4	K-SB104_5-7	173	K-EP102_0-2	50	1,720	270
Lead	76.4	K-SB107_0-2	248	K-EP102_0-2	63	450	400
Manganese	1,710	K-SB105_6-8	1,710	K-SB105_6-8	1,600	2,000	2,000
Mercury	0.24	K-SB105_9-11	0.243	K-SB105_9-11	0.18	0.73	0.81
Selenium	4.42	K-EP101_0-2	8.63	K-SB102_0-2	3.9	4	180
Zinc	118	K-SB103_0-2	1,210	K-EP102_0-2	109	2,480	10,000

TCLP Metals

No RCRA 8 metals exceeded the U.S. EPA Maximum Concentration of Contaminants for the Toxicity Characteristic.

Emerging Contaminants – PFAS and 1,4-Dioxane

PFOS exceeded the UU SCOs. Minimum and maximum SCO exceedances are shown in the table below. The applicable SCO for each compound is shown in the column on the right. No detections exceeded the RURR or PGW SCOs:

Analyte	Minimum SCO Exceedance (mg/kg)		Maximum SCO Exceedance (mg/kg)		UU SCOs (mg/kg)	PGW SCOs (mg/kg)	RURR SCOs (mg/kg)
PFOS	0.001	K-EP101_0-2	0.00297	DUP07_092421	0.00088	0.0037	0.044

5.4 Groundwater Findings

5.4.1 Field Observations

Forty-eight groundwater samples were collected for laboratory analysis. Sheen, petroleum-like odors, and/or elevated headspace PID readings were observed in the monitoring wells and are summarized in the following table.

Block ID (Sampling Area)	Monitoring Well ID	Headspace PID Reading (ppm)	Observations
Blocks 1826/1827 (E)	E-MW101	23.3	
	E-MW102	18.9	
	E-MW103	7.0	LNAPL
	E-MW104	10.7	
	E-MW115	37.3	
Block 1825 (F)	F-MW101	2.4	
	F-MW102	0.0	
	F-MW103	3.5	
	F-MW104	0.2	
	F-MW105	5.7	
	F-MW106	14.0	
	F-MW107	0.0	
	F-MW108	0.2	
	F-MW109	0.0	
	F-MW110	18.0	
	F-MW111	5.7	
Block 1824 (G)	G-MW101	0.2	
	G-MW102	260	
	G-MW103	0.3	
	G-MW104	2.1	
	G-MW105	19.0	
	G-MW106	1.2	
	G-MW107	0.3	
	G-MW108	5.4	
	G-MW109	1.4	
	G-MW110	5.3	
Block 1823 (H)	H-MW101	0.2	
	H-MW102	2.5	
	H-MW103	9.1	Petroleum-like odor and sheen
	H-MW104	24.0	
	H-MW105	24.9	

Block ID (Sampling Area)	Monitoring Well ID	Headspace PID Reading (ppm)	Observations
	H-MW106	0.0	
	H-MW107	0.2	
	H-MW108	0.1	
Block 1822 (I)	I-MW101	400	
	I-MW102	1.9	
	I-MW103	20.3	
	I-MW104	79.5	
	I-MW105	0.2	
Block 1833 (J)	J-MW101	0.3	
	J-MW102	2.5	Petroleum-like odor and sheen
	J-MW112	-	LNAPL
	J-MW117	20.5	Petroleum-like odor
	J-MW118	29.2	Petroleum-like odor
Block 1820 (K)	K-MW101	0.0	
	K-MW102	0.0	
	K-MW103	21.8	
	K-MW104	6.7	
	K-MW105	0.0	

5.4.2 Analytical Results

Groundwater samples were analyzed for one or more of the following: TCL VOCs, SVOCs, PCBs, pesticides, TAL metals (total and dissolved), 1,4-dioxane, and PFAS. Groundwater sample analytical results are compared to:

- NYSDEC NYCRR Part 703.5 and 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);
- Part 375 Remedial Programs Guidelines for Sampling and Analysis of PFAS (June 2021); and
- Drinking water maximum contaminant level (MCL) adopted by New York State for public water systems (July 2020) for 1,4-dioxane.

A summary of the groundwater sample analytical results are shown on Tables 5A to 5G and Figures 8A to 8G.

As described below, VOCs, SVOCs, PCBs, and metals were detected at concentrations exceeding NYSDEC SGVs. PFAS compounds were detected above the Part 375 Remedial Programs Guidelines for Sampling and Analysis of PFAS NYSDEC June 2021 guidance value. Currently, a groundwater cleanup regulatory criterion does not exist for 1,4-dioxane in New York State. Concentrations of 1,4-dioxane were compared to New York State's drinking water maximum contaminant level (MCL) of 1 microgram per liter (µg/L). 1,4-Dioxane was detected above the MCL for drinking water; however, the MCL is not directly applicable to the groundwater results because groundwater beneath OU-2 is not used as a potable water source.

Area E

Analytical results discussed in the following section include all groundwater samples collected during this RI, plus two samples from two monitoring wells installed within this section of OU-2 as a part of previous investigations to provide additional data in the northeast section of Area E. D-PZ202 was installed in April 2019 as part of the OU-1 RIR, and E-MW04 was installed in October 2019 as part of the 2019 limited site investigation on OU-2.

VOCs

Two VOCs exceeded the NYSDEC SGVs. Minimum and maximum SGV exceedances are shown in the table below. The applicable SGV for each compound is shown in the column on the right:

Analyte	Minimum SGV Exceedance (µg/L)		Maximum SGV Exceedance (µg/L)		NYSDEC SGVs (µg/L)
Cymene	76	D-PZ202_052819	76	D-PZ202_052819	5
Tert-Butyl Methyl Ether	11.6	E-MW102_092921	11.6	E-MW102_092921	10

SVOCs

Three SVOCs exceeded the NYSDEC SGVs. Minimum and maximum SGV exceedances are shown in the table below. The applicable SGV for each compound is shown in the column on the right:

Analyte	Minimum SGV Exceedance (µg/L)		Maximum SGV Exceedance (µg/L)		NYSDEC SGVs
Benzo(a)anthracene	0.08	D-PZ202_052819	0.08	D-PZ202_052819	0.002
Benzo(a)pyrene	0.05	D-PZ202_052819	0.05	D-PZ202_052819	ND
Indeno(1,2,3-cd)pyrene	0.04	D-PZ202_052819	0.04	D-PZ202_052819	0.002

ND = Not Detected

TPH Identification

LNAPL was observed in E-MW103 and one sample for TPH identification was collected. The sample identified the LNAPL as hydraulic oil.

Pesticides

Pesticides were not detected.

PCBs

Total PCBs exceeded the SGV in one groundwater sample. The concentration is provided below:

Analyte	Minimum SGV Exceedance (µg/L)		Maximum SGV Exceedance (µg/L)		NYSDEC SGVs (µg/L)
Total PCBs	0.106	D-PZ202_052819	0.106	D-PZ202_052819	0.09

Dissolved Metals

One or more of three dissolved metals exceeded the NYSDEC SGVs. Minimum and maximum SGV exceedances are shown in the table below. The applicable SGV for each compound is shown in the column on the right:

Analyte	Minimum SGV Exceedance (µg/L)		Maximum SGV Exceedance (µg/L)		NYSDEC SGVs (µg/L)
Iron	603	E-MW102_092921	12,100	E-MW04_110519	300
Manganese	336.1	E-MW04_110519	336.1	E-MW04_110519	300
Sodium	121,000	E-MW101_093021	295,000	E-MW04_110519	20,000

Total Metals

One or more of three total metals exceeded the NYSDEC SGVs. Minimum and maximum SGV exceedances are shown in the table below. The applicable SGV for each compound is shown in the column on the right:

Analyte	**Minimum SGV Exceedance (µg/L)**		**Maximum SGV Exceedance (µg/L)**		**NYSDEC SGVs (µg/L)**
Iron	760	E-MW115_092921	13,700	E-MW101_093021	300
Lead	26.1	E-MW102_092921	27.89	D-PZ202_052819	25
Sodium	37,600	E-MW115_092921	198,000	E-MW104_092921	20,000

