
REMEDIAL INVESTIGATION REPORT

One Third Avenue – Phase 2

**Block 174, Lots 1, 7 and 10 (formerly p/o Lots 1, 9, & 13)
Brooklyn, New York 11217
E-Designation E-124
CEQR No. 03DME016K (Lots 7 & 10)**

Prepared for:
**Flatbush Phase 2 Developer, LLC
c/o Alloy Development
20 Jay Street, Suite 1003
Brooklyn, NY 11201**

Prepared by:
**Langan Engineering, Environmental, Surveying,
Landscape Architecture and Geology, D.P.C.
360 West 31st Street, 8th Floor
New York, New York 10001**

LANGAN

**May 7, 2024
Langan Project No.: 170775901**

TABLE OF CONTENTS

CERTIFICATION	III
EXECUTIVE SUMMARY	IV
1.0 SITE BACKGROUND	1
1.1 Site Location and Current Usage	1
1.2 Proposed Redevelopment	2
1.3 Description of Surrounding Property	3
2.0 SITE HISTORY	5
2.1 Past Uses and Ownership	5
2.2 Previous Environmental Reports	6
2.3 Site Inspection	8
2.4 Areas of Concern	8
3.0 PROJECT MANAGEMENT	9
3.1 Project Organization	9
3.2 Health and Safety	9
3.3 Materials Management	9
4.0 REMEDIAL INVESTIGATION	10
4.1 Geophysical Survey	10
4.2 Soil Investigation	10
4.3 Groundwater Investigation	12
4.4 Soil Vapor and Indoor Air Investigation	13
5.0 OBSERVATIONS AND ANALYTICAL RESULTS	16
5.1 Geology and Hydrogeology	16
5.1.1 Non-Native Fill	16
5.1.2 Native Soil Layers	16
5.1.3 Bedrock	16
5.1.4 Hydrogeology	16
5.2 Soil Findings	17
5.2.1 Field Observations	17
5.2.2 Analytical Results	18
5.3 Groundwater Findings	21
5.3.1 Field Observations	21
5.3.2 Analytical Results	21
5.4 Soil Vapor and Indoor Air Findings	25
5.4.1 Field Observations	25
5.4.2 Analytical Results	25
5.5 QA/QC Sample Results	27
5.6 Potential Hazardous Waste Generation	27
5.7 Impediments to Remedial Action	27
6.0 CONCLUSIONS	28
7.0 LIMITATIONS	31

LIST OF FIGURES

Figure 1	Site Location Map
Figure 2	Development Property Map
Figure 3	Land Use and Sensitive Receptors Map
Figure 4	Sample Location and AOC Map
Figure 5	Soil Sample Analytical Results Map
Figure 6	Soil Sample Analytical Results Map – TCLP
Figure 7	Soil Sample Analytical Results Map – Hazardous Lead Delineation
Figure 8	Groundwater Sample Analytical Results Map
Figure 9	Soil Vapor Sample Analytical Results Map

LIST OF TABLES

Table 1	Sample Collection Summary
Table 2A	Soil Sample Analytical Results
Table 2B	Soil Sample Analytical Results – TCLP
Table 2C	Soil Sample Analytical Results – Hazardous Lead Delineation
Table 3	Groundwater Sample Analytical Results
Table 4	Soil Vapor Analytical Results
Table 5	Indoor Air and Sub-Slab Soil Vapor Sample Analytical Results
Table 6	Indoor Air and Sub-Slab Soil Vapor Sample Analytical Results – NYSDOH Decision Matrices
Table 7	Quality Assurance and Quality Control Sample Analytical Results

LIST OF APPENDICES

Appendix A	Topographic, Boundary and Utility Survey
Appendix B	Proposed Foundation Plans
Appendix C	Previous Environmental Reports
Appendix D	Investigation-Derived Waste Disposal Documentation
Appendix E	Geophysical Survey Report
Appendix F	Boring Delineation Survey Summary
Appendix G	Soil Boring Logs
Appendix H	Monitoring Well Construction and Groundwater Sampling Logs
Appendix I	Soil/Sub-Slab Soil Vapor Construction and Sampling Logs
Appendix J	Laboratory Analytical Reports

CERTIFICATION

I, Jason Hayes am a Professional Engineer, as defined in RCNY § 43-1402(rr). I had primary direct responsibility for implementation of the Remedial Investigation for the One Third Avenue site (NYC OER Site No. 24TMP0905K). I am responsible for the content of this Remedial Investigation Report (RIR), have reviewed its contents and certify that this RIR is accurate to the best of my knowledge and contains all available environmental information and data regarding the property.

Jason Hayes, PE


EXECUTIVE SUMMARY

This Remedial Investigation Report (RIR) provides sufficient information for establishment of remedial action objectives, evaluation of remedial action alternatives, and selection of a remedy pursuant to RCNY§ 43-1407(f). The Remedial Investigation (RI) described in this document is consistent with applicable guidance.

Site Location and Current Usage

The site known as One Third Avenue encompasses an area of 22,000 square feet and is in the Downtown Brooklyn neighborhood of Brooklyn, New York. The site represents Phase 2 of a larger full-block redevelopment that includes three phases; Phase 1A (489 State Street, Brooklyn, NY [20CVCP023K]) - Block 174, Lot 7501 (formerly p/o Lots 1, 9, 13, and 18), Phase 1B (100 Flatbush Avenue, Brooklyn, NY [20CVCP023K]) - Block 174, Lot 7502 (formerly Lots 23, 24 and p/o Lot 18), and Phase 2 (1 3rd Avenue, Brooklyn, NY [03DME016K]) Block 174, Lots 1, 7 and 10 (formerly p/o Lots 1, 9 and 13 – subject of this RIR). The Phase 2 redevelopment will include the construction of a new tower in the southern part of site and the adaptive reuse of existing structures in the northern part of site. Each part of the redevelopment will be filed under separate New York City Department of Building (DOB) filings; 475 State Street (new tower - Lots 7 and 10 and p/o Lot 1) and 362 Schermerhorn Street (adaptive reuse/retail building - Block 174, p/o Lot 1). All three lots on the Phase 2 site will be merged into a single tax (Lot 1) at a later date.

The site is bound by Schermerhorn Street to the north, Third Avenue to the west, State Street to the south, and the Phase 1A site (construction in progress) to the east. Critical water supply infrastructure, owned by the New York City Department of Environmental Protection (NYCDEP), is located northwest of the site in the area beneath Flatbush Avenue. Lot 1 is occupied by a public school (Khalil Gibran International Academy) and is improved with three, three-story buildings with a shared cellar that surrounds a central outdoor sports/recreation area and a chimney stack. Top of cellar slab elevations generally range from about el. 35 in the northern part of the site to el. 33 in the southern part of the site, except for the deeper slab of the mechanical room, which is at about el. 29, in the central part of the cellar. Lots 7 and 10 are undeveloped and covered with construction and demolition debris; this area is currently used to support Phase 1A construction activities.

Throughout this RIR, depths will generally be described by three different reference points; 1) by elevation (el.) with respect to the 1988 North American Vertical Datum (NAVD88), 2) by depth below sidewalk grade (bsg) which ranges between elevation (el.) 40 and 43 along the site boundaries, and 3) by depth beneath existing grade. The Lot 1 existing grade elevation ranges

from about el. 40 to 43 with the topography sloping from a high point in the southeastern part of the site to a low point in the northwestern part of the site. Site elevation drops to about el. 30 (about 10 feet bsg) in Lots 7 and 10. Depth to groundwater was recorded between about 33 to 37 feet bsg, roughly corresponding to about el. 7 to 2. The RI did not include a monitoring well elevation survey or synoptic gauging event.

Summary of Proposed Redevelopment Plan

The proposed redevelopment will consist of the following:

- 475 State Street - Construction of a new, approximately 760-foot tall, 61-floor tower with a cellar that will include residential, retail, and commercial space. The redevelopment at 475 State Street will encompass about 18,500 square feet (about 14,000 square feet will consist of the tower footprint and the remaining 4,500 square feet will consist of outdoor amenity areas and entranceways). The first through fourth floors of the tower will consist of a mixed-use podium (comprised of commercial/retail space, office and residential lobbies, and services/mechanical spaces). The fifth through fourteenth floors will be occupied by offices, and the floors above the fifteenth floor will be occupied by residential units (about 512 residential units). Construction of the tower will include removal of the existing cellar slabs beneath the tower footprint and lowering the elevation of the new cellar floor (except for an about 1,700-square-foot area in the southwest corner which will be removed and backfilled to design grade). The outer walls and façade of structure in the southwest corner will be preserved, so that part of the structure becomes a sheltered, open air courtyard while the other part of the structure becomes part of the new tower.
- 362 Schermerhorn Street - The renovation and adaptive reuse of about 3,500 square feet of the northernmost existing brick and timber structure (from the 1800s) for retail use. The retail building will include 3 floors and be positioned under a cantilevered part of the new tower. The existing cellar slab and subgrade walls will remain as part of the renovation with the exception of a new elevator pit (about 100 square feet), which will require limited excavation below the existing slab. The cellar will be used for storage. The type of retail tenant has not been identified at this time.

Excavation and backfilling associated with redevelopment activities will generally consist of the following:

- 475 State Street (new tower):
 - Excavation to about el. 29.5 feet to accommodate the cellar foundation slab, including removal of and excavation below the existing cellar slab in the southeastern part of the tower footprint;
 - Excavation to about el. 28.5 feet to accommodate a crane pad;
 - Excavation to about el. 14.5 feet to accommodate the deep building core;
 - Excavations to about el. 13.5, 23 and 26 in discrete areas to accommodate elevator pits; and,
 - Removal of a portion of the existing cellar (about 1,700 square feet) in the southwest part of tower footprint and backfilling of this area to design grade with OER-approved fill.
- 362 Schermerhorn (adaptive reuse/retail building):
 - The existing cellar slab and subgrade walls will remain as part of the renovation with the exception of a new elevator pit (about 100 square feet), which will be excavated to el. 30 feet (about 10 feet bsg), or about 5 feet below the existing slab elevation..

About 12,150 tons (about 6,750 cubic yards [CY]) of soil/fill will be excavated from the site for construction and will be disposed of off-site in accordance with local, state, and federal laws and regulations.

