2246 FULTON STREET

BROOKLYN, NEW YORK

Remedial Investigation Report

OER Project Number 22TMP0391K, 22EHAN084K

E-Designation: E-363

CEQR Number: 15DCP102K

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REMEDIAL INVESTIGATION REPORT

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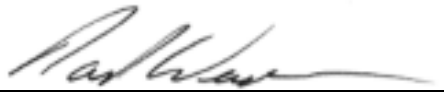
LIST OF ACRONYMS

Acronym	Definition
AOC	Area of Concern
CAMP	Community Air Monitoring Plan
COC	Contaminant of Concern
CPP	Citizen Participation Plan
CSM	Conceptual Site Model
DER-10	New York State Department of Environmental Conservation Technical Guide 10
FID	Flame Ionization Detector
GPS	Global Positioning System
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
IRM	Interim Remedial Measure
NAPL	Non-aqueous Phase Liquid
NYC VCP	New York City Voluntary Cleanup Program
NYC DOHMH	New York City Department of Health and Mental Hygiene
NYC OER	New York City Office of Environmental Remediation
NYS DOH ELAP	New York State Department of Health Environmental Laboratory Accreditation Program
OSHA	Occupational Safety and Health Administration
PID	Photoionization Detector
QEP	Qualified Environmental Professional
RI	Remedial Investigation
RIR	Remedial Investigation Report
SCO	Soil Cleanup Objective
SPEED	Searchable Property Environmental Electronic Database

CERTIFICATION

I, David M. Winslow am a Qualified Environmental Professional, as defined in RCNY § 43-1402(tt). I have primary direct responsibility for implementation of the Remedial Investigation for the 2246 Fulton Street (OER Project Number: 22TMP0391K, 22EHAN084K). 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.

David M. Winslow, Ph.D., P.G. June 23, 2023 

Qualified Environmental Professional Date Signature

EXECUTIVE SUMMARY

The 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 is located at 2246 Fulton Street, in the Ocean Hill neighborhood of Brooklyn, New York and is identified as Block 1553 and Lot 18 on the New York City Tax Map. The Site is 15,000 SF and is bounded by Fulton Street and Callahan Kelly Playground to the north, several 3- to 4-story walkup apartments to the south, a 1-story warehouse building (2234 Fulton Street) to the west, Sackman Street and a 1-story warehouse building to the east.

Currently, the Site is a rectangular-shaped parcel occupied by a 1-story warehouse building (with two partial basements) used by a packaging supply manufacturer (Alpine Paper Box). The Site is located at an approximate elevation (EL) 82.50 at the southern boundary to EL 87.00 at the northern boundary based on the North American Vertical Datum of 1988 (NAVD88).

Summary of Proposed Redevelopment Plan

The proposed future use of the Site will consist of an 11-story mixed-use commercial and residential building which will cover the entire Site. The proposed building would rise 115 feet (ft) in height and include a full height cellar level requiring excavation of the entire lot footprint to a depth of approximately 12 ft below grade generating approximately 6,700 cubic yards (CY) of soil. The proposed residential floor area will be 83,450 square feet (SF) (5.56 floor to area ratio [FAR]) and the proposed commercial floor area will be 526.84 SF (0.04 FAR). The total proposed floor area will be 83,977 SF less than the 84,000 SF maximum allowed.

Based on the available online information from other Sites in the vicinity, groundwater is anticipated to be within 65 feet to 82 feet below ground surface (bgs), therefore the proposed development does not anticipate encountering groundwater.

The new cellar will contain a trash compactor room, mechanical and electrical service room, elevator machine room and a commercial accessory space. The ground floor will have a

commercial space, residential lobby, package room, mail room and a vehicular ingress/egress ramp to access the second floor. The second floor will contain a parking garage for 46 vehicles, storage space and elevators. The third floor will contain residential units (some with outdoor terraces), indoor/outdoor recreational spaces, business center, and a gym. The fourth to eleventh floors will have residential dwelling units (some with private terrace space). The total project includes 120,548 SF of gross residential space, 18,191 SF of gross commercial space. The current zoning designation is for light manufacturing district (M1-4) and residential properties (R7D). The proposed use is consistent with existing zoning for the property.