Emerging Contaminants – PFAS and 1,4-Dioxane

Two PFAS exceeded the PFAS Guidance Values; minimum and maximum exceedances are provided below:

Analyte	**Minimum Guidance Value Exceedance (µg/L)**		**Maximum Guidance Value Exceedance (µg/L)**		**NYSDEC Guidance Values (µg/L)**
PFOS	0.0456	GWDUP01_092921 Parent: E-MW115	0.173	E-MW104_092921	0.01
PFOA	0.0167	E-MW102_092921	0.0272	E-MW104_092921	0.01

1,4-Dioxane exceeded the MCL in monitoring wells E-MW104 and D-PZ202. Minimum and maximum exceedances are shown in the table below. The MCL is shown in the column on the right:

Analyte	**Minimum MCL Exceedance (µg/L)**		**Maximum MCL Exceedance (µg/L)**		**NYSDEC MCL (µg/L)**
1,4-Dioxane	1.2	D-PZ202_052819	1.33	E-MW104_092921	1

Although no groundwater cleanup regulatory criterion exists for 1,4-dioxane, the NYSDEC promulgated a MCL of 1 µg/L for drinking water. The MCL is not directly applicable to the groundwater results because OU-2 groundwater is not used as a potable water source, but will be considered for remedy selection.

Area F

VOCs

One VOC exceeded the NYSDEC SGV in three groundwater monitoring wells. Minimum and maximum SGV exceedances are shown in the table below. The applicable SGV for each compound is shown in the column on the right:

Analyte	Minimum SGV Exceedance (µg/L)		Maximum SGV Exceedance (µg/L)		NYSDEC SGVs (µg/L)
Benzene	8.25	F-MW103_101321	13.3	F-MW106_100421	1

SVOCs

No SVOCs exceeded the SGVs.

Pesticides

Pesticides were not detected.

PCBs

PCBs were not detected.

Dissolved Metals

One or more of three dissolved metals exceeded the NYSDEC SGVs in ten of the eleven groundwater wells sampled. Minimum and maximum SGV exceedances are shown in the table below. The applicable SGV for each compound is shown in the column on the right:

Analyte	Minimum SGV Exceedance (µg/L)		Maximum SGV Exceedance (µg/L)		NYSDEC SGVs (µg/L)
Iron	305	F-MW107_093021	1,500	F-MW110_093021	300
Manganese	315	F-MW104_100121	478	F-MW107_093021	300
Sodium	27,100	F-MW105_100121	96,300	F-MW109_100121	20,000

Total Metals

One or more of four total metals exceeded the NYSDEC SGVs in ten of the eleven groundwater wells sampled. Minimum and maximum SGV exceedances are shown in the table below. The applicable SGV for each compound is shown in the column on the right:

Analyte	Minimum SGV Exceedance (µg/L)		Maximum SGV Exceedance (µg/L)		NYSDEC SGVs (µg/L)
Iron	888	F-MW106_100421	10,100	F-MW109_100121	300
Manganese	338	F-MW108_093021	525	F-MW107_093021	300
Mercury	1.7	F-MW108_093021	1.7	F-MW108_093021	0.7
Sodium	23,500	F-MW108_093021	89,100	F-MW110_093021	20,000

Emerging Contaminants – PFAS and 1,4-Dioxane

Two PFAS exceeded the PFAS Guidance Values in ten of the eleven wells; minimum and maximum exceedances are provided below:

Analyte	Minimum Guidance Value Exceedance (µg/L)		Maximum Guidance Value Exceedance (µg/L)		NYSDEC Guidance Values (µg/L)
PFOS	0.0163	F-MW103_101321	0.122	F-MW106_100421	0.01
PFOA	0.0115	F-MW105_100121	0.0299	F-MW108_093021	0.01

1,4-Dioxane exceeded the MCL in monitoring well F-MW106. The concentration is provided in the following table:

Analyte	Minimum MCL Exceedance (µg/L)		Maximum MCL Exceedance (µg/L)		NYSDEC MCL (µg/L)
1,4-Dioxane	2.32	F-MW106_100421	2.32	F-MW106_100421	1

Although no groundwater cleanup regulatory criterion exists for 1,4-dioxane, the NYSDEC promulgated a MCL of 1 µg/L for drinking water. The MCL is not directly applicable to the groundwater results because OU-2 groundwater is not used as a potable water source, but will be considered for remedy selection.

Area G

VOCs

Two VOCs exceeded the NYSDEC SGV in G-MW109. Minimum and maximum SGV exceedances are shown in the table below. The applicable SGV for each compound is shown in the column on the right:

Analyte	Minimum SGV Exceedance (µg/L)		Maximum SGV Exceedance (µg/L)		NYSDEC SGVs (µg/L)
Chloroform	13.9	G-MW109_101321	13.9	G-MW109_101321	7
Total Xylenes	5.8	G-MW109_101321	5.8	G-MW109_101321	5

SVOCs

One SVOC exceeded the NYSDEC SGV in G-MW109. The concentration is shown in the table below:

Analyte	Minimum SGV Exceedance (µg/L)		Maximum SGV Exceedance (µg/L)		NYSDEC SGVs (µg/L)
Phenol	19.9	G-MW109_101321	19.9	G-MW109_101321	1

Pesticides

No pesticides exceeded the SGVs.

PCBs

PCBs were not detected.

Dissolved Metals

One or more of three dissolved metals exceeded the NYSDEC SGVs in all ten groundwater wells sampled. Minimum and maximum SGV exceedances are shown in the table below. The applicable SGV for each compound is shown in the column on the right:

Analyte	Minimum SGV Exceedance (µg/L)		Maximum SGV Exceedance (µg/L)		NYSDEC SGVs (µg/L)
Iron	519	G-MW102_100521	26,600	G-MW107_100721	300

Analyte	Minimum SGV Exceedance (µg/L)		Maximum SGV Exceedance (µg/L)		NYSDEC SGVs (µg/L)
Manganese	413	G-MW107_100721	1,390	G-MW105_100521	300
Sodium	29,300	G-MW106_100521	423,000	G-MW109_101321	20,000

Total Metals

One or more of four total metals exceeded the SGVs in nine of the ten groundwater wells sampled. Minimum and maximum SGV exceedances are shown in the table below. The applicable SGV for each compound is shown in the column on the right:

Analyte	Minimum SGV Exceedance (µg/L)		Maximum SGV Exceedance (µg/L)		NYSDEC SGVs (µg/L)
Barium	1,240	G-MW101_100421	1,240	G-MW101_100421	1,000
Iron	3,130	G-MW104_100821	21,300	G-MW101_100421	300
Manganese	419	G-MW107_100721	1,490	G-MW105_100521	300
Sodium	29,800	G-MW110_101321	12,4000	G-MW101_100421	20,000

Emerging Contaminants – PFAS and 1,4-Dioxane

Two PFAS exceeded the PFAS Guidance Values in all ten wells; minimum and maximum exceedances are provided below:

Analyte	Minimum Guidance Value Exceedance (µg/L)		Maximum Guidance Value Exceedance (µg/L)		NYSDEC Guidance Values (µg/L)
PFOS	0.0222	G-MW109_101321	0.11	G-MW108_100821	0.01
PFOA	0.0101	G-MW107_100721	0.0286	G-MW104_100821	0.01

1,4-Dioxane did not exceed the MCL.

Area H

VOCs

One VOC exceeded the NYSDEC SGV in H-MW103. The concentration is provided below:

Analyte	Minimum SGV Exceedance (µg/L)		Maximum SGV Exceedance (µg/L)		NYSDEC SGVs (µg/L)
Toluene	8.01	H-MW103_101321	8.01	H-MW103_101321	5

SVOCs

One SVOC exceeded the NYSDEC SGV in H-MW102. The concentration is provided below:

Analyte	Minimum SGV Exceedance (µg/L)		Maximum SGV Exceedance (µg/L)		NYSDEC SGVs (µg/L)
Benzo(a)anthracene	0.0541	H-MW102_101321	0.0541	H-MW102_101321	0.002

Pesticides

Pesticides were not detected.