Summary of Past Site Uses and Areas of Concern

Site lots 7 and 10 were assigned an E-Designation (E-124) for Hazardous Materials and Noise pursuant to City Environmental Quality Review (CEQR) #03DME016K as part of the Downtown Brooklyn Rezoning in 2003. No E-Designations were assigned to Lot 1. Because of the impending lot merger, the Hazardous Materials and Noise E-Designation requirements will carry over to Lot 1 and will be applicable to the entire future merged tax lot.

Lot 1 was occupied since at least 1886 by a school and is now currently occupied by the Khalil Gibran Academy. Part of a vacant 3-story townhouse with a cellar was also historically located on Lot 1; the townhouse was demolished as part of the redevelopment of the adjoining Phase 1A site. A 4,000-gallon No. 2 fuel oil aboveground storage tank (AST) on stilts within secondary containment (PBS ID No. 2-605759) was in the townhouse cellar and serviced the Khalil Gibran International Academy. The AST was removed prior to the start of the Phase 1A redevelopment

and indications of a release were not observed (no staining, leaking, or cracks were observed in the secondary containment). A detailed description of the history of Lot 1 is included in Langan's January 22, 2018 Phase I Environmental Site Assessment (ESA) Report for 362-368 Schermerhorn Street (Block 174, Lot 1). Information on the 4,000-gallon No. 2 fuel oil AST closure is included in the Remedial Action Report (RAR) for the Phase 1A Site (489 State Street, 20CVCP023K).

Lot 7 (formerly p/o lot 9) was previously improved with a one-story carpenter's shop in as early as 1887, a six- and seven-story structure with a cellar occupied by the Young Women's Christian Association (YWCA) from 1904 to 1915, and a one-story commercial structure from 1950 to 2007. A detailed description of the Lot 9 history is included in Langan's August 24, 2016 Phase I ESA Report for 370 Schermerhorn Street (Block 174, Lot 9).

Lot 10 (formerly p/o lot 13) was previously occupied by part of a New York City Department of Social Services building from 1969 to 2007. A detailed description of the history of Lot 13 is included in Langan's April 2015 Phase I ESA Report for 80-98 and 102-110 Flatbush Avenue (Block 174, Lots 13, 18 and 24).

Based on review of previous environmental reports, areas of concern (AOCs) evaluated by the RI include:

1. AOC 1: Hazardous lead-impacted soil/fill discovered in the northeastern part of the site (Lot 7) during Langan's previously completed RI for the Phase 1A and Phase 1B sites.
2. AOC 2: Historical use of adjoining and surrounding properties, including auto repair shops, laboratories, an iron railing factory, and a filling station; and
3. AOC 3: An off-site spill (Spill No. 19-04655) was reported at an adjoining property (489 State Street) on August 2, 2019 after petroleum-impacted soil was discovered during Langan's previously completed RI for the Phase 1A site. The petroleum-impacted soil was discovered immediately northeast of the site at the groundwater table (about 40 feet bsg) and was attributed to an unknown, hydraulically upgradient off-site source. Spill No. 19-04655 was open during the start of this RI; however, the spill was closed on March 19, 2024. A new spill was reported to the NYSDEC on March 11, 2024 (based on impacts observed during this RI) and spill number 23-09645 was assigned to the site.

Summary of the Work Performed under the Remedial Investigation

The RI was implemented between December 2023 and February 2024, and included a geophysical survey, advancement of 18 soil borings (nine of which were part of a hazardous lead delineation in the northeast part of the site), installation of five monitoring wells, installation of five soil vapor probes and two sub-slab soil vapor probes, and collection and analysis of 42 grab soil samples, five groundwater samples, five soil vapor samples, two sub-slab soil vapor samples, two indoor air samples co-located with the sub-slab vapor samples, and associated quality assurance/quality control (QA/QC) samples. The soil analytical results from the hazardous lead delineation in the northeast part of the site (soil borings SB03A through SB07R) are discussed separately from other soil analytical results throughout this RIR. Langan field staff was on-site to document the field investigation.

Summary of Environmental Findings

A summary of findings based on the RI is presented below:

1. The geophysical survey identified subsurface anomalies resembling potential subsurface utilities (such as sewer, water, gas, telecom and electric). Subsurface anomalies with reflections or signatures consistent with underground storage tanks (USTs) were not identified.
2. Depth to groundwater was recorded at depths ranging from between about 34 and 39 feet bsg, roughly about el. 6 to 1. Based on previous environmental studies performed by Langan on adjacent sites, groundwater is expected to flow southwest towards the Gowanus Canal, which is about 2,400 feet southwest of the site.
3. Bedrock was not encountered during the RI; however, bedrock was encountered at about 150 feet bsg as documented in the Langan's February 2024 Geotechnical Engineering Report. Based on the Bedrock and Engineering Geological Maps of New York Country and Parts of Kings and Queens Counties, New York and Parts of Bergen and Hudson Counties, New Jersey (Baskerville, 1994), the bedrock underlying the site consists of the Hartland Formation (Middle Ordovician to Lower Cambrian).
4. The site stratigraphy consists of a non-native fill layer characterized as sand, silt, and gravel with varying amounts of anthropogenic materials (i.e., brick, styrofoam, slag, glass, coal, concrete, and organic material) extending from surface grade to depths ranging from about el. 40 to 18. The non-native fill layer is generally underlain by native soil consisting of varying amounts of sand, clay, gravel, and silt. An isolated area of residual and

weathered petroleum impacts was observed near the groundwater table at borings SB-01, SB-08, SB-10, and SB-13 and similar impacts were also observed above the groundwater table at borings SB-14 and SB-15. The field and analytical evidence suggest the impacts are likely associated with known contamination from closed Spill No. 19-04655 associated with the Phase 1A site. The shallower impacts observed at SB-14 and SB-15 were confined to narrow zones and did not extend to the groundwater table; therefore, the shallower impacts are attributable to the quality of non-native fill. Based on the observed residual/weathered impacts and soil and groundwater analytical data from the RI (described below), a new spill was reported to the NYSDEC on March 11, 2024 and spill number 23-09645 was assigned to the site.

5. Soil analytical results were compared to the 6 New York Code Rules and Regulations (NYCRR) Part 375-6.8(a) Unrestricted Use (UU) Soil Cleanup Objectives (SCOs) and Part 375-6.8(b) Restricted Use Restricted-Residential (RURR) SCOs and Protection of Groundwater SCOs, and the April 2023 NYSDEC Part 375 Remedial Programs Guidelines for Sampling and Analysis of PFAS (April 2023 PFAS Guidance) UU, RURR, and PGW guidance values (GV). Soil analytical results are summarized below by analyte category.
 - Volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs) were not detected at concentrations above UU SCOs.
 - Total polychlorinated biphenyls (PCBs) (0.144 milligrams per kilogram [mg/kg]) were detected at a concentration exceeding the UU SCO in one soil sample. Total PCBs were not detected at concentrations above the RURR and/or PGW SCOs.
 - One or more of two pesticides, including 4,4'-DDE (max. 0.0285 mg/kg) and 4,4'-DDT (max. 0.141 mg/kg), were detected at concentrations above the UU SCOs in three soil samples. Pesticides were not detected above the RURR and/or PGW SCOs.
 - One or more of five metals, including trivalent chromium (max. 49.4 mg/kg), lead (max. 1,630 mg/kg), mercury (max. 0.22 mg/kg), nickel (max. 88.8 mg/kg) and zinc (max. 322 mg/kg) exceeded the UU SCOs in 21 soil samples (not including the soil samples collected as part of the hazardous lead delineation). One metal, lead, exceeded the RURR and PGW SCOs in one soil sample.

- i. Toxicity Characteristic Leaching Procedure (TCLP) lead (not including the soil samples collected as part of the hazardous lead delineation) was detected at concentrations exceeding the United States Environmental Protection Agency (USEPA) Maximum Concentration of Contaminants for the Toxicity Characteristic in one soil sample (SB-02_11-13). A delineation program was not completed during the RI at SB-02 because site access issues; however, one will be completed at a later date.
 - o As part of the RI, a hazardous lead delineation was conducted in the northeast part of the site around soil boring SB07R. Total lead was detected at concentrations above UU, RURR, and/or PGW SCOs in 16 soil samples collected as part of the hazardous lead delineation in the northeast part of the site. The maximum concentration of total lead (within the hazardous lead delineation area in the northeast part of the site) was identified in SB-05B at 2,120 mg/kg. TCLP lead was detected at concentrations exceeding the USEPA Maximum Concentration of Contaminants for the Toxicity Characteristic in three delineation soil samples. The hazardous lead-impacted soil was horizontally and vertically delineated in this area during the RI.
 - o Herbicides were not detected at concentrations above UU SCOs.
 - o One per- and poly-fluoroalkyl substances (PFAS) compound, perfluorooctane sulfonate (PFOS), exceeded the UU and/or PGW GV (max. 0.00326 mg/kg) in four soil samples.
6. Groundwater analytical results were compared to the 6 NYCRR Part 703.5 Water Quality Standards for Class GA waters and the NYSDEC Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards and Guidance Values (SGVs) for Class GA water (collectively referred to as the "NYSDEC SGVs") and to the ambient water quality guidance values (GV) in the April 2023 PFAS Guidance and are summarized below by analyte category.
- o One or more of four VOCs, including 1,2,4,5-tetramethylbenzene (max. 10 micrograms per liter [$\mu\text{g/L}$]), chloroform (max. 14 $\mu\text{g/L}$), isopropylbenzene (max. 7.2 $\mu\text{g/L}$) and n-propylbenzene (max. 9.8 $\mu\text{g/L}$) were detected at concentrations above the SGVs in four groundwater samples (including a duplicate sample).