Summary of Past Uses of Site and Areas of Concern

The historical documents from as early as 1888 until circa 1908, show the Site as comprised of several undeveloped lots (designated as lots 3,4,5,6,7, and 8). By around 1932, the lots were combined and occupied by a 1-story commercial building (used as a garage for 100 cars) with an office. Two (2) gasoline tanks were depicted on the northern portion of the subject property. By 1940, the subject property was listed as being used by a lumber company (Bond Lumber Co.) By 1951, the subject property was used as an auto service facility with only one (1) gasoline tank shown. By 1963, the subject property was used by a paper box manufacturing company (Alpine Paper Box Co.), with no gasoline tanks shown. At the time of GZA's RI work in May 2022, the subject property remained as a commercial building used by a paper box manufacturing company.

The AOCs identified for this site include:

1. The presence of approximately 12.5 feet thick of historic fill at the Site.
2. The presence of petroleum storage tanks.
3. On site soil and soil vapor may have been impacted by historic on and off-site sources.

Summary of the Work Performed under the Remedial Investigation

The RI was conducted in accordance with the NYC OER-approved Phase II Work Plan (Short Form) prepared by GZA GeoEnvironmental of New York (GZA) and dated January 11, 2022. The RI field work was performed on May 13, 2022, and included the following scope of work:

- GZA performed a geophysical survey of the Site to locate the subsurface consistent with underground utilities, other subsurface structure, or USTs.
- GZA conducted a Site inspection to identify AOCs and physical obstructions (i.e., structures, buildings, etc).
- GZA installed eight soil borings across the entire project Site and collected sixteen (16) soil samples for chemical analysis from the soil borings to evaluate soil quality.
- GZA installed seven soil vapor probes around Site perimeter and collected seven (7) samples for chemical analysis.

Summary of Environmental Findings

1. Elevation of the property ranges from approximately 82 feet above mean sea level (amsl) based on the North American Vertical Datum of 1988 (NAVD88) at the southeastern boundary (along Sackman Street) to 88 feet amsl NAVD88 at the northwestern boundary (along Fulton Street).
2. According to the USGS Fact Sheet 134-97, Water Table Altitude in Kings and Queens Counties, New York, in March 1997 (Monti and Chu, November 1997) groundwater is anticipated to be at approximately 10 to 12 feet above mean sea level. However, groundwater was not encountered during the RI. Based on existing available information from other E-Designation Sites available on the NYC OER SPEED 2.0, there are multiple projects near our site that showed the water table at approximately between 65 feet bgs to 82 bgs. Groundwater flow is generally to the southeast towards Fresh Creek and Jamaica Bay.
3. The RI showed a subsurface profile consisting of fill material to a depth of approximately 1 to 12.5 feet below ground surface (ft bgs), underlain by a sand stratum down to the termination depth of the borings to about 13 to 16 ft bgs.
4. According to the 1994 USGS publication 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 (Baskerville 1994), bedrock in this area is comprised on interbedded units of gray, fine-grained quartz-feldspar, gray to tan muscovite-biotite garnet schist, and dark greenish black amphibolite (Hartland Formation) and is anticipated to be

greater than 300 feet below mean sea level based on the National Geodetic Vertical Datum of 1929 (NGVD29).

5. The geophysical survey did not identify anomalies / subsurface signatures indicative of underground storage tanks. However, the RI noted the presence of two (2) 275-gallon aboveground storage tanks (ASTs) heating oil tanks in the partial basement at the eastern side and one (1) 1,080-gallon heating oil tank encased in concrete in the partial basement at northwestern portion of the building. The tanks are no longer in service.