PCBs

PCBs were not detected.

Dissolved Metals

One or more of five dissolved metals exceeded the SGVs in all eight groundwater wells sampled. Minimum and maximum SGV exceedances are shown in the table below. The applicable SGV for each compound is shown in the column on the right:

Analyte	Minimum SGV Exceedance (µg/L)		Maximum SGV Exceedance (µg/L)		NYSDEC SGVs (µg/L)
Arsenic	126	H-MW101_101421	126	H-MW101_101421	25
Iron	4,860	H-MW106_101421	38,300	H-MW102_101321	300
Lead	29	H-MW107_101321	29	H-MW107_101321	25
Manganese	366	H-MW104_101321	2,620	H-MW108_101421	300

Analyte	Minimum SGV Exceedance (µg/L)		Maximum SGV Exceedance (µg/L)		NYSDEC SGVs (µg/L)
Sodium	47,200	H-MW103_101321	103,000	H-MW105_101321	20,000

Total Metals

One or more of four total metals exceeded the SGVs in all eight groundwater wells sampled. Minimum and maximum SGV exceedances are shown in the table below. The applicable SGV for each compound is shown in the column on the right:

Analyte	Minimum SGV Exceedance (µg/L)		Maximum SGV Exceedance (µg/L)		NYSDEC SGVs (µg/L)
Arsenic	36.6	H-MW107_101321	73.2	H-MW101_101421	25
Iron	3,360	H-MW106_101421	30,700	H-MW102_101321	300
Manganese	366	H-MW104_101321	2,630	H-MW108_101421	300
Sodium	47,300	H-MW101_101421	107,000	H-MW105_101321	20,000

Emerging Contaminants – PFAS and 1,4-Dioxane

Two PFAS exceeded the PFAS Guidance Values in seven of the eight wells; minimum and maximum exceedances are provided below:

Analyte	Minimum Guidance Value Exceedance (µg/L)		Maximum Guidance Value Exceedance (µg/L)		NYSDEC Guidance Values (µg/L)
PFOS	0.0164	H-MW105_101321	0.153	H-MW103_101321	0.01
PFOA	0.0129	H-MW105_101321	0.029	H-MW101_101421	0.01

1,4-Dioxane did not exceed the MCL.

Area I

VOCs

Twelve VOCs exceeded the NYSDEC SGVs in I-MW101. Minimum and maximum SGV exceedances are shown in the table below. The applicable SGV for each compound is shown in the column on the right:

Analyte	**Minimum SGV Exceedance (µg/L)**		**Maximum SGV Exceedance (µg/L)**		**NYSDEC SGVs (µg/L)**
1,2,4-Trimethylbenzene	12.6	I-MW101_101121	12.6	I-MW101_101121	5
Benzene	98.4	I-MW101_101121	98.4	I-MW101_101121	1
Ethylbenzene	8	I-MW101_101121	8	I-MW101_101121	5
Isopropylbenzene (Cumene)	62	I-MW101_101121	62	I-MW101_101121	5
M,P-Xylene	45	I-MW101_101121	45	I-MW101_101121	5
n-Butylbenzene	13.1	I-MW101_101121	13.1	I-MW101_101121	5
n-Propylbenzene	151	I-MW101_101121	151	I-MW101_101121	5
o-Xylene (1,2-Dimethylbenzene)	12	I-MW101_101121	12	I-MW101_101121	5
Sec-Butylbenzene	8.78	I-MW101_101121	8.78	I-MW101_101121	5
Tert-Butyl Methyl Ether	10.1	I-MW101_101121	10.1	I-MW101_101121	10
Toluene	14	I-MW101_101121	14	I-MW101_101121	5
Total Xylenes	57	I-MW101_101121	57	I-MW101_101121	5

SVOCs

SVOCs did not exceed the SGVs.

Pesticides

Pesticides were not detected.

PCBs

PCBs were not detected.

Dissolved Metals

One or more of three dissolved metals exceeded the SGVs in all five groundwater wells sampled. Minimum and maximum SGV exceedances are shown in the table below. The applicable SGV for each compound is shown in the column on the right:

Analyte	Minimum SGV Exceedance (µg/L)		Maximum SGV Exceedance (µg/L)		NYSDEC SGVs (µg/L)
Iron	1,470	I-MW102_101121	9,650	I-MW104_101121	300
Manganese	441	I-MW103_101121	1,260	I-MW105_101121	300
Sodium	92,800	I-MW101_101121	239,000	I-MW103_101121	20,000

Total Metals

One or more of three total metals exceeded the SGVs in five groundwater wells sampled. Minimum and maximum SGV exceedances are shown in the table below. The applicable SGV for each compound is shown in the column on the right:

Analyte	Minimum SGV Exceedance (µg/L)		Maximum SGV Exceedance (µg/L)		NYSDEC SGVs (µg/L)
Iron	4,610	I-MW103_101121	20,200	I-MW102_101121	300
Manganese	493	I-MW103_101121	1,320	I-MW105_101121	300
Sodium	100,000	I-MW101_101121	246,000	I-MW103_101121	20,000

Emerging Contaminants – PFAS and 1,4-Dioxane

Two PFAS exceeded the PFAS Guidance Values in all five wells; minimum and maximum exceedances are provided below:

Analyte	Minimum Guidance Value Exceedance (µg/L)		Maximum Guidance Value Exceedance (µg/L)		NYSDEC Guidance Values (µg/L)
PFOS	0.0357	I-MW104_101121	0.302	I-MW102_101121	0.01
PFOA	0.0204	I-MW104_101121	0.0335	I-MW105_101121	0.01

1,4-Dioxane exceeded the MCL in monitoring well I-MW105. The concentration range is provided in the following table:

Analyte	Minimum MCL (µg/L)		Maximum MCL (µg/L)		NYSDEC MCL (µg/L)
1,4-Dioxane	1.6	I-MW105_101121	1.6	I-MW105_101121	1

Although no groundwater cleanup regulatory criterion exists for 1,4-dioxane, the NYSDEC promulgated a MCL of 1 µg/L for drinking water. The MCL is not directly applicable to the groundwater results because OU-2 groundwater is not used as a potable water source, but will be considered for remedy selection.

Area J

VOCs

One or more of fourteen VOCs exceeded the SGVs in all four groundwater monitoring wells. Minimum and maximum SGV exceedances are shown in the table below. The applicable SGV for each compound is shown in the column on the right:

Analyte	Minimum SGV Exceedance (µg/L)		Maximum SGV Exceedance (µg/L)		NYSDEC SGVs (µg/L)
1,2,4-Trimethylbenzene	6.02	J-MW102_101421	110	J-MW118_030422	5
1,3,5-Trimethylbenzene	24.7	J-MW117_030422	30.1	J-MW118_030422	5
Acetone	63.6	J-MW117_030422	203	J-MW118_030422	50
Benzene	1.27	J-MW102_101421	137	J-MW118_030422	1
Ethylbenzene	59.5	J-MW117_030422	92.5	J-MW118_030422	5
Isoproylbenzene	9.3	J-MW117_030422	9.3	J-MW117_030422	5
M,P-Xylene	7.35	J-MW102_101421	346	J-MW118_030422	5
Methylene Chloride	22	J-MW117_030422	22	J-MW117_030422	5
n-Propylbenzene	10.5	J-MW118_030422	25.5	J-MW117_030422	5
o-Xylene	108	J-MW117_030422	212	J-MW118_030422	5
Styrene	9	J-MW117_030422	10.1	J-MW118_030422	5
Tert-Butyl Methyl Ether	12.5	J-MW101_101421	1,190	J-MW118_030422	10
Toluene	191	J-MW117_030422	478	J-MW118_030422	5

Analyte	Minimum SGV Exceedance (μg/L)		Maximum SGV Exceedance (μg/L)		NYSDEC SGVs (μg/L)
Total Xylenes	12.2	J-MW102_101421	558	J-MW118_030422	5

SVOCs

One or more of six SVOCs exceeded the NYSDEC SGVs in J-MW117 and/or J-MW118. Minimum and maximum SGV exceedances are shown in the table below. The applicable SGV for each compound is shown in the column on the right:

Analyte	Minimum SGV Exceedance (μg/L)		Maximum SGV Exceedance (μg/L)		NYSDEC SGVs
2,4-Dichlorophenol	7.13	J-MW118_030422	7.13	J-MW118_030422	1
2,4-Dimethylphenol	31.8	J-MW118_030422	70.5	J-MW117_030422	1
Benzo(a)anthracene	0.129	J-MW118_030422	0.129	J-MW118_030422	0.002
Chrysene	0.586	J-MW118_030422	0.586	J-MW118_030422	0.002
Naphthalene	33.9	J-MW118_030422	44.5	J-MW117_030422	10
Phenol	5.39	J-MW117_030422	32.6	J-MW118_030422	1

Pesticides

Pesticides were not detected.