- One or more of five SVOCs, including benzo(a)anthracene (max. 0.03 µg/L), benzo(b)fluoranthene (max. 0.02 µg/L), benzo(k)fluoranthene (max. 0.01 µg/L), chrysene (max. 0.04 µg/L) and indeno(1,2,3-c,d)pyrene (max. 0.01 µg/L) were detected at concentrations exceeding the SGVs in two groundwater samples. The SVOCs listed above were detected an order of magnitude higher than the SGV in both groundwater samples.
 - One or more of three metals, including iron (max. 1,920 µg/L), manganese (max. 564.8 µg/L), and sodium (max. 130,000 µg/L) were detected in four unfiltered groundwater samples at concentrations exceeding the SGVs.
 - One or more of two dissolved metals, manganese (max. 480.9 µg/L) and sodium (max. 142,000 µg/L) were detected in four filtered groundwater samples at concentrations exceeding the SGVs.
 - Total PCBs were not detected at concentrations exceeding the SGVs in any groundwater sample.
 - Pesticides and herbicides were not detected at concentrations exceeding the SGVs in any groundwater sample.
 - One or more of two PFAS compounds, including PFOS (max. 0.137 µg/L) and perfluorooctanoic acid (PFOA) (max. 0.0429 µg/L), exceeded the GV in five groundwater samples.
 - 1,4-Dioxane was not detected in any groundwater sample.
7. No standards currently exist for soil vapor in New York State. Sub-slab soil vapor and indoor sample results were evaluated using the New York State Department of Health (NYSDOH) Air Guideline Values (AGV) and the NYSDOH Decision Matrices contained in the October 2006 Guidance for Evaluating Soil Vapor Intrusion in the State of New York and subsequent updates (2013, 2015, 2017, 2024). The NYSDOH Decision Matrices (Matrices A, B, C, D, E, and F) address the compounds tetrachloroethene (PCE), trichloroethene (TCE), 1,1,1-trichloroethane (1,1,1-TCA), 1,1-dichloroethene, cis-1,2-dichloroethene, vinyl chloride, methylene chloride, carbon tetrachloride, benzene, ethylbenzene, naphthalene, cyclohexane, isooctane (2,2,4-trimethylpentane), 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, o-xylene, m-xylene, p-xylene, heptane, hexane, and toluene. The matrix evaluation requires sub-slab soil vapor and indoor air data. Sub-slab soil vapor results are summarized below.

o Soil Vapor Samples:

- i. TCE, 1,1,1-TCA, 1,1-dichloroethene, cis-1,2-dichloroethene, vinyl chloride, naphthalene, carbon tetrachloride, and 1,3,5-trimethylbenzene were not detected in the soil vapor samples.
- ii. PCE was detected in one soil vapor sample (SV-09) at a concentration of 1.95 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$).
- iii. Benzene was detected in three soil vapor samples (SV-08, SV-09 and SV-10) at concentrations ranging from 0.75 $\mu\text{g}/\text{m}^3$ in SV-09 to 6.49 $\mu\text{g}/\text{m}^3$ in SV-10.
- iv. Ethylbenzene was detected in three soil vapor samples (SV-09, SV-10, and SV-13) at concentrations ranging from 0.89 $\mu\text{g}/\text{m}^3$ in SV-09 to 7.12 $\mu\text{g}/\text{m}^3$ in SV-10.
- v. Cyclohexane was detected in two soil vapor samples at concentrations of 0.795 $\mu\text{g}/\text{m}^3$ (SV-13) and 13.1 $\mu\text{g}/\text{m}^3$ (SV-10).
- vi. 2,2,4-trimethylpentane was detected in two soil vapor samples at 1 $\mu\text{g}/\text{m}^3$ (SV-09) and 31.2 $\mu\text{g}/\text{m}^3$ (SV-10).
- vii. 1,2,4-trimethylbenzene was detected in three soil vapor samples (SV-09, SV-10, and SV-13) at concentrations ranging from 1.05 $\mu\text{g}/\text{m}^3$ in SV-09 to 1.24 $\mu\text{g}/\text{m}^3$ in SV-13.
- viii. O-xylene was detected in three soil vapor samples (SV-09, SV-10, and SV-13) at concentrations ranging from 1.1 $\mu\text{g}/\text{m}^3$ in SV-09 to 9.03 $\mu\text{g}/\text{m}^3$ in SV-10.
- ix. M/p-xylene was detected in four soil vapor samples (SV-08, SV-09, SV-10, and SV-13) at concentrations ranging from 2.58 $\mu\text{g}/\text{m}^3$ in SV-08 to 19.2 $\mu\text{g}/\text{m}^3$ in SV-10.
- x. N-heptane was detected in two soil vapor samples at 0.893 $\mu\text{g}/\text{m}^3$ (SV-08) and 19.1 $\mu\text{g}/\text{m}^3$ (SV-10).
- xi. N-hexane was detected in two soil vapor samples at 1.24 $\mu\text{g}/\text{m}^3$ (SV-08) and 14.9 $\mu\text{g}/\text{m}^3$ (SV-10).
- xii. Toluene was detected in four soil vapor samples (SV-08, SV-09, SV-10, and SV-13) at concentrations ranging from 3.26 $\mu\text{g}/\text{m}^3$ in SV-09 to 34 $\mu\text{g}/\text{m}^3$ in SV-10.

- xiii. Total BTEX compounds were detected in soil vapor samples at concentrations ranging from 7.71 $\mu\text{g}/\text{m}^3$ in SV-08 to 75.84 in SV-10 $\mu\text{g}/\text{m}^3$.
- xiv. Total VOCs were detected in the soil vapor samples at concentrations ranging from 60.265 $\mu\text{g}/\text{m}^3$ in SV-13 to 398.18 $\mu\text{g}/\text{m}^3$ in SV-11.
- o Sub-Slab Soil Vapor and Indoor Air:
 - i. 1,1,1-TCA, 1,1-dichloroethene, 1,3,5-trimethylbenzene, 2,2,4-trimethylpentane, cis-1,2-dichloroethene, naphthalene, TCE, and vinyl chloride were not detected in sub-slab soil vapor samples.
 - ii. No VOCs exceeded in the AGVs in the two indoor air samples.
 - iii. Total BTEX compounds were detected in soil vapor samples at concentrations ranging from 4.059 $\mu\text{g}/\text{m}^3$ in SSV-01 to 15.13 in SSV-02 $\mu\text{g}/\text{m}^3$.
 - iv. The concentrations of the detected VOCs in the co-located sub-slab soil vapor and indoor air samples result in recommendations of "no further action."

1.0 SITE BACKGROUND

Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C. (Langan) prepared this Remedial Investigation Report (RIR) report on behalf of Flatbush Phase 2 Developer, LLC (c/o Alloy Development) for the site known as One Third Avenue, located in Brooklyn, New York (the site). The owner/developer intends to enroll the site in the New York City Voluntary Cleanup Program (NYC VCP). The about 22,000 square foot site (about 0.5-acre) represents Phase 2 of a larger full-block redevelopment that includes three phases; Phase 1A (489 State Street, Brooklyn, NY [20CVCP023K]) - Block 174, Lot 7501 (formerly p/o Lots 1, 9, 13, and 18), Phase 1B (100 Flatbush Avenue, Brooklyn, NY [20CVCP023K]) - Block 174, Lot 7502 (formerly Lots 23, 24 and p/o Lot 18), and Phase 2 (1 3rd Avenue, Brooklyn, NY [03DME016K]) Block 174, Lots 1, 7 and 10 (formerly p/o Lots 1, 9 and 13 – subject of this RIR). The Phase 2 redevelopment will include the construction of a new tower in the southern part of site and the adaptive reuse of existing structures in the northern part of site. Each part of the redevelopment will be filed under separate New York City Department of Building (DOB) filings; 475 State Street (new tower - Lots 7 and 10 and p/o Lot 1) and 362 Schermerhorn Street (adaptive reuse/retail building - Block 174, p/o Lot 1). All three lots on the Phase 2 site will be merged into a single tax (Lot 1) at a later date. Residential and commercial use is proposed for the property. A site location map is included as Figure 1 and the development property layout is included as Figure 2.

The RIR provides sufficient information for establishment of remedial action objectives, evaluation of remedial action alternatives, and selection of a remedy pursuant to RCNY§ 43-1407(f). The Remedial Investigation (RI) described in this document is consistent with applicable guidance. This RIR includes a description of investigation methodologies and field observations, tabulated summaries of laboratory analytical results, scaled figures, and conclusions.

1.1 Site Location and Current Usage

The 22,000-square-foot site is located in the Downtown Brooklyn neighborhood of Brooklyn, New York and is site is bound by Schermerhorn Street to the north, Third Avenue to the west, State Street to the south, and the Phase 1A redevelopment site (construction in progress) to the east. Critical water supply infrastructure, owned by the New York City Department of Environmental Protection (NYCDEP), is located northwest of the site in the area beneath Flatbush Avenue. Lot 1 is occupied by a public school (Khalil Gibran International Academy) and is improved with three three-story buildings with a shared common cellar (approximately 17,500 square feet) that surrounds a central outdoor sports/recreation area and a chimney stack. Top of cellar slab elevations generally range from about el. 35 in the northern part of the site to el. 33 in the

southern part of the site, except for the deeper slab of the mechanical room, which is at about el. 29, in the central part of the cellar. Lots 7 and 10 are undeveloped and covered with construction and demolition debris; this area is currently used to support construction activities of the Phase 1A redevelopment site.

Throughout this RIR, depths will generally be described by three different reference points; 1) by elevation (el.) with respect to the 1988 North American Vertical Datum (NAVD88), 2) by depth below sidewalk grade (bsg) which ranges between elevation (el.) 40 and 43 along the site boundaries, and 3) by depth beneath existing grade. The Lot 1 existing grade elevation ranges from about el. 40 to 43 with the topography sloping from a high point in the southeastern part of the site to a low point in the northwestern part of the site. Site elevation drops to about el. 30 (about 10 feet bsg) in Lots 7 and 10. Depth to groundwater was recorded between about 33 to 37 feet bsg, roughly corresponding to about el. 7 to 2. The RI did not include a monitoring well elevation survey or synoptic gauging event. A survey showing current site and cellar elevations is included as Appendix A.

1.2 Proposed Redevelopment

The proposed redevelopment will consist of the following:

- 475 State Street - Construction of a new, approximately 760-foot tall, 61-floor tower with a cellar that will include residential, retail, and commercial space. The redevelopment at 475 State Street will encompass about 18,500 square feet (about 14,000 square feet will consist of the tower footprint and the remaining 4,500 square feet will consist of outdoor amenity areas and entranceways). The first through fourth floors of the tower will consist of a mixed-use podium (comprised of commercial/retail space, office and residential lobbies, and services/mechanical spaces). The fifth through fourteenth floors will be occupied by offices, and the floors above the fifteenth floor will be occupied by residential units (about 512 residential units). Construction of the tower will include removal of the existing cellar slabs beneath the tower footprint and lowering the elevation of the new cellar floor (except for an about 1,700-square-foot area in the southwest corner which will be removed and backfilled to design grade). The outer walls and façade of structure in the southwest corner will be preserved, so that part of the structure becomes a sheltered, open air courtyard while the other part of the structure becomes part of the new tower.
- 362 Schermerhorn Street - The renovation and adaptive reuse of about 3,500 square feet of the northernmost existing brick and timber structure (from the 1800s) for retail use. The retail building will include 3 floors and be positioned under a cantilevered part of the

new tower. The existing cellar slab and subgrade walls will remain as part of the renovation with the exception of a new elevator pit (about 100 square feet), which will require limited excavation below the existing slab. The cellar will be used for storage. The type of retail tenant has not been identified at this time.