6. Soil/fill samples collected during the RI were compared to the New York State Department of Environmental Conservation (NYSDEC) 6NYCCRR Part 375 Section 6.8 Unrestricted Use Soil Cleanup Objectives (SCOs), Residential Use SCOs, and Protection Groundwater Resources SCOs.

    - VOCs and Emerging Contaminants were either below detection limits or detected below UUSCOs, RUSCOs, and PGWSCOs;

    - SVOCs were either below detection limits or detected below UUSCOs, RUSCOs, and PGWSCOs from the soil samples except for one sample. The sample collected at SB-7 (11-13') showed benzo(a)pyrene (maximum [max.] of 2.5 mg/kg), benzo(k)fluoranthene (max. of 1 mg/kg), dibenzo(a,h)anthracene (max. of 0.38 mg/kg) and indeno (1,2,3-cd)pyrene (max. of 1.6 mg/kg) were detected above UUSCOs and RUSCOs. The sample collected at SB-7 (11-13') also showed that benzo(a)anthracene (max. of 3.4 mg/kg), benzo(b)fluoranthene (max. of 2.8 mg/kg), and chrysene (max of 3.3 mg/kg) were detected above UUSCOs, RUSCOs, and PGWSCOs;

    - Several Metals were detected above UUSCOs including copper (max. of 123 mg/kg at SB-2, 0'-2'), zinc (max. of 514 mg/kg at SB-8, 0'-2'); and above UUSCOs, RUSCOs, and PGWSCOs including lead (max. of 4,150 mg/kg at SB-8, 0'-2') and mercury (max. of 0.829 mg/kg at SB-6);

    - SB-8 is lead hotspot in shallow soils.

    - One pesticide, 4,4'-DDE, (max of 0.0036 mg/kg at SB-6 [12.5'-14.5']) was detected in at concentration above its Unrestricted Use SCOs.

7. Due to groundwater not being encountered at the deepest boring location and encountered refusals, groundwater samples were not collected. Based on available information from other OER projects near the Site, groundwater is anticipated to be between at 65 to 82 feet deep.
8. Soil vapor samples collected during the RI were compared to the New York State Department of Health (NYSDOH) Final Guidance for Evaluating Soil Vapor Intrusion matrices date October 2006.
    - Soil vapor results indicated low levels of petroleum-related VOCs and low levels of chlorinated VOCs.
    - The total concentration of petroleum-related VOCs (e.g., benzene, toluene, ethylbenzene, and xylenes [BTEX]) ranged from 156.12 micrograms per cubic meter (µg/m^3) to 2,011.6 (µg/m^3), with the maximum concentration in SG-8.
    - Several chlorinated VOCs (CVOCs) including 1,1,1-trichloroethane, 1,1-dichloroethene, carbon tetrachloride, cis-1,2-dichloroethene, methylene chloride, trichloroethene (TCE), and vinyl chloride were either below detection limits or were detected below the NYSDOH Air Guideline Values (AGVs), except for tetrachloroethene (PCE). PCE concentrations ranged from 11.9 µg/m^3 to 41.9 µg/m^3, with two samples SG-3 and SG-7 (41.9 µg/m^3 and 33 µg/m^3, respectively) detected above NYSDOH AGV of 30 µg/m^3.

REMEDIAL INVESTIGATION REPORT

1.0 SITE BACKGROUND

TOT Developers retained GZA GeoEnvironmental of New York (GZA) to investigate and remediate a 0.34- acre (15,000 square feet [SF]) property located at 2246 Fulton Street (a.k.a 50 Sackman Street) in the Ocean Hill neighborhood of Brooklyn, New York (Site). Mixed commercial and residential use is proposed for the property. The RI work was performed on May 13, 2022. This Remedial Investigation Report (RIR) summarizes the nature and extent of contamination and provides sufficient information for establishment of remedial action objectives, evaluation of remedial action alternatives, and selection of a remedy that is protective of human health and the environment consistent with the use of the property pursuant to RCNY§ 43-1407(f). Limitations to this RIR are presented in **Appendix A**.