PCBs

Total PCBs exceeded the SGV in two groundwater samples. The concentration is provided below:

Analyte	Minimum SGV Exceedance (μg/L)		Maximum SGV Exceedance (μg/L)		NYSDEC SGVs (μg/L)
Total PCBs	0.328	J-MW117_030422	0.952	J-MW118_030422	0.09

Dissolved Metals

One or more of seven dissolved metals exceeded the SGVs in all four groundwater wells sampled. Minimum and maximum SGV exceedances are shown in the table below. The applicable SGV for each compound is shown in the column on the right:

Analyte	**Minimum SGV Exceedance (µg/L)**		**Maximum SGV Exceedance (µg/L)**		**NYSDEC SGVs (µg/L)**
Antimony	15.6	J-MW117_030422	24.8	J-MW118_030422	3
Arsenic	48.6	J-MW118_030422	48.6	J-MW118_030422	25
Chromium (Total)	116	J-MW118_030422	116	J-MW118_030422	50
Iron	410	J-MW101_101421	3,510	J-MW118_030422	300
Lead	76.7	J-MW117_030422	89.5	J-MW118_030422	25
Selenium	14	J-MW117_030422	44.1	J-MW118_030422	10
Sodium	116,000	J-MW102_101421	992,000	J-MW118_030422	20,000

Total Metals

One or more of eight total metal exceeded the SGVs in all four groundwater wells sampled. Minimum and maximum SGV exceedances are shown in the table below. The applicable SGV for each compound is shown in the column on the right:

Analyte	**Minimum SGV Exceedance (µg/L)**		**Maximum SGV Exceedance (µg/L)**		**NYSDEC SGVs (µg/L)**
Antimony	13.5	J-MW117_030422	26.7	J-MW118_030422	3
Arsenic	34.5	J-MW117_030422	54.7	J-MW118_030422	25
Cyanide	302	J-MW117_030422	302	J-MW117_030422	200
Iron	621	J-MW117_030422	3,890	J-MW118_030422	300
Lead	33.7	J-MW117_030422	33.7	J-MW117_030422	25
Nickel	106	J-MW118_030422	106	J-MW118_030422	100
Selenium	46.6	J-MW117_030422	73.8	J-MW118_030422	10

Analyte	Minimum SGV Exceedance (µg/L)		Maximum SGV Exceedance (µg/L)		NYSDEC SGVs (µg/L)
Sodium	122,000	J-MW102_101421	973,000	J-MW118_030422	20,000

Emerging Contaminants – PFAS and 1,4-Dioxane

Two PFAS exceeded the PFAS Guidance Values in three groundwater wells; minimum and maximum exceedances are provided below:

Analyte	Minimum Guidance Value Exceedance (µg/L)		Maximum Guidance Value Exceedance (µg/L)		NYSDEC Guidance Values (µg/L)
PFOS	0.103	J-MW102_101421	0.493	J-MW117_030422	0.01
PFOA	0.0283	J-MW102_101421	0.388	J-MW118_030422	0.01

1,4-Dioxane exceeded the MCL in monitoring wells J-MW117 and J-MW118. Minimum and maximum exceedances are shown in the table below. The MCL is shown in the column on the right:

Analyte	Minimum MCL Exceedance (µg/L)		Maximum MCL Exceedance (µg/L)		NYSDEC MCL (µg/L)
1,4-Dioxane	8.5	J-MW117_030422	13.4	J-MW118_030422	1

Area K

VOCs

One VOC exceeded the SGV in three groundwater monitoring wells. Minimum and maximum SGV exceedances are shown in the table below. The applicable SGV for each compound is shown in the column on the right:

Analyte	Minimum SGV Exceedance (µg/L)		Maximum SGV Exceedance (µg/L)		NYSDEC SGVs (µg/L)
Tert-Butyl Methyl Ether	19.9	K-MW105_100721	29.6	GWDUP02_100621 (Parent Sample: K-MW104_100621)	10

SVOCs

SVOCs did not exceed the SGVs.

Pesticides

Pesticides were not detected.

PCBs

PCBs were not detected.

Dissolved Metals

One or more of four dissolved metals exceeded the SGVs in four of the five groundwater wells sampled. Minimum and maximum SGV exceedances are shown in the table below. The applicable SGV for each compound is shown in the column on the right:

Analyte	**Minimum SGV Exceedance (µg/L)**		**Maximum SGV Exceedance (µg/L)**		**NYSDEC SGVs (µg/L)**
Iron	588	K-MW105_100721	22,800	GWDUP02_100621 (Parent Sample: K-MW104_100621)	300
Magnesium	165,000	K-MW105_100721	165,000	K-MW105_100721	35,000
Manganese	1,060	K-MW104_100621	12200	K-MW105_100721	300
Sodium	31,700	K-MW103_100621	1,070,000	K-MW105_100721	20,000

Total Metals

One or more of four total metals exceeded the SGVs in four of the five groundwater wells sampled. Minimum and maximum SGV exceedances are shown in the table below. The applicable SGV for each compound is shown in the column on the right:

Analyte	**Minimum SGV Exceedance (µg/L)**		**Maximum SGV Exceedance (µg/L)**		**NYSDEC SGVs (µg/L)**
Iron	595	K-MW102_100621	30,900	K-MW104_100621	300
Magnesium	164,000	K-MW105_100721	164,000	K-MW105_100721	35000
Manganese	1,150	K-MW104_100621	12,800	K-MW105_100721	300
Sodium	33,000	K-MW103_100621	1,070,000	K-MW105_100721	20,000

Emerging Contaminants – PFAS and 1,4-Dioxane

Two PFAS exceeded the PFAS Guidance Values in four of the wells sampled; minimum and maximum exceedances are provided below:

Analyte	Minimum Guidance Value Exceedance (µg/L)		Maximum Guidance Value Exceedance (µg/L)		NYSDEC Guidance Values (µg/L)
PFOS	0.0166	K-MW105_100721	0.0989	K-MW104_100621	0.01
PFOA	0.0165	K-MW102_100621	0.0638	K-MW104_100621	0.01

1,4-Dioxane did not exceed the MCL.

5.5 Soil Vapor Findings

Forty-four soil vapor samples and one outdoor ambient air sample were collected and submitted for laboratory analysis for VOCs. Seven soil vapor samples were also analyzed for methane. A direct comparison standard has not been established for soil vapor in New York State. A summary of detected VOCs in samples collected during the RI is provided in Tables 6A to 6G and shown on Figures 9A to 9G. The following table summarizes methane readings that were measured using a GEM 2000 landfill gas meter prior to soil vapor sampling and concentrations for the seven samples collected for laboratory analysis.