Excavation and backfilling associated with redevelopment activities will generally consist of the following:

- 475 State Street (new tower):
 - Excavation to about el. 29.5 feet to accommodate the cellar foundation slab, including removal of and excavation below the existing cellar slab in the southeastern part of the tower footprint;
 - Excavation to about el. 28.5 feet to accommodate a crane pad;
 - Excavation to about el. 14.5 feet to accommodate the deep building core;
 - Excavations to about el. 13.5, 23 and 26 in discrete areas to accommodate elevator pits; and,
 - Removal of a portion of the existing cellar (about 1,700 square feet) in the southwest part of tower footprint and backfilling of this area to design grade with OER-approved fill.
- 362 Schermerhorn (adaptive reuse/retail building):
 - The existing cellar slab and subgrade walls will remain as part of the renovation with the exception of a new elevator pit (about 100 square feet), which will be excavated to el. 30 feet (about 10 feet bsg), or about 5 feet below the existing slab elevation..

About 12,150 tons (about 6,750 cubic yards [CY]) of soil/fill will be excavated from the site for construction and will be disposed of off-site in accordance with local, state, and federal laws and regulations. The proposed foundation plans are included ad Appendix B.

1.3 Description of Surrounding Property

The site is bound by Schermerhorn Street to the north, Third Avenue to the west, State Street to the south, and the Phase 1A site (construction in progress) to the east. The surrounding area consists of multi-story mixed-use residential, commercial and institutional buildings.

A search was performed for sensitive receptors, including, but not limited to, schools, daycare facilities, parks, hospitals, and senior care facilities, within an approximate 500-foot radius of the site boundary. Six sensitive receptors were identified within the search radius:

- Khalil Gibran International Academy (the site)
- Sixteen Sycamores Playground
- Mark Morris Dance School
- SHSAT School
- Rockwell Place Community Garden
- A new school is currently under construction on the eastern adjoining Phase 1A site. The Khalil Gibran International Academy will relocate to this new school building following its completion and receipt of its certificate of occupancy.

The land use of the surrounding area and the sensitive receptors identified within an approximate 500-foot radius of the site boundary are presented as Figure 3.

2.0 SITE HISTORY

2.1 Past Uses and Ownership

Site lots 7 and 10 were assigned an E-Designation (E-124) for Hazardous Materials and Noise pursuant to City Environmental Quality Review (CEQR) #03DME016K as part of the Downtown Brooklyn Rezoning in 2003. No E-Designations were assigned to Lot 1. Because of the impending lot merger, the Hazardous Materials and Noise E-Designation requirements will carry over to Lot 1 and will be applicable to the entire future merged tax lot.

Lot 1 was occupied since at least 1886 by a school and is now currently occupied by the Khalil Gibran Academy. Part of a vacant 3-story townhouse with a cellar was also historically located on Lot 1; the townhouse was demolished as part of the redevelopment of the adjoining Phase 1A site. A 4,000-gallon No. 2 fuel oil aboveground storage tank (AST) on stilts within secondary containment (PBS ID No. 2-605759) was in the townhouse cellar and serviced the Khalil Gibran International Academy. The AST was removed prior to the start of the Phase 1A redevelopment and indications of a release were not observed (no staining, leaking, or cracks were observed in the secondary containment). A detailed description of the history of Lot 1 is included in Langan's January 22, 2018 Phase I Environmental Site Assessment (ESA) Report for 362-368 Schermerhorn Street (Block 174, Lot 1). Information on the 4,000-gallon No. 2 fuel oil AST closure is included in the Remedial Action Report (RAR) for the Phase 1A Site (489 State Street, 20CVCP023K).

Lot 7 (formerly p/o lot 9) was previously improved with a one-story carpenter's shop in as early as 1887, a six- and seven-story structure with a cellar occupied by the Young Women's Christian Association (YWCA) from 1904 to 1915, and a one-story commercial structure from 1950 to 2007. A detailed description of the Lot 9 history is included in Langan's August 24, 2016 Phase I ESA Report for 370 Schermerhorn Street (Block 174, Lot 9).

Lot 10 (formerly p/o lot 13) was previously occupied by part of a New York City Department of Social Services building from 1969 to 2007. A detailed description of the history of Lot 13 is included in Langan's April 2015 Phase I ESA Report for 80-98 and 102-110 Flatbush Avenue (Block 174, Lots 13, 18 and 24), dated April 2015, which is included in Appendix C.

2.2 Previous Environmental Reports

The following previous environmental reports were reviewed as part of this RIR and are summarized below. The reports were drafted prior to the current tax lot configuration and therefore contain information for the site and for adjoining properties. The following summaries were curated to only contain information applicable to the site:

1. April 2015 Phase I Environmental Site Assessment for 80-98 and 102-110 Flatbush Avenue (Block 174, Lots 13, 18 and 24), prepared by Langan
2. August 24, 2016, Phase I Environmental Site Assessment for 370 Schermerhorn Street (Block 174, Lot 9), prepared by Langan
3. January 22, 2018, Phase I Environmental Site Assessment for 362-368 Schermerhorn Street (Block 174, Lot 1), prepared by Langan
4. August 5, 2019, Remedial Investigation Report for 80 Flatbush Avenue – Phase I (Block 174, Lots 18, 23 & 24, p/o Lots 1, 9 and 13), prepared by Langan

Previous environmental reports are provided as Appendix C.

April 2015 Phase I Environmental Site Assessment for 80-98 and 102-110 Flatbush Avenue (Block 174, Lots 13, 18 and 24), prepared by Langan

The Phase I ESA identified two recognized environmental conditions (RECs):

1. Historical uses of Lots 13, 18, and 24 include a marble works in 1887, coal yard, auto manufacturer and iron railing facility in 1904, battery storage in 1928, and manufacturing from 1928 to 1945 (none of which are within the Lot 10 [formerly p/o Lot 13]);
2. Historical use of adjoining and surrounding properties include a sign painting, auto repair shops, laboratories, carpentry shop, tin shop, blacksmith, iron railing factory, automobile dealership, filling station, and commercial businesses.

August 24, 2016, Phase I Environmental Site Assessment for 370 Schermerhorn Street (Block 174, Lot 9), prepared by Langan

The Phase I ESA identified one REC:

1. Historical use of adjoining and surrounding properties include a sign painting, iron railing facility, automobile dealership, laboratories, and historical auto station.

January 22, 2018, Phase I Environmental Site Assessment for 362-368 Schermerhorn Street (Block 174, Lot 1), prepared by Langan

The Phase I ESA identified one REC:

1. An off-site open spill (Spill No. 1401845) was reported at 280 Ashland Place on May 20, 2014. The spill was reassigned to an adjoining property, 262-268 Ashland Place after the spill was determined to be from an active 10,000-gallon underground storage tank (UST). At the time of the Phase I ESA and this RIR, the cleanup of the spill was pending. The spill site is located about 350 feet northeast of the site, which is presumed to be hydraulically upgradient.

August 5, 2019, Remedial Investigation Report for 80 Flatbush Avenue – Phase I (Block 174, Lots 18, 23 & 24, p/o Lots 1, 9 and 13), prepared by Langan

- The RI, which was designed to investigate the Phase 1A and 1B sites, included the collection of 23 soil samples, three groundwater samples, and six soil vapor samples. During the Phase 1 RIR, soil boring SB-07 was advanced within the Phase 2 site boundary and therefore the laboratory analytical results from SB-07 were not included in the Phase 1 RI. The laboratory analytical results for SB-07 are discussed below:
 - Total lead was detected at 2,100 milligrams per kilogram (mg/kg) in soil sample SB07_11-13 above the 6 New York Code Rules and Regulations (NYCRR) Part 375-6.8(b) Restricted Use Restricted-Residential (RURR) and Protection of Groundwater soil cleanup objectives (SCO).
 - Toxicity Characteristic Leaching Procedure (TCLP) lead was detected in soil sample SB07_11-13 at 8.36 milligrams per liter (mg/L) above the USEPA Maximum Concentration of Contaminants for the Toxicity Characteristic.
- An isolated area of residual/weathered petroleum-impacted soil was observed at the groundwater table (about 40 feet bsg) in the northeastern part of the Phase 1A site. Based on field observations and analytical data, a spill was reported to the NYSDEC in August 2019. Spill number 19-04655 was assigned to the case. The RI attributed the impacts to an unknown, hydraulically upgradient off-site source.

2.3 Site Inspection

Before the start of ground-intrusive field work, a site inspection was performed by Jack Frey on August 9, 2023. The site inspection was performed under the direction of the PE certifying this report for the purpose of identifying site features and access constraints.

2.4 Areas of Concern

Based on review of previous environmental reports, areas of concern (AOCs) evaluated by the RI include:

1. AOC 1: Hazardous lead-impacted soil/fill discovered in the northeastern part of the site (Lot 7) during Langan's previously completed RI for the Phase 1A and Phase 1B sites.
2. AOC 2: Historical use of adjoining and surrounding properties, including auto repair shops, laboratories, an iron railing factory, and a filling station; and
3. AOC 3: An off-site spill (Spill No. 19-04655) was reported at an adjoining property (489 State Street) on August 2, 2019 after petroleum-impacted soil was discovered during Langan's previously completed RI for the Phase 1A site. The petroleum-impacted soil was discovered immediately northeast of the site at the groundwater table (about 40 feet bsg) and was attributed to an unknown, hydraulically upgradient off-site source. Spill No. 19-04655 was open during the start of this RI; however, the spill was closed on March 19, 2024. A new spill was reported to the NYSDEC on March 11, 2024 (based on impacts observed during this RI) and spill number 23-09645 was assigned to the site.

A map of the AOCs is included on Figure 4.

3.0 PROJECT MANAGEMENT

3.1 Project Organization

The PE responsible for preparation of this RIR is Jason Hayes, P.E., LEED AP of Langan. Gregory C. Wyka, P.G., of Langan was the project manager during implementation of the RI.

3.2 Health and Safety

The work described in this RIR was performed in full compliance with applicable laws and regulations, including site and Occupational Safety and Health Administration (OSHA) worker safety requirements and Hazardous Waste Operations and Emergency Response (HAZWOPER) requirements.

3.3 Materials Management

Soil and fill encountered during the RI was managed in accordance with applicable laws and regulations. Boreholes were backfilled with non-impacted soil cuttings and/or clean bagged sand and patched with concrete or asphalt. Soil and groundwater investigation-derived wastes (IDW) were containerized in separate properly labeled and sealed United Nations (UN)/Department of Transportation (DOT)-approved 55-gallon drums. The soil/fill and groundwater drums, including one drum of hazardous lead soil, were disposed of off-site by Brookside Environmental, Inc. (Brookside) at Veolia ES Technical Solutions of Flanders, NJ and/or Clean Water of New York of Staten Island, NY, respectively, on February 22, 2024. Spent disposable sampling equipment, including gloves, bags, and paper towels, were double bagged and disposed of as municipal trash. Disposal manifests are included in Appendix D.

4.0 REMEDIAL INVESTIGATION

The purpose of the RI was to: 1) satisfy the investigation requirements of the Hazardous Materials E-Designation and 2) evaluate subsurface conditions to inform any site remediation and health and safety considerations during construction. The scope of work presented herein draws from OER's Turbo Training requirements, the protocols contained in ASTM International's Standard E-1903-11 Phase II Environmental Site Assessments, and New York State Department of Environmental Conservation (NYSDEC) Technical Guidance for Site Investigation and Remediation (DER-10).

The RI was implemented between December 2023 and February 2024, and included a geophysical survey, advancement of 18 soil borings (eight of which were part of a hazardous lead delineation in the northeast part of the site), installation of five monitoring wells, installation of five soil vapor probes and two sub-slab soil vapor probes, and collection and analysis of 42 grab soil samples, five groundwater samples, five soil vapor samples, two sub-slab soil vapor samples, two indoor air samples co-located with the sub-slab soil vapor samples, and associated quality assurance/quality control (QA/QC) samples. Langan field staff was on-site to document the field investigation. A sample collection summary is presented as Table 1.

4.1 Geophysical Survey

NOVA Geophysical Services of Douglaston, New York (NOVA) conducted a geophysical survey on August 9, 2023 to clear proposed sample locations and attempt to identify USTs, utilities, and subsurface anomalies. The site was fully accessible during the survey. The survey utilized ground penetrating radar (GPR) and electromagnetic (EM) detection equipment. If an anomaly was identified, the area was marked and then later inspected with the utility locator to determine if the anomaly was a utility or a larger subsurface metallic object or structure. Borings were relocated as necessary to avoid subsurface utilities and anomalies. A copy of the geophysical survey report is included in Appendix E.

4.2 Soil Investigation

The soil investigation included the advancement of 18 soil borings (eight of which were part of a hazardous lead delineation in the northeast part of the site) between December 2023 and February 2024 by Lakewood Environmental Services under observation by Langan field personnel. Due to nearby critical water supply infrastructure and as required by the NYCDEP, Hager-Ritcher Geosciences performed borehole deviation surveys every 25 feet of boring advancement and at the bottom of each borehole. Soil borings with a final depth less than 25 feet and soil borings greater than 200 feet from the NYCDEP critical infrastructure (SB-03 through

SB-07, SB-11 and SB-12) did not require deviation surveys. Soil boring locations are shown on Figure 4. A copy of the deviation survey report is included in Appendix F.

The soil borings were advanced using a Geoprobe™ 6610DT drill rig (outside of cellar) and an AMS PowerProbe 9100P drill rig (inside of cellar) to depths between about 8 and 46 feet beneath existing grade, corresponding to about el. 32 and -6. Soil samples were collected into MacroCore® barrels lined with 4-foot dedicated acetate sleeves. Extracted soil was screened with a photoionization detector (PID) equipped with a 10.6 electron volt (eV) lamp, inspected for visual and olfactory evidence of contamination, and classified by Langan field personnel. The soil boring logs, including the log for boring SB-07, are included in Appendix G.

Three discrete (grab) soil samples were collected from each boring for laboratory analysis, except at boring SB-14, which was advanced for observation purposes only. Soil samples were generally collected from an interval within the non-native fill layer, at the groundwater interface, and/or at the interval of greatest contamination, if encountered (except for soil samples collected as part of the hazardous lead delineation, where sample depths were selected based on previous analytical data from boring SB-07). If impacts were not observed, two soil samples were collected from the non-native fill layer and one sample was collected from the groundwater interface. TerraCore® sampling kits (5-gram) were used to collect soil samples for volatile organic compound (VOC) analysis. Two field duplicate samples, two field blanks, and four trip blanks (one per cooler of VOC samples) were collected and analyzed for QA/QC purposes.

Soil samples and QA/QC samples were collected into laboratory-supplied glassware and TerraCore® samplers and submitted to an New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP)-certified laboratory (Alpha Analytical, Inc. [Alpha] of Westborough, MA [ELAP ID #11148]) via courier service under standard chain-of-custody protocol. Soil samples, field duplicates, and field blanks samples were generally analyzed for the following parameters (except for soil samples collected as part of the hazardous lead delineation which were only analyzed for total lead and TCLP lead by USEPA Method 6010C and 7471B):

- Target Compound List (TCL)/Part 375 VOCs by USEPA Method 8260
- TCL/Part 375 SVOCs by USEPA Method 8270D
- TCL/Part 375 PCBs by USEPA Method 8082A
- TCL/Part 375 pesticides and herbicides by USEPA Method 8081B and 8151A, respectively
- TAL/Part 375 and TCLP metals by USEPA Method 6010C and 7471B
- Hexavalent chromium by USEPA Method 7196A
- Trivalent chromium by USEPA Method 3060/107

- Total cyanide by USEPA Method 9010C/9012B
- Per- and polyfluoroalkyl substances (PFAS) by USEPA Method 1633 (except for soil samples from soil borings SB-03A through SB-07R)

Trip blanks were analyzed for VOCs only by USEPA Method 8260C. The reported list of soil sample results is inclusive of all parameters listed in the TCL/TAL standard list.

4.3 Groundwater Investigation

Five temporary groundwater monitoring wells were installed between December 2023 and February 2024 by Lakewood using a Geoprobe™ 6610DT or AMS Power Probe 9100P drilling rig under observation by Langan field personnel. The wells were installed with either 1-inch or 1.5-inch diameter, 10-foot long, threaded, flush-joint, polyvinyl chloride (PVC) casings and 10-foot-long 0.010-inch-slot well screens set to straddle the groundwater table. The annulus of each well was filled with No. 1 sand from about 1 foot below the well screen to about 2 feet above the top of the screen, followed by an about 2-foot-thick bentonite seal, clean soil cuttings and/or sand, and another 2-foot-thick bentonite seal. The wells were finished with flush-mounted access covers set in concrete. Monitoring well locations are shown on Figure 4. The monitoring well construction and sampling logs are provided in Appendix H.

One groundwater sample was collected from each monitoring well in general accordance with NYSDEC DER-10 and USEPA's Low Flow Purging and Sampling Procedures for the Collection of Groundwater Samples from Monitoring Wells (Low Flow Procedures). The groundwater samples were collected using a bladder pump and dedicated high-density polyethylene (HDPE) tubing. The bladder was replaced prior to the collection of each groundwater sample. Before a groundwater sample was collected, the well was continuously purged in an attempt to stabilize groundwater quality parameters (pH, conductivity, turbidity, dissolved oxygen, temperature, and oxidation-reduction potential), to the extent practical, in accordance with the USEPA's low-flow sampling guidance. Criteria for stabilization were three consecutive readings, each 5 minutes apart, of all parameters within the limits specified in the USEPA's low-flow sampling guidance. A multi-parameter water quality system (Horiba U52) was used to monitor the groundwater quality parameters during sampling. The groundwater samples were collected into laboratory-supplied batch-certified glassware and submitted to Alpha via courier service under standard chain-of-custody protocol. Groundwater sampling logs are included in Appendix H.

The groundwater samples were generally analyzed for the following analyses:

- TCL VOCs by USEPA Method 8260C;
- TCL SVOCs by USEPA Method 8270D;
- TCL PCBs by USEPA Method 8082A;

- TAL metals (total and dissolved) by USEPA Method 6020B and 7470A;
- Hexavalent chromium by USEPA Method 7196A;
- Trivalent chromium by USEPA Method 3060/107;
- Pesticides by USEPA method 8081B;
- Herbicides by USEPA method 8151A;
- Total cyanide by USEPA method 9010C/9012B;
- PFAS by USEPA Method 1633
- 1,4-Dioxane by USEPA Method 8270 with SIM isotope dilution

Trip blanks were analyzed for VOCs only by USEPA Method 8260C. The groundwater sample collected from MW-13 was only analyzed for VOCs, SVOCs, PFAS and 1,4-dioxane because of poor well recharge. The reported list of groundwater results was inclusive of all parameters listed in the TCL/TAL standard list.

4.4 Soil Vapor and Indoor Air Investigation

Five soil vapor sampling points (SV-08 through SV-11, and SV-13) and two sub-slab soil vapor points (SSV-01 and SSV-02) were installed by Lakewood Environmental Services between December 2023 and February 2024. Two indoor air samples were collected at locations co-located with the sub-slab soil vapor samples. Soil vapor and sub-slab soil vapor sampling points were installed under observation by Langan field personnel. Soil vapor, sub-slab soil vapor, and indoor air sampling locations are shown on Figure 4.

The soil vapor sampling points were installed using a Geoprobe™ 6610DT or an AMS Power Probe 9100P drill rig to depths between about 12 and 15 feet below existing surface grade. The sub-slab soil vapor point sampling points were installed using a hammer drill to about 0.5 below surface grade. A table with soil vapor probe and sub-slab vapor probe installation depths is presented below.