Block ID (Sampling Area)	Soil Vapor ID	Field Screened Methane Reading (%)	Laboratory Result (parts per million volume [ppmV])
Blocks 1826/1827 (E)	E-SV101	0.8	not sampled
	E-SV102	1	not sampled
	E-SV103	0.5	not sampled
	E-SV104	21.8	56.9
Block 1825 (F)	F-SV101	1.7	not sampled
	F-SV103	1.5	not sampled
	F-SV110	40.2	605,000
Block 1824 (G)	G-SV102	3.6	not sampled
	G-SV104	15	156,000
	G-SV110	0.9	not sampled
Block 1823 (H)	H-SV101	12.2	105,000
	H-SV102	1.9	not sampled
	H-SV103	38.3	not sampled
	H-SV104	5.5	not sampled

Block ID (Sampling Area)	Soil Vapor ID	Field Screened Methane Reading (%)	Laboratory Result (parts per million volume [ppmV])
	H-SV105	4.3	not sampled
	H-SV106	1.8	not sampled
Block 1822 (I)	I_SV101	17.9	not sampled
	I_SV102	22.1	not sampled
	I_SV104	3.3	not sampled
	I_SV105	35.9	28.6
Block 1833 (J)	J-SV101	0.7	not sampled
	J-SV102	0.9	7,090
Block 1820 (K)	K-SV103	4	not sampled
	K-SV104	19.3	270,000
	K-SV105	6.4	not sampled

The following tables summarizes the range of total VOCs and total benzene, toluene, ethylbenzene, and xylenes (BTEX) concentrations in soil vapor.

Area	Analyte	Minimum (micrograms per cubic meter [µg/m³])		Maximum (µg/m³)	
E	Total VOCs	246	E-SV101	11,141	E-SV104
	Total BTEX	37	E-SV115	1,367	E-SV103
F	Total VOCs	173	F-SV104	217,318	F-SV110
	Total BTEX	9		17,600	
G	Total VOCs	379	G-SV101	56,313	G-SV102
	Total BTEX	92		13,680	
H	Total VOCs	494	H-SV108	78,895	H-SV104
	Total BTEX	128		7,690	
I	Total VOCs	79	I-SV101	79,618	I-SV103
	Total BTEX	33		2,350	
J	Total VOCs	634	J-SV102	2,692	J-SV101
	Total BTEX	29		258	
K	Total VOCs	146	K-SV101	30,030	K-SV103
	Total BTEX	11		4,740	

Several chlorinated VOCs (CVOCs) were found in soil vapor in OU-2. Summaries of CVOC soil vapor findings per sampling area are provided below.

Area E

1,1-Dichloroethene (1,1-DCE) and 1,1,1-trichloroethane (1,1,1-TCA) were not detected in soil vapor. Carbon tetrachloride, cis-1,2-dichloroethene (cis-1,2-DCE), methylene chloride, PCE, TCE, and/or vinyl chloride were detected in one or more soil vapor samples at the following concentration ranges:

Analyte	Minimum Detected Concentration (µg/m^3)		Maximum Detected Concentration (µg/m^3)	
Carbon Tetrachloride	0.31	E-SV101_091521	0.31	E-SV101_091521
Cis-1,2-DCE	8.1	E-SV115_091521	8.1	E-SV115_091521
Methylene Chloride	1.9	E-SV101_091521	6.3	E-SV103_091521
PCE	2.0	E-SV101_091521	38	E-SV115_091521
TCE	0.87	E-SV101_091521	26	E-SV115_091521
Vinyl Chloride	0.21	E-SV115_091521	1.7	E-SV102_091521

Area F

1,1-DCE and methylene chloride were not detected in soil vapor. 1,1,1-TCA, carbon tetrachloride, cis-1,2-DCE, methylene chloride, PCE, TCE, and/or vinyl chloride were detected in one or more soil vapor samples at the following concentration ranges:

Analyte	Minimum Detected Concentration (µg/m^3)		Maximum Detected Concentration (µg/m^3)	
1,1,1-TCA	2.2	F-SV107_092221	2.2	F-SV107_092221
Carbon Tetrachloride	0.3	F-SV103_092221 F-SV109_092221	0.82	F-SV105_092221
Cis-1,2-DCE	0.3	F-SV107_092221	1.7	F-SV108_092221
PCE	3.7	F-SV104_092221	240	F-SV107_092221
TCE	0.5	F-SV107_092221	1.1	F-SV105_092221
Vinyl Chloride	0.2	F-SV103_092221	2.1	F-SV104_092221

Area G

1,1-DCE, carbon tetrachloride, cis-1,2-DCE, TCE, and vinyl chloride were not detected in soil vapor. 1,1,1-TCA and methylene chloride were detected in one soil vapor sample and PCE was detected in all ten soil vapor samples at the following concentration ranges.

Analyte	Minimum Detected Concentration (µg/m^3)		Maximum Detected Concentration (µg/m^3)	
1,1,1-TCA	2.3	G-SV101_100721	2.3	G-SV101_100721
Methylene Chloride	7.5	G-SV110_100721	7.5	G-SV110_100721
PCE	2.9	G-SV106_100721	190	G-SV105_100721

Area H

1,1,1-TCA was not detected in soil vapor. CVOCs were detected in four soil vapor samples on the western side Area H at the following concentration ranges.

Analyte	Minimum Detected Concentration (µg/m³)		Maximum Detected Concentration (µg/m³)	
1,1-DCE	3	SVDUP03	53	H-SV104_100821
Carbon Tetrachloride	0.5	H-SV108_100821	0.5	H-SV108_100821
Cis-1,2-DCE	0.2	H-SV108_100821	12,000	H-SV104_100821
Methylene Chloride	4	H-SV106_100821	27	H-SV103_100821
PCE	2.5	H-SV102_100821	58	H-SV104_100821
TCE	1.1	H-SV108_100821	130	H-SV104_100821
Vinyl Chloride	12	H-SV102_100821	45,000	H-SV104_100821

Area I

1,1,1-TCA, 1,1-DCE, methylene chloride, and TCE were not detected in soil vapor. Carbon tetrachloride, cis-1,2-DCE, PCE, and/or vinyl chloride were detected in one or more soil vapor samples at the following concentration ranges:

Analyte	Minimum Detected Concentration (µg/m³)		Maximum Detected Concentration (µg/m³)	
Carbon Tetrachloride	0.33	I_SV101_092921	0.33	I_SV101_092921
Cis-1,2-DCE	3.4	I_SV102_092921	3.4	I_SV102_092921
PCE	3.4	I_SV105_092921	3.4	I_SV105_092921
Vinyl Chloride	7.1	I_SV102_092921	7.1	I_SV102_092921

Area J

1,1,1-TCA, 1,1-DCE, and carbon tetrachloride were not detected in soil vapor. Cis-1,2-DCE, methylene chloride, PCE, TCE, and/or vinyl chloride were detected in one or more soil vapor samples at the following concentration ranges:

Analyte	Minimum Detected Concentration (µg/m³)		Maximum Detected Concentration (µg/m³)	
Cis-1,2-DCE	1.4	SVDUP01_100821	1.4	SVDUP01_100821
Methylene Chloride	5.8	J-SV102_100821	5.8	J-SV102_100821
PCE	4.1	J-SV101_100821	42	J-SV102_100821
TCE	12	J-SV102_100821	12	J-SV102_100821
Vinyl Chloride	0.8	J-SV102_100821	0.84	J-SV102_100821

Area K

1,1,1-TCA and 1,1-DCE were not detected in soil vapor. Carbon tetrachloride, cis-1,2-DCE, methylene chloride, PCE, TCE, and/or vinyl chloride were detected in one or more soil vapor samples at the following concentration ranges:

Analyte	Minimum Detected Concentration (µg/m³)		Maximum Detected Concentration (µg/m³)	
Carbon Tetrachloride	0.3	K-SV101_092821	0.32	K-SV101_092821
Cis-1,2-DCE	0.3	K-SV102_092821	40	K-SV104_092821
Methylene Chloride	13	K-SV104_092821	13	K-SV104_092821
PCE	4	K-SV101_092821	34	K-SV102_092821
TCE	270	K-SV102_092821	270	K-SV102_092821
Vinyl Chloride	1.5	K-SV105_092821	200	K-SV104_092821

5.6 Data Usability

Category B laboratory reports for RI soil, groundwater, and soil vapor samples and preliminary waste characterization soil samples were provided by York and were forwarded to Langan's data validator. Copies of the DUSRs are provided in Appendix I.