Name	Approximate Depth (bgs)	Approximate Elevation
SSV-01	0.5	35
SSV-02	0.5	33
SV-08	15	27
SV-09	15	27
SV-10	15	27
SV-11	12	21
SV-13	13	27

Each sample collection point was constructed with a dedicated 1-7/8-inch polyethylene implant threaded into 3/16-inch-diameter inert polyethylene tubing. The annulus (i.e., the sampling zone) around the probe was filled with No. 2 sand to about six inches above the top of the probe screen and sealed to the surface with hydrated bentonite. After sample collection, the soil vapor points were removed and the ground surface was restored to its original level with clean sand on Lots 7 and 10. Soil vapor sampling locations on Lot 1 were patched with concrete.

Soil vapor samples were collected in general accordance with NYSDOH guidance. Before collecting the soil vapor sample, a minimum of three implant volumes (i.e., the volume of the sample probe and tubing) were purged from the sample port at a rate of less than 0.2 liters per minute using a RAE Systems MultiRAE® meter. The purged soil vapor was monitored for VOCs with the MultiRAE® during purging.

A helium tracer gas was used in accordance with the NYSDOH protocols to serve as a quality assurance/quality control (QA/QC) technique to document the integrity of the soil vapor sampling point seal before and after sampling. The tracer gas was introduced into a container placed upside down above the sample port and sealed to the ground with bentonite; the container acted as a shroud for the vapor point and seal. Helium was measured from the sampling tube and inside the container. The sample tubing at each soil vapor point did not contain more than 10% of the tracer gas concentration that was introduced into the container, therefore, the seals at each location were considered adequate for sampling.

After the integrity of each seal was confirmed, soil vapor and sub-slab soil vapor samples were collected for a 2-hour and 8-hour sampling period, respectively, into laboratory-supplied batch-certified clean 6-liter Summa® canisters calibrated with flow controllers. Ambient air samples (AA-01 and AA-02) were collected concurrently with the soil vapor samples collected on December 29, 2023 and February 21, 2024 to evaluate potential outdoor air interferences.

Co-located indoor air samples (IA-01 and IA-02) were collected concurrently with sub-slab soil vapor samples SSV-01 and SSV-02 for an 8-hour sampling period to evaluate soil vapor intrusion risk at the northernmost existing brick/timber structure, which is planned for adaptive reuse and renovation as part of the Phase 2 redevelopment. The indoor air samples were collected at a height above the ground to represent the breathing zone (about 3 to 5 feet). Outdoor air infiltration was minimized by closing doors and windows in the building during sub-slab soil vapor and indoor air sampling. A product/chemical inventory and a NYSDOH indoor air quality (IAQ) questionnaire for the immediate area of indoor air samples was completed on March 18, 2024. The on-site representative confirmed product/chemical inventory had not changed since the vapor sampling event.

A log sheet for each air sample was completed to record the following:

- Sample identification name
- Date and time of sample collection
- Sampling depth
- Name of the field engineer responsible for sampling
- Sampling methods and equipment
- Soil vapor purge volumes
- Volume of soil vapor extracted
- Flow rate
- Vacuum of canisters before and after sample collection

Air samples were submitted to Alpha via courier service under standard chain-of-custody protocol and analyzed for VOCs by USEPA Method TO-15. The soil vapor, indoor air, and ambient air sampling logs are provided in Appendix I.

5.0 OBSERVATIONS AND ANALYTICAL RESULTS

5.1 Geology and Hydrogeology

Geologic and hydrogeologic observations are described below.

5.1.1 Non-Native Fill

The site is underlain by a layer of non-native fill characterized as varying amounts of sand, silt, and gravel and varying amounts of anthropogenic materials (i.e., brick, styrofoam, slag, glass, coal, concrete, and organic material) extending from surface grade to depths between el. 40 and 18.

5.1.2 Native Soil Layers

The non-native fill layer is underlain by native soil consisting of varying amounts of sand, clay, gravel, and silt. During foundation excavation at the adjoining Phase 1A and 1B sites, cobbles and boulders were also identified within the native layer.

5.1.3 Bedrock

Bedrock was not encountered during the RI; however, bedrock was encountered at about 150 feet bsg as documented in Langan's February 2024 Geotechnical Engineering Report. Based on a review of the Bedrock and Engineering Geological Maps of New York Country and Parts of Kings and Queens Counties, New York and Parts of Bergen and Hudson Counties, New Jersey (Baskerville, 1994), the bedrock underlying the site consists of the Hartland Formation (Middle Ordovician to Lower Cambrian).

5.1.4 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, and coverage by impervious surfaces. Other factors influencing groundwater include depth to bedrock, the presence of non-native fill, and variability in local geology and groundwater sources or sinks. 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.

Depth to groundwater was recorded between about 33 to 37 feet bsg, roughly corresponding to about el. 7 to 2, based on groundwater measurements collected after each well recharged from purging and sampling. No light non-aqueous phase liquid (LNAPL), dense non-aqueous phase liquid (DNAPL), sheen, or PID readings above background were observed during well development except for readings up to 15.1 parts per million (ppm) and 7.3 ppm at monitoring wells MW-01 and MW-15, respectively. The RI did not include a monitoring well elevation survey or synoptic gauging event.

Regional groundwater is expected to flow southwest towards the Gowanus Canal, which is about 2,400 feet southwest of the site.

5.2 Soil Findings

5.2.1 Field Observations

Field observations of petroleum impacts, evidenced by odors, staining, and/or PID readings above background levels, are summarized in the table below. For more detailed information, refer to the boring logs included in Appendix G.

Boring	Depth of Observed Impacts (el.)	Type of Observed Impacts	Highest Recorded PID Reading (ppm)
SB-01	1.1 to -4.9	PID, odor, staining	112.0
SB-08	6.1 to 0.1	PID, odor	50.3
SB-10	1.1 to 0.1	PID, odor	50.7
SB-13	4.35 to 2.35	PID, odor	49.3
SB-14	22.6 to 20.6 20.6 to -8.9	PID, odor, staining PID, odor	51.3 72.3
SB-15	22.1 to 19.1 3.1 to -6.9	PID, odor PID, odor	11.9 75.8

Based on the above observed residual/weathered impacts and soil and groundwater analytical data (described below), a new spill was reported to the NYSDEC on March 11, 2024 and Spill Number 23-09645 was assigned to the site. The isolated zones of petroleum-impacted soil (with staining, odors, and/or PID readings) observed at borings SB-14 and SB-15 above the

groundwater table are likely attributable to the quality of non-native fill. Although odors and PID readings persisted below the isolated zone in SB-14, this observation is likely the result of cross-contamination induced by drilling methods.

5.2.2 Analytical Results

A summary of RI laboratory results (not including results from the TCLP samples and hazardous lead delineation) compared to the NYSDEC Unrestricted Use (UU), RURR, and PGW SCOs is provided in Table 2A. TCLP sample results were compared to the 6 NYCRR Part 371 Maximum Concentration of Contaminants for the Toxicity Characteristic and are provided in Table 2B. A summary of laboratory results from the hazardous lead delineation are included in Table 2C. PFAS soil sample results were compared to the April 2023 NYSDEC Part 375 Remedial Programs Guidelines for Sampling and Analysis of PFAS (April 2023 PFAS Guidance) UU, RURR, and PGW guidance values (GV) for perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS). QA/QC sample results are provided in Table 6. Soil sample analyte concentrations that exceed the UU, RURR, and/or PGW SCOs are shown on Figure 5. Soil sample analyte concentrations exceeding the Maximum Concentration of Contaminants for the Toxicity Characteristic are shown on Figure 6 and hazardous lead delineation results are shown on Figure 7. Laboratory analytical reports are provided in Appendix J. The following sections and tables summarize compounds detected at concentrations exceeding the UU, RURR, and/or PGW SCOs (measured in milligram/kilogram [mg/kg]). Concentrations detected above the RURR SCOs are shown in **bold** and concentrations above the PGW SCOs are underlined. Sample depths in feet bsg are denoted by the last two numbers of the sample ID.

VOCs and SVOCs

VOCs and SVOCs were not detected at concentrations above the UU SCOs.

Pesticides

One or more of two pesticides were detected at concentrations above the UU SCOs in four soil samples collected between 6 and 14 feet bsg. Pesticides were not detected above the PGW or RURR SCOs. The table below provides the concentrations of pesticides exceeding the SCOs:

Parameter	Range of Concentrations Detected Above SCOs		UU, RURR, and PGW SCOs
	Minimum Detected Concentration above SCOs	Maximum Detected Concentration above SCOs	
4,4'-DDE	0.0285 mg/kg in SB-12_8-10		UU: 0.0033 mg/kg PGW: 17 mg/kg RURR: 8.9 mg/kg
4,4'-DDT	0.00396 mg/kg in SB-12_12-14	0.141 mg/kg in SB-12_8-10	UU: 0.0033 mg/kg PGW: 136 mg/kg RURR: 7.9 mg/kg

Herbicides

Herbicides were not detected at concentrations above the UU SCOs.

PCBs

Total PCBs were detected at a concentration above the UU SCO (0.1 mg/kg) in one soil sample collected from 1 to 2 feet bsg in soil boring SB-08 at a concentration of 0.144 mg/kg. PCBs were not detected above the PGW or RURR SCOs.

Metals (Outside of Hazardous Lead Delineation Area)

One or more of five metals were detected at concentrations above the UU SCOs in soil samples collected from depths ranging from 5 to 41 feet bsg in soil borings SB-01, SB-02, SB-08, SB-09, SB-10, SB-11, SB-13, and SB-15. In soil sample SB-02_11-13, total lead was detected at a concentration above the PGW and RURR SCOs and TCLP lead was detected at a concentration above the USEPA Maximum Concentration of Contaminants for the Toxicity Characteristic. A delineation program was not completed during the RI at SB-02 because site access issues;

however, one will be completed at a later date. The table below provides concentration ranges of metals exceeding the SCOs:

Parameter	Range of Concentrations Detected Above SCOs		UU, RURR, and PGW SCOs
	Minimum Detected Concentration above SCOs	Maximum Detected Concentration above SCOs	
Chromium, Trivalent	49.4 mg/kg in SB-13_35-37		UU: 30 mg/kg RURR: 180 mg/kg
Mercury	0.22 mg/kg in SODUP02_012824*		UU: 0.18 mg/kg PGW: <u>0.73 mg/kg</u> RURR: 0.81 mg/kg
Nickel	32.2 mg/kg in SB02_15-17	88.8 mg/kg in SB02_37-39	UU: 30 mg/kg PGW: <u>130 mg/kg</u> RURR: 310 mg/kg
Lead	63.6 mg/kg in SODUP02_012824	1,630 mg/kg in SB-02_11-13	UU: 63 mg/kg PGW: <u>450 mg/kg</u> RURR: 400 mg/kg
Zinc	322 mg/kg in SODUP02_012824		UU: 109 mg/kg PGW: <u>2,480 mg/kg</u> RURR: 10,000 mg/kg

*SODUP02_012824 is a duplicate of parent sample SB-01_1-3

Metals (Hazardous Lead Delineation)

As part of the RI, a hazardous lead delineation was conducted in the northeast part of the site and included the advancement of nine soil borings (SB-03A through SB-07R). The hazardous lead-impacted soil in this area was delineated (horizontally and vertically) during the RI. This section discusses the analytical results of the soil samples collected as part of the hazardous lead delineation. Total lead was detected at concentrations above the UU SCOs in 16 soil samples and at concentrations the above RURR and/or PGW SCOs in eight soil samples. The maximum concentration of lead was identified in SB-05B at 2,120 mg/kg. TCLP lead was detected at concentrations exceeding the USEPA Maximum Concentration of Contaminants for the Toxicity Characteristic (5 mg/L) in three soil samples (SB-05A [6.46 mg/L], SB-06A [6.61 mg/L], and SB-07R [5.18 mg/L]).

PFAS (40-Compound List)

Soil PFAS analytical results were compared to the NYSDEC April 2023 PFAS Guidance GVs for PFOA and PFOS. PFOS was detected at concentrations exceeding the UU GV in four soil samples

collected from depths ranging from 1 to 14 feet bsg in soil borings SB-02, SB-08, SB-10 and SB-13 and at a concentration above the PGW GV in a soil sample collected from 1 to 2 feet bsg in soil boring SB-02. PFOS was not detected above the UU GV. The table below provides concentration range of PFOS exceeding the GVs.

Parameter	Range of Concentrations Detected Above GVs		UU, RURR, and PGW GVs
	Minimum Detected Concentration above GVs	Maximum Detected Concentration above GVs	
PFOS	0.00094 mg/kg in SB-02_11-13	<u>0.00326 mg/kg</u> in SB-13_12-14	UU: 0.00088 mg/kg PGW: <u>0.001 mg/kg</u> RURR: 0.044 mg/kg

5.3 Groundwater Findings

5.3.1 Field Observations

Newly installed monitoring wells were gauged for LNAPL and DNAPL with an oil-water interface probe. No LNAPL or DNAPL was encountered in any monitoring well. Prior to sampling, monitoring well headspaces were measured with a PID. Petroleum-like odors and/or monitoring well headspace PID measurements up to 15.1 ppm and 7.3 ppm were observed at monitoring wells MW-01 and MW-15, respectively.

5.3.2 Analytical Results

A summary of laboratory results for RI groundwater samples, with comparisons to NYSDEC SGVs, is presented in Table 3. Groundwater sample results that were detected above NYSDEC SGVs for RI samples are shown on Figure 8. Groundwater sampling logs are included in Appendix H. Laboratory analytical data reports are included in Appendix J.

The following sections present summaries of RI groundwater sample results that exceeded NYSDEC SGVs and are organized by analytical parameter.

VOCs

One or more of four VOCs were detected at concentrations above the NYSDEC SGVs in three groundwater samples collected from monitoring wells MW-01, MW-09 and MW-11. The table below provides concentrations of VOCs above the NYSDEC SGVs:

Parameter	Range of Concentrations Detected Above the SGVs		NYSDEC SGVs
	Minimum Detected Concentration above SGVs	Maximum Detected Concentration above SGVs	
1,2,4,5-tetramethylbenzene	10 microgram-per-liter (µg/L) in MW-01_022124		5 µg/L
Chloroform	12 µg/L in MW-09_011324	14 µg/L in GWDUP01_020824* and MW-11_020824	7 µg/L
Isopropylbenzene (cumene)	7.2 µg/L in MW-01_022124		5 µg/L
n-propylbenzene	9.8 µg/L in MW-01_02124		5 µg/L

*GWDUP01_020824 is a duplicate of parent sample MW-11_020824

SVOCs

One or more of five SVOCs were detected at concentrations above the NYSDEC SGVs in two groundwater samples collected from monitoring wells MW-01 and MW-13. The table below provides concentrations of SVOCs above the NYSDEC SGVs:

Parameter	Range of Concentrations Detected Above the NYSDEC SGVs		NYSDEC SGVs
	Minimum Detected Concentration above SGVs	Maximum Detected Concentration above SGVs	
Benzo(a)anthracene	0.03 µg/L in MW-13_122223		0.002 µg/L
Benzo(b)fluoranthene	0.02 µg/L in MW-01_022124		0.002 µg/L
Benzo(k)fluoranthene	0.01 µg/L in MW-13_122223		0.002 µg/L
Chrysene	0.04 µg/L in MW-01_022124		0.002 µg/L

Parameter	Range of Concentrations Detected Above the NYSDEC SGVs		NYSDEC SGVs
	Minimum Detected Concentration above SGVs	Maximum Detected Concentration above SGVs	
Indeno(1,2,3-cd)pyrene	0.01 µg/L in MW-01_022124 and MW-13_122223		0.002 µg/L

The SVOCs listed above were detected an order of magnitude higher than the SGV in both groundwater samples. The reporting limits of many SVOCs in the groundwater samples were higher than the NYSDEC SGVs.

Total Metals

One or more of three total metals were detected at concentrations above the NYSDEC SGVs in four groundwater samples collected from monitoring wells MW-01, MW-09, MW-11 and MW-15. The table below provides concentrations of total metals above the NYSDEC SGVs:

Parameter	Range of Concentrations Detected Above the NYSDEC SGVs		NYSDEC SGVs
	Minimum Detected Concentration above SGVs	Maximum Detected Concentration above SGVs	
Iron	1,920 µg/L in MW-01_022124		300 µg/L
Manganese	564.8 µg/L in MW-01_022124		300 µg/L
Sodium	37,400 µg/L in MW-15_122123	130,000 µg/L in MW-11_020824	20,000 µg/L

Dissolved Metals

One or more of two dissolved metals were detected above the NYSDEC SGVs in four groundwater samples collected from monitoring wells MW-01, MW-09, MW-11 and MW-15. The table below provides concentrations of dissolved metals above the NYSDEC SGVs:

Parameter	Range of Concentrations Detected Above the NYSDEC SGVs		NYSDEC SGVs
	Minimum Detected Concentration above SGVs	Maximum Detected Concentration above SGVs	
Manganese	480.9 µg/L in MW-01_022124		300 µg/L
Sodium	40,300 µg/L in MW-15_122123	142,000 µg/L in MW-11_020824	20,000 µg/L

PCBs

PCBs were not detected at concentrations exceeding the NYSDEC SGVs.

Pesticides and Herbicides

Pesticides and herbicides were not detected at concentrations exceeding the NYSDEC SGVs.

PFAS (40-Compound List) and 1,4-Dioxane

One or more of two PFAS compounds, PFOA and PFOS, were detected above the NYSDEC SGVs in five groundwater samples collected from monitoring wells MW-01, MW-09, MW-11, MW-13 and MW-15. 1,4-Dioxane was not detected above the NYSDEC SGV. The table below provides concentration ranges of PFAS compounds that were detected above NYSDEC SGVs:

Parameter	Range of Concentrations Detected above the PFAS Guidance Values		NYSDEC PFAS Guidance Values
	Minimum Detected Concentration above Guidance Values	Maximum Detected Concentration above Guidance Values	
PFOS	0.0027 µg/L in MW-15_122123	0.137 µg/L in MW-13_122223	0.0027 µg/L
PFOA	0.0176 µg/L in MW-01_022124	0.0429 µg/L in MW-13_122223	0.0067 µg/L

5.4 Soil Vapor and Indoor Air Findings

5.4.1 Field Observations

Post-purge PID readings did not exceed 0.0 ppm at any of the soil vapor or sub-slab soil vapor points.

5.4.2 Analytical Results

Soil vapor, sub-slab soil vapor, and indoor air sample results are summarized in Tables 4, 5, and 6 and shown on Figure 9. No standards currently exist for soil vapor in New York State. Sub-slab soil vapor and indoor sample results were evaluated using the New York State Department of Health (NYSDOH) Air Guideline Values (AGV) and the Decision Matrices contained in the October 2006 Guidance for Evaluating Soil Vapor Intrusion in the State of New York and subsequent updates (2013, 2015, 2017, 2024). Matrices A, B, C, D, E, and F address the compounds tetrachloroethene (PCE), trichloroethene (TCE), 1,1,1-trichloroethane (1,1,1-TCA), 1,1-dichloroethene, cis-1,2-dichloroethene, vinyl chloride, methylene chloride, carbon tetrachloride, benzene, ethylbenzene, naphthalene, cyclohexane, isooctane (2,2,4-trimethylpentane), 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, o-xylene, m-xylene, p-xylene, heptane, hexane, and toluene.

Soil Vapor Samples:

- TCE, 1,1,1-TCA, 1,1-dichloroethene, cis-1,2-dichloroethene, vinyl chloride, naphthalene, carbon tetrachloride, and 1,3,5-trimethylbenzene were not detected in the soil vapor samples.
- PCE was detected in one soil vapor sample (SV-09) at a concentration of 1.95 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$).
- Benzene was detected in three soil vapor samples (SV-08, SV-09 and SV-10) at concentrations ranging from 0.75 $\mu\text{g}/\text{m}^3$ in SV 09 to 6.49 $\mu\text{g}/\text{m}^3$ in SV-10.
- Ethylbenzene was detected in three soil vapor samples (SV-09, SV-10, and SV-13) at concentrations ranging from 0.89 $\mu\text{g}/\text{m}^3$ in SV-09 to 7.12 $\mu\text{g}/\text{m}^3$ in SV 10.
- Cyclohexane was detected in two soil vapor samples at concentrations of 0.795 $\mu\text{g}/\text{m}^3$ (SV-13) and 13.1 $\mu\text{g}/\text{m}^3$ (SV-10).
- 2,2,4-trimethylpentane was detected in two soil vapor samples at 1 $\mu\text{g}/\text{m}^3$ (SV 09) and 31.2 $\mu\text{g}/\text{m}^3$ (SV-10).