According to the validation results, the data were determined to be acceptable. Completeness, defined as the percentage of analytical results that are judged to be valid, is 100% for soil, groundwater, and soil vapor. All data are considered useable as qualified.

5.7 Evaluation of Areas of Concern

This section discusses the RI results with respect to the AOCs described in Section 3.4. The RURR SCOs are the applicable soil standards for comparison based on the anticipated mixed-use residential, commercial, and institutional development. The results were also compared to UU SCOs to evaluate whether unrestricted land use is practical. The sample locations and original AOCs are shown on Figure 4.

5.7.1 AOC 1: Historic Fill

In addition to the OU-2's historical use as a dumping ground for coal ash, fill from unknown sources may have been 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 2021/2022 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 and/or RURR 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 but below RURR SCOs in samples collected within the historic fill layer. VOCs are associated with AOC 2 and discussed in Section 5.7.2.
- Ten SVOCs exceeded UU and/or RURR SCOs in samples collected within the historic fill layer. Total SVOC concentrations were above 250 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 RURR 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 and/or RURR SCOs in samples collected within the historic fill layer. Concentrations of chromium above the U.S. EPA Maximum Concentration of Contaminants for the Toxicity Characteristic were identified in the upper 2 feet of E-SB104.
- PFOS exceeded the UU guidance value from two samples collected within the historic fill layer.

Groundwater

- One or more of three dissolved-phase metals exceeded the 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.

<u>*AOC 1 Area F*</u>

Soil

- Historic fill located throughout the area contains VOCs, SVOCs, pesticides, PCBs, metals, and PFOS at concentrations above the Part 375 UU and/or RURR 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 and/or RURR SCOs in samples collected within the historic fill layer. VOCs are associated with AOC 2 and discussed in Section 5.7.2.
- Eight SVOCs exceeded the UU and/or RURR 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 RURR 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 RURR 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 and/or RURR SCOs in samples collected within the historic fill layer. Concentrations of lead above the U.S. EPA 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. 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 guidance value in 17 samples collected within the historic fill layer.

Groundwater

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

<u>*AOC 1 Area G*</u>

Soil

- Historic fill located throughout the area contains VOCs, SVOCs, pesticides, PCBs, metals, and PFOS at concentrations above the Part 375 UU and/or RURR 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 and/or RURR SCOs in samples collected within the historic fill layer. VOCs are associated with AOC 2 and discussed in Section 5.7.2.
- Eight SVOCs exceeded the UU and/or RURR SCOs in samples collected within the historic fill layer. SVOC concentrations were consistent with NYC historic fill composition.
- Four pesticides exceeded the UU SCOs but below RURR SCOs in samples collected within the historic fill layer. Pesticide concentrations were consistent with NYC historic fill composition.
- Total PCBs exceeded the UU SCOs but below RURR SCOs in 3 soil samples collected within the historic fill layer at concentrations consistent with NYC historic fill composition.
- Twelve metals exceeded the UU and/or RURR SCOs in samples collected within the historic fill layer. Concentrations of lead above the U.S. EPA 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 SCO in nine samples collected within the historic fill layer.

Groundwater

- Two VOCs, chloroform and total xylenes, exceeded the SGVs in G-MW109. Detections of total xylenes are associated with AOC 2 and are discussed in Section 5.7.2.
- One SVOC, phenol, exceeded the 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 and/or RURR 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 exceeded the UU SCOs but below RURR SCOs in samples collected within the historic fill layer. VOCs are associated with AOC 2 and discussed in Section 5.7.2.
- Seven SVOCs exceeded the UU and/or RURR 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 RURR SCOs in samples collected within the historic fill layer. Pesticide concentrations were consistent with NYC historic fill composition.
- Total PCBs exceeded the UU SCOs but below RURR 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 and/or RURR SCOs in samples collected within the historic fill layer. Concentrations of lead above the U.S. EPA Maximum Concentration of Contaminants for the Toxicity Characteristic were not detected in the 6 borings that were analyzed for TCLP metals.

- PFOS exceeded the UU guidance value 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 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 and/or RURR 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 SCOs but below RURR SCOs in samples collected within the historic fill layer. VOCs are associated with AOC 2 and are discussed in Section 5.7.2.
- Seven SVOCs exceeded the UU and/or RURR 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 RURR SCOs in samples collected within the historic fill layer. Pesticide concentrations were consistent with NYC historic fill composition.
- Total PCBs exceeded the UU SCOs and/or RURR SCOs in 6 samples collected within the historic fill layer at concentrations consistent with NYC historic fill composition.
- Nine metals exceeded the UU and/or RURR SCOs in samples collected within the historic fill layer. Concentrations of lead were not detected above the U.S. EPA Maximum Concentration of Contaminants for the Toxicity Characteristic in the boring that was analyzed for TCLP metals.

- PFOS and/or PFOA exceeded the UU SCO in seven samples collected within the historic fill layer.

Groundwater

- Two SVOCs, benzo(a)anthracene and bis(2-ethylhexyl)phthalate, exceeded the SGVs in I-MW103.
- Three dissolved-phase metals exceeded the 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 and/or RURR 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 and/or RURR SCOs in samples collected within the historic fill layer. VOCs are associated with AOC 2 and are discussed in Section 5.7.2.
- Eleven SVOCs exceeded the UU and/or RURR 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 RURR SCOs in samples collected within the historic fill layer. Pesticide concentrations were consistent with NYC historic fill composition.
- Total PCBs exceeded the UU and/or RURR 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 and/or RURR SCOs in samples collected within the historic fill layer. Concentrations of lead above the U.S. EPA 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 guidance value in four samples collected within the historic fill layer.

Groundwater

- Two dissolved-phase metals exceeded the 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 and/or RURR 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, exceeded the UU SCOs and/or RURR SCOs in samples collected within the historic fill layer.
- Six SVOCs exceeded the UU and/or RURR 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 RURR SCOs in samples collected within the historic fill layer. Pesticide concentrations were consistent with NYC historic fill composition.
- Total PCBs exceeded the UU SCOs but below RURR 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 SCOs but below RURR SCOs in samples collected within the historic fill layer.
- PFOS exceeded the UU SCO in three samples collected within the historic fill layer.

Groundwater

- One or more of four dissolved-phase metals exceeded the 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.

VOCs detected in soil and groundwater are associated with known on-site petroleum contamination associated with historical automotive uses, discussed in Section 5.7.2. SVOCs 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. PCBs, pesticides, and metals in soil are generally consistent with NYC historic fill composition.

SVOCs detected in groundwater may be the result of suspended solids in the groundwater samples derived from historic fill. SVOC 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 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 U.S. EPA 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 RURR soil guidance values. No on-site PFAS source in soil was identified.

5.7.2 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 SCOs but below RURR 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 and/or RURR SCOs. Concentrations of chromium above the U.S. EPA 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 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.

<u>*AOC 2 Area F*</u>

Soil

- Six petroleum-related VOCs exceeded the UU and/or RURR 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 and/or RURR SCOs in samples within the historic fill layer. Concentrations of lead above U.S. EPA 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 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.

<u>*AOC 2 Area G*</u>

Soil

- Six petroleum-related VOCs exceeded the RURR 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 and/or RURR SCOs in samples collected within the historic fill layer. A concentrations of lead above the U.S. EPA 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 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 SCOs but below RURR 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 and/or RURR 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 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-DCE, cis-1,2-DCE, PCE, TCE, and vinyl chloride) were detected in multiple samples with the highest concentrations detected at H-SV104.

<u>*AOC 2 Area I*</u>

Soil

- Nine petroleum-related VOCs were detected above the UU SCOs but below RURR 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 and/or RURR 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 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.

<u>*AOC 2 Area J*</u>

Soil

- Petroleum-related VOCs were detected above the UU SCOs and/or RURR 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 SCOs.
- Lead and chromium exceeded the UU and/or RURR SCOs in samples collected within the historic fill layer. A concentrations of lead above the U.S. EPA 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 fourteen petroleum-related VOCs exceeded the SGVs in all four monitoring wells. Petroleum-like odors and sheen were observed during groundwater purging and sampling. The headspace PID readings ranged from 2.5 ppm to 29.5 ppm. The highest headspace PID reading was identified in J-MW118.
- 1,4-dioxane was detected at concentrations above the drinking water MCL in J-MW117 and J-MW118.
- 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.

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 and/or RURR 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.

Groundwater

- One petroleum-related VOC, MTBE, exceeded the 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 2021/2022 RI and are likely related to historical automotive commercial or industrial uses. Speciically for Area J, the analytical data and field observations indicate petroleum impacts resulted from former automotive uses and infilling with waste auto parts along with other debris and fill. 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.

5.7.3 AOC 3: Petroleum Bulk Storage

The 2014 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 SCOs but below RURR 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 and/or RURR 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 SCOs but below RURR 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 SCOs but below RURR 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.

5.7.4 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 the site boundaries to investigate this AOC. Investigation locations at the site 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 this section.

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 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 were detected across the area with the exception of two soil vapor points.

<u>*AOC 4 Area G*</u>

Groundwater

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

Soil Vapor

- CVOCs were detected in all soil vapor samples.

<u>*AOC 4 Area H*</u>

Groundwater

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

Soil Vapor

- CVOCs were detected in all soil vapor samples, with the highest concentrations observed on the western part of the area.

<u>*AOC 4 Area I*</u>

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 were detected in three of five soil vapor samples. CVOCs were not detected in the two most centrally located soil vapor samples.

<u>*AOC 4 Area J*</u>

Groundwater

- PFOA and PFOS exceeded the PFAS Guidance Values in J-MW102, J-MW117, and J-MW118.

Soil Vapor

- CVOCs 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 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 possibly attributed to on- 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.

6.0 QUALITATIVE HUMAN AND FISH/WILDLIFE EXPOSURE ASSESSMENT

Human health exposure risk was evaluated for both current and future on-site and off-site conditions, in accordance with the May 2010 NYSDEC Final DER-10 Technical Guidance for Site Investigation and Remediation. The assessment includes an evaluation of potential sources and migration pathways of site contamination, potential receptors, exposure media, and receptor intake routes and exposure pathways.

In addition to the human health exposure assessment, NYSDEC DER-10 requires an on-site and off-site Fish and Wildlife Resources Impact Analysis (FWRIA) if certain criteria are met. Based on the requirements stipulated in Section 3.10 and Appendix 3C of DER-10, a FWRIA for OU-2 is not required. A completed DER-10 Appendix 3C form is enclosed in Appendix L.

6.1 Current Conditions

OU-2 covers 15.084 acres in a former industrial zone, which is now zoned commercial (C4-4) within the Special Willets Point District. Willets Point was developed primarily with automotive uses, including small car repair shops, filling stations, and scrapyards. These automotive-centric industrial activities characterized OU-2 through about 2015 when they were largely shutdown. 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 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 buildings exist on Block 1824.

6.2 Proposed Conditions

Currently, plans for proposed development of OU-2 are in concept-phase and under review. The project team currently anticipates that OU-2 remediation activities will be performed in advance of redevelopment. The structures that remain within OU-2 will be demolished. Future proposed development will likely consist of multifamily housing and other commercial uses.

6.3 Summary of Environmental Conditions

Soil sample analytical results across OU-2 identified concentrations of VOCs, SVOCs, PCBs, metals, and PFOS that exceed the UU and/or RURR SCOs, and in four sampling areas, lead or chromium that exceeds the U.S. EPA Maximum Concentration of Contaminants for the Toxicity Characteristic.

Concentrations of SVOCs, PCBs, and metals, including arsenic and lead, are likely associated with the NYC historic fill composition that was placed during historical uses as a dumping ground for coal ash and fill imported from unknown sources during land development. Historic fill is present across OU-2 to depths ranging between 5 to 21.5 feet bgs.

Concentrations of petroleum-related VOCs and SVOCs in soil are likely associated with former automotive uses and former PBS. Concentrations of CVOCs in soil may be associated with former automotive uses or current automotive uses at adjoining properties.

Groundwater sample analytical results identified concentrations of petroleum-related VOCs, SVOCs, PCBs, and metals that exceed NYSDEC SGVs; concentrations of PFAS that exceed the PFAS Guidance Values; and concentrations of 1,4-dioxane that exceed the New York State MCL for drinking water. Concentrations of petroleum-related VOCs and SVOCs are likely associated with former automotive industrial uses at OU-2 and/or former PBS. Concentrations of total SVOCs, PCBs, and metals are likely associated with suspected solids in the groundwater samples derived from historic fill. Concentrations of iron, magnesium, manganese, selenium, and sodium are indicative of regional groundwater conditions.

CVOCs were detected in soil vapor at a concentration at which the NYSDOH Decision Matrix would recommend ‘no further action’ to ‘mitigate’, depending on indoor concentrations.

6.4 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, groundwater and soil vapor, potential migration pathways, and potentially complete exposure pathways.

6.4.1 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 potential 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 site-wide presence of historic fill has been established as a source of SVOCs, PCBs, pesticides, and metals.

6.4.2 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 and/or RURR SCOs. Groundwater impacts include petroleum-related VOCs, SVOCs, metals, PFAS, and 1,4-dioxane. Soil vapor is impacted with petroleum-related VOCs, CVOCs, and methane.

6.4.3 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.

6.5 Potential Exposure Pathways – On-Site

6.5.1 Current Conditions

Human exposure to contaminated soil is currently limited as OU-2 is fenced and parts of OU-2 are either asphalt-paved or covered by former concrete building slabs. In localized unpaved areas where human exposure to contaminated soil is possible, the potential exposure pathway for dermal absorption, inhalation, and ingestion is controlled through the implementation of a Health and Safety Plan (HASP) and access restrictions.

Because groundwater in this area of New York City is not used as a potable water source and access to groundwater below OU-2 is prevented by surface soil or the site cover, there is no complete exposure pathway under current conditions.

Because OU-2 is undeveloped with limited enclosed spaces, there are minimal exposure pathways for soil vapor intrusion. One building remains active on the southwest side of Area F, but when occupied, the garage door is open which allows for air circulation. Soil vapor that may penetrate through the ground surface via cracks or perforations in the asphalt pavement or former concrete building slabs 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 by those with access.

6.5.2 Construction/Remediation Condition

Remedial construction activities will be performed in accordance with a HASP and CAMP. The implementation of these programs, as well as use of vapor and dust suppression techniques, serves to limit the exposure pathways presented by potential dermal absorption, ingestion, and inhalation.

6.6 Potential Exposure Pathways – Off-Site

Contaminated soil has the potential to be transported off-site by wind in the form of dust or on the tires of vehicles or equipment leaving OU-2 during remedial construction, creating an exposure risk to the public adjacent to OU-2. If necessary, groundwater will be removed during construction and will be pre-treated and discharged to the New York City sewer system, per NYCDEP permit requirements. During construction, dust and VOCs in air will be monitored and controlled in accordance with the HASP and CAMP.

The potential off-site migration of site contaminants is not expected to result in a complete exposure pathway during current construction and remediation activities or future conditions for the following reasons:

- OU-2 is located in an urban area and partially covered by continuous, relatively impervious, surface covering (i.e., concrete former building slabs and concrete and asphalt paving), and has access restrictions.
- The following protective measures will be implemented during remedial construction:
    - Continuous air monitoring will be conducted for particulates (i.e., dust) and VOCs during intrusive activities in accordance with a CAMP. Dust and/or vapor suppression techniques will be employed to limit potential for off-site migration of soil and vapors.
    - Vehicle tires and undercarriages will be washed as necessary prior to leaving to prevent tracking soil and fill off-site.
    - A soil erosion/sediment control plan will be implemented during construction to control runoff and off-site migration of soil or sediment.
- Groundwater in New York City is not used as a potable water source and the nearest ecological receptor, Flushing Bay, is located approximately 450 feet north of OU-2. On-site contaminant sources will be removed as part of remediation. As needed, dewatered groundwater fluids will be pre-treated and discharged off-site via the New York City sewer system, in accordance with applicable permits.