- 1,2,4-trimethylbenzene was detected in three soil vapor samples (SV-09, SV 10, and SV-13) at concentrations ranging from 1.05 $\mu\text{g}/\text{m}^3$ in SV-09 to 1.24 $\mu\text{g}/\text{m}^3$ in SV-13.
- O-xylene was detected in three soil vapor samples (SV-09, SV-10, and SV-13) at concentrations ranging from 1.1 $\mu\text{g}/\text{m}^3$ in SV-09 to 9.03 $\mu\text{g}/\text{m}^3$ in SV-10.
- M/p-xylene was detected in four soil vapor samples (SV-08, SV-09, SV-10, and SV-13) at concentrations ranging from 2.58 $\mu\text{g}/\text{m}^3$ in SV-08 to 19.2 $\mu\text{g}/\text{m}^3$ in SV-10.
- N-heptane was detected in two soil vapor samples at 0.893 $\mu\text{g}/\text{m}^3$ (SV-08) and 19.1 $\mu\text{g}/\text{m}^3$ (SV-10).
- N-hexane was detected in two soil vapor samples at 1.24 $\mu\text{g}/\text{m}^3$ (SV-08) and 14.9 $\mu\text{g}/\text{m}^3$ (SV-10).
- Toluene was detected in four soil vapor samples (SV-08, SV-09, SV-10, and SV-13) at concentrations ranging from 3.26 $\mu\text{g}/\text{m}^3$ in SV-09 to 34 $\mu\text{g}/\text{m}^3$ in SV-10.
- Total BTEX compounds were detected in soil vapor samples at concentrations ranging from 7.71 $\mu\text{g}/\text{m}^3$ in SV-08 to 75.84 in SV-10 $\mu\text{g}/\text{m}^3$.
- Total VOCs were detected in the soil vapor samples at concentrations ranging from 60.265 $\mu\text{g}/\text{m}^3$ in SV-13 to 398.18 $\mu\text{g}/\text{m}^3$ in SV-11.

Sub-Slab Soil Vapor and Indoor Air:

- 1,1,1-TCA, 1,1-dichloroethene, 1,3,5-trimethylbenzene, 2,2,4-trimethylpentane, cis-1,2-dichloroethene, naphthalene, TCE, and vinyl chloride were not detected in sub-slab soil vapor samples.
- No VOCs exceeded in the AGVs in the two indoor air samples.
- Total BTEX compounds were detected in soil vapor samples at concentrations ranging from 4.059 $\mu\text{g}/\text{m}^3$ in SSV-01 to 15.13 in SSV-02 $\mu\text{g}/\text{m}^3$.
- The concentrations of the detected VOCs in the co-located sub-slab soil vapor and indoor air samples result in recommendations of “no further action.”

5.5 QA/QC Sample Results

Duplicate, field blank, and trip blank samples collected during the RI are detailed in Table 1. Duplicate and field blanks are samples were generally collected at a frequency of 1 per 20 primary samples. Trip blank samples were generally collected at a frequency of 1 per day of aqueous sampling. The trip blank results demonstrated the absence of cross-contamination during sample transport. The field blank results demonstrated negligible evidence of cross-contamination from the ambient sampling environment. Sample-specific quality control data for each individual sample and laboratory batch quality control for each parameter are summarized in the laboratory data packages.

5.6 Potential Hazardous Waste Generation

The potential for hazardous lead soil waste exists based on total lead and TCLP concentrations in two areas of the site and the planned excavation of non-native fill for site remediation and construction in these areas. A waste characterization study will be completed as part of the Remedial Action Work Plan (RAWP) that will include delineation sampling for the hazardous lead-impacted soil at SB-02. No further delineation is anticipated to be required at SB-07.

5.7 Impediments to Remedial Action

There are no known impediments to remedial action at the site.

6.0 CONCLUSIONS

The following are conclusions and recommendations based on field observations and analytical results generated by this investigation:

- Geophysical Survey: The geophysical survey identified subsurface anomalies resembling potential subsurface utilities (such as sewer, water, gas, telecom and electric). Subsurface anomalies with reflections or signatures consistent with underground storage tanks (USTs) were not identified.
- Stratigraphy: Lot 1 is covered with concrete and Lots 7 and 10 are covered with construction and demolition debris. Non-native fill, primarily characterized as varying amounts of sand, silt, and gravel and varying amounts of anthropogenic materials (i.e., brick, styrofoam, slag, glass, coal, concrete, and organic material), was observed in soil borings extending from surface grade to depths ranging from about el. 40 to 18. The non-native fill layer was underlain by native soil consisting of varying amounts of sand, clay, gravel, and silt. Bedrock was not encountered during the RI; however, bedrock was encountered at about 150 feet bsg as documented in Langan's February 2024 Geotechnical Engineering Report.
- Petroleum-Impacted Soil: An isolated area of residual and weathered petroleum impacts (as evidenced by staining, odors, and/or PID readings) was observed at the groundwater table at borings SB01, SB08, SB-10, and SB-13 and similar impacts were also observed above the groundwater table at borings SB-14 and SB-15. The field and analytical evidence suggest the deeper impacts are likely associated with known contamination from closed Spill No. 19-04655 associated with the Phase 1A site. The shallower impacts observed at SB-14 and SB-15 were confined to narrow zones and did not extend to the groundwater table; therefore, the shallower impacts are attributable to the quality of non-native fill. Based on the observed impacts and soil and groundwater analytical data from the RI, a new spill was reported to the NYSDEC on March 11, 2024 and spill number 23-09645 was assigned to the site.
- Hydrogeology: Depth to groundwater ranged from about el. 7 to 2 based on groundwater measurements collected after each well recharged from purging and sampling. Groundwater flow at the site was not evaluated during the RI through well surveys, synoptic well gauging and contouring, but is expected to flow southwest towards the Gowanus Canal, which is about 2,400 feet southwest of the site, based on hydrogeological principles.

- Soil: Non-native fill contained contaminants including pesticides, PCBs, and metals at concentrations above UU, RURR and/or PGW SCOs. PFOS was detected in the non-native fill layer at concentrations exceeding the UU GV and/or PGW GV. TCLP lead was detected in the non-native fill layer in the northeast part of the site and in the central part of the site at concentrations exceeding the USEPA Maximum Concentration of Contaminants for the Toxicity Characteristic. The presence of the analytes listed above are commonly found in and are attributed to the composition of non-native fill in urban environments.
- Groundwater: Groundwater contains VOCs, SVOCs, metals, and PFAS at concentrations exceeding the NYSDEC SGVs or GVs.
 - Manganese, sodium, and iron are commonly detected in groundwater above the NYSDEC SGVs and are representative of naturally occurring and/or regional groundwater conditions.
 - SVOCs detected in groundwater above NYSDEC SGVs are likely related to suspended solids in the groundwater samples derived from non-native fill at the site.
 - The presence of petroleum-related VOCs in one groundwater sample (MW-01) is associated with the off-site spill (Spill No. 19-04655) and the new spill case (Spill No 23-09645) for the site.
 - No on-site source of PFAS was identified; therefore, the presence of PFAS in groundwater is likely a regional condition and attributed to off-site sources.
- Soil Vapor: No petroleum-related VOCs and CVOCs exceeded the minimum concentrations for which mitigation is recommended by the NYSDOH Decision Matrices in the five soil vapor samples collected during the RI. No CVOCs exceeded the NYSDOH AGVs in the two indoor air samples, and the co-located sub-slab soil vapor and indoor air sampling analytical data result in a recommendation of “no further action” when compared to the NYSDOH Decision Matrices. The soil vapor and indoor analytical data, together with the soil and groundwater analytical data, do not support a vapor intrusion risk at the site.
- Areas of Concern: No new areas of concern were identified by the RI except for one additional isolated area of hazardous lead-impacted soil. This area will be delineated during the upcoming waste characterization study required by the RAWP. The suspected

petroleum-related impacts associated with off-site Spill No. 19-04655 were confirmed in the eastern part of the site as evidenced by field observations and analytical data from borings SB-01, SB-08, SB-10, SB-13, SB-14, and SB-15 and wells MW-01 and MW-15.

RI confirmed the presence of non-native fill at the site and the observations and analytical data set indicates subsurface environmental conditions at the site are consistent with what one would expect to find on urban brownfield property in New York City.

The RI provides sufficient information for satisfying the investigation requirements of the Hazardous Materials E-Designation and evaluating subsurface conditions to inform site remediation and health and safety considerations during construction.

7.0 LIMITATIONS

This RIR was prepared expressly for Flatbush Phase 2 Developer, LLC for the proposed development at One Third Avenue – Phase 2 (Block 174, Lots 1, 7 and 10) in Brooklyn, New York and for the objectives defined herein. Langan cannot assume responsibility for the use of this report for any property other than the specific site addressed in this report, or by any third party without specific written authorization from Langan.

The conclusions, opinions, and recommendations provided in this report are based on subsurface conditions ascertained from the analysis of a limited number of samples and from environmental reports prepared by other professionals. Recommendations provided are contingent upon one another and no recommendation should be followed independent of the others. Actual conditions encountered may differ substantially from those presented herein and should be brought to our attention whereby we may determine how such changes may affect our conclusions, opinions and recommendations.

FIGURES

TABLES

APPENDIX A

TOPOGRAPHIC, BOUNDARY AND UTILITY SURVEY

APPENDIX B

PROPOSED FOUNDATION PLANS

APPENDIX C

PREVIOUS ENVIRONMENTAL REPORTS

APPENDIX D

INVESTIGATION-DERIVED WASTE DISPOSAL DOCUMENTATION

APPENDIX E

GEOPHYSICAL SURVEY REPORT

APPENDIX F

BORING DELINEATION SURVEY SUMMARY

APPENDIX G

SOIL BORING LOGS

APPENDIX H

MONITORING WELL CONSTRUCTION AND GROUNDWATER SAMPLING LOGS

APPENDIX I

SOIL/SUB-SLAB SOIL VAPOR CONSTRUCTION AND SAMPLING LOGS

APPENDIX J

LABORATORY ANALYTICAL REPORTS