6.7 Evaluation of Human Health Exposure

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.

6.7.1 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 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.

Because OU-2 is mostly vacant and has limited 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 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.

6.7.2 Remedial Construction 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 because 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 exit to prevent off-site soil tracking, maintaining site security, and wearing the appropriate personal protective equipment.

6.7.3 Proposed Future Conditions

Remedial construction is expected to address source material and contaminated historic fill identified in this RIR. After construction, residual contaminants may remain on-site if a Track 1 remedy is not achieved, and to a lesser extent, would include those listed under current conditions. Contaminant release and transport mechanisms include penetrations through the building foundations and any remaining exposed soil. If protective measures and remediation are not implemented, points of exposure would include potential cracks in the proposed building foundation and exposure during any future soil-disturbing activities. Routes of exposure may include inhalation of vapors entering the buildings or dust during any soil-disturbing work. The receptor population will include the building tenants, residential 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 construction and maintenance of a composite cover system (i.e., concrete or at least two feet of clean soil), and implementation of a Site Management Plan.

6.7.4 Human Health Exposure Assessment Conclusions

1. 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.
2. In the absence of protective measures, there is a moderate risk of exposure during the construction and remediation activities. The primary exposure pathways are:
    a. Dermal contact, ingestion, and inhalation of contaminated soil, groundwater, or soil vapor by site visitors and construction and remediation workers.
    b. 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 community air monitoring (CAMP), following the appropriate health and safety plans, implementing vapor and dust suppression techniques, and using site security to control access.

3. 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.
4. 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. If a Track 1 remedy is not achieved, residual soil will be capped by a composite cover (i.e., concrete building slab and/or two feet of clean soil). Regional groundwater is not used as a potable water source in New York City. As 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 the buildings will be minimized because the proposed building will have a vapor mitigation system (e.g. sub-slab depressurization system and/or a waterproofing/vapor barrier membrane) beneath the foundation slab.

7.0 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 Section 5.0 and from previous investigations.

7.1 Soil Contamination

7.1.1 Historic Fill

Contaminants related to historic fill include SVOCs, PCBs, pesticides, metals, PFOA and PFOS. Historic fill is present across OU-2 from surface grade 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. Soil samples collected from the historic fill layer contained concentrations of SVOCs and metals (including arsenic, barium, cadmium, hexavalent chromium, trivalent chromium, copper, lead, manganese, mercury, nickel, selenium, silver, and zinc) above UU and/or RURR SCOs. Concentrations of lead and chromium above U.S. EPA Maximum Concentration of Contaminants for the Toxicity Characteristic were identified on Areas E, F, G and J. Pesticides were not detected at concentrations above RURR SCOs. Total PCBs were identified at concentrations above the UU and/or RURR SCOs. PFAS were also detected in fill samples at concentrations above the UU SCOs/guidance value.

7.1.2 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 and/or RURR 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 in Area I and Area J is presumed to be present off-site. Supplemental off-site investigations are not necessary to complete the qualitative human and fish/wildlife exposure assessments because there are no receptors on the adjoining lots, the remedial party is a volunteer, and the site is determined to not be a significant threat.

7.1.3 CVOC Contamination

CVOCs were detected in soil vapor samples, but were not detected in soil at concentrations exceeding RURR SCOs nor in groundwater above SGVs. Isolated CVOC concentrations above UU 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.

7.2 Groundwater Contamination

7.2.1 Historic-Fill Contaminated Groundwater

SVOCs, mercury, lead, and arsenic at concentrations above the SGVs may be attributed to historic fill quality and/or historical automotive industrial uses at OU-2.

7.2.2 Petroleum-Contaminated Groundwater

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, J-MW102, J-MW117, and J-MW118. LNAPL was observed in J-MW112, and petroleum-like odors and/or sheen were observed during purging and sampling in J-MW102, J-MW117, and J-MW118.
- 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.

7.2.3 CVOC-Contaminated Groundwater

CVOCs were not detected at concentrations above the 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, J, 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.

7.2.4 Regional Groundwater Quality

Iron, magnesium, manganese, selenium, and sodium, which were detected at concentrations above the 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 RURR guidance values, are not considered contaminants of concern.

7.3 Soil Vapor Contamination

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 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.

8.0 CONCLUSIONS

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:

1. 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 peat, except in the northernmost area of Area K where native soil predominantly consists of sand with varying amounts of clay and silt. The interbedded peat 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.
2. 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.
3. Historic Fill Quality: Contaminants related to historic fill include SVOCs, PCBs, pesticides, metals, PFOA and PFOS, which were detected at concentrations above UU and/or RURR SCOs, and lead and chromium, which were detected at concentrations above the U.S. EPA Maximum Concentration of Contaminants for the Toxicity Characteristic, within this layer. SVOCs and dissolved metals potentially attributed to historic fill or previous site use were also identified in groundwater at concentrations above the SGVs.
4. Petroleum Contamination in Soil, Groundwater, and Soil Vapor:
    a. 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

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

to 22 feet bgs. Petroleum-related VOCs (e.g., BTEX) and SVOCs were detected at concentrations exceeding UU and/or RURR SCOs.

b. 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.
c. 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 PBS may be contributing to the petroleum-related contamination found in groundwater. Groundwater may also be impacted by off-site petroleum sources.
d. BTEX and other petroleum-related compounds were detected in soil vapor throughout OU-2. BTEX concentrations in soil vapor ranged from 9.4 $\mu g/m^3$ in F-SV104 to 17,600 $\mu g/m^3$ in F-SV110. Petroleum-impacted soil and groundwater from historical automotive use or PBS may be sources of petroleum-impacts to soil vapor. Soil vapor may also be impacted by off-site petroleum sources.

Petroleum contamination in Area I and Area J is presumed to be present off-site. Supplemental off-site investigations are not necessary to complete the qualitative human and fish/wildlife exposure assessments because there are no receptors on the adjoining lots, the remedial party is a volunteer, and the site is determined to not be a significant threat.

5. <u>CVOC Impacts:</u> CVOCs were detected at concentrations above UU SCOs in soil in three isolated locations. CVOCs were not detected at concentrations above RURR SCOs or at concentrations above the 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.
6. <u>1,4-Dioxane Impacts:</u> 1,4-Dioxane was not detected in any soils samples collected during the RI, but was detected at concentrations above its drinking water MCL in 5 isolated monitoring wells located in Areas E, F, I, J, 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.
7. <u>Methane Impacts:</u> 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.

Sufficient analytical data were gathered during the RI, together with previous studies, to establish soil cleanup levels and to develop a remedy that is protective of human health and the environment. The remedy will be detailed in a RAWP that will be prepared in accordance with New York State BCP guidelines. The remedy will address historic fill impacted with SVOCs, PCBs, and metals; petroleum-related impacts to soil, groundwater, and soil vapor; CVOC impacts to soil vapor; potential soil vapor intrusion conditions; and a contingency plan for the removal and closure of unknown USTs and contamination.

9.0 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 2014.

5. Willets Point Development – Operable Unit 2 (Phase 1B) Remedial Investigation Work Plan Addendum, prepared by Langan, dated August 2021.

6. Federal Emergency Management Agency, Effective National Flood Insurance Rate Map for the City of New York (Community Panel No. 3604970114F), dated September 5, 2007.

7. 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.

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, issued May 3, 2010; effective June 18, 2010.

10. New York State Department of Environmental Conservation, Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS), dated June 2021.

11. New York State Department of Health, Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York, dated October 2006.

12. New York State Division of Water Technical and Operational Guidance Series (TOGS) (1.1.1) dated June 1998.

13. United States Environmental Protection Agency, Low Flow Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells, EQASOP-GW 001, September 19, 2017.

14. United States Geological Survey, Bedrock and Engineering Geologic Maps of New York County and Parts of Kings and Queens Counties, New York, and Parts of Bergen and Hudson Counties, New Jersey, dated 1994.

15. United States Geological Survey, Flushing, New York Quadrangle 7.5-Minute Topographic Map, dated 2013.