1.1. Site Location and Current Usage

The Site is located at 2246 Fulton Street, in the Ocean Hill neighborhood of Brooklyn, New York and is identified as Block 1553 and Lot 18 on the New York City Tax Map. **Figure 1** shows the Site location. The Site is 15,000 SF and is bounded by Fulton Street and Callahan Kelly Playground to the north, several 3- to 4-story walkup apartments to the south, a 1-story warehouse building (2234 Fulton Street) to the west, Sackman Street and a 1-story warehouse building to the east. A map of the site boundary is shown in **Figure 2**.

Currently, the Site is a rectangular-shaped parcel occupied by a 1-story warehouse building (with two partial basements) used by a packaging supply manufacturer (Alpine Paper Box). The Site is located at an approximate elevation (EL) 82.50 at the southern boundary to EL 87.00 at the northern boundary based on the North American Vertical Datum of 1988 (NAVD88) An architectural survey dated May 12, 2021, is included in **Appendix B.**

1.2. Proposed Redevelopment Plan

The proposed future use of the Site will consist of an 11-story mixed-use commercial and residential building which will cover the entire Site. The proposed building would rise 115 feet (ft) in height and include a full height cellar level requiring excavation of the entire lot footprint to a depth of approximately 12 ft below grade generating approximately 6,700 cubic yards (CY) of soil. The proposed residential floor area will be 83,450 square feet (SF) (5.56 floor to area ratio

[FAR]) and the proposed commercial floor area will be 526.84 SF (0.04 FAR). The total proposed floor area will be 83,977.41 SF less than the 84,000 SF maximum allowed.

Based on the available online information from other Sites in the vicinity, groundwater is anticipated to be within 65 feet to 82 feet below ground surface (bgs), therefore the proposed development does not anticipate encountering groundwater.

The new cellar will contain a trash compactor room, mechanical and electrical service room, elevator machine room and a commercial accessory space. The ground floor will a commercial space, residential lobby, package room, mail room and a vehicular ingress/egress ramp to access the second floor. The second floor will contain a parking garage for 46 vehicles, storage space and elevators. The third floor will contain residential units (some with outdoor terraces), indoor/outdoor recreational spaces, business center, and a gym. The fourth to eleventh floors will have residential dwelling units (some with private terrace space). The total project includes 120,548 SF of gross residential space, 18,191 SF of gross commercial space. The current zoning designation is for light manufacturing district (M1-4) and residential properties (R7D). The proposed use is consistent with existing zoning for the property. The proposed Site development plans are presented in **Appendix C**.

1.3. Description of Surrounding Property

The current properties within a ¼-mile of the Site consist primarily of multi-story buildings. The table below lists the properties that adjoin the Site and describes their current use.

Direction	Street Address/Location	Name and Current Use
North	Fulton and Truxton Street	Callahan Kelly Playground
South	52 Sackman Street	4-story multi-family walk-up residential building
	1417 Herkimer Street	3-story multi-family walk-up residential building
	1415 Herkimer Street	3-story multi-family walk-up residential building
	1411 Herkimer Street	3-story multi-family walk-up residential building
West	2234 Fulton Street	1-Story Commercial Building
East	2360 Fulton Street	Primer Lumber & Home Center Inc. / 1-Story Commercial Building (Fulton Park Realty LLC)

Buildings along Fulton Street are comprised mainly of 1 -story warehouses. The areas to the south of the Site along Sackman and Herkimer Street are mainly occupied by multi-story residential buildings. The New York City Metropolitan Transportation Authority (MTA) elevated A and C Subway Line runs east to west along Fulton Street, to the north of the Site, and the J and Z Line

runs east to west along Broadway, further north of the Site. The Broadway Junction terminal. Sensitive receptors were identified with approximately 500 feet from the Site. These are: 1) Callahan -Kelly Playground located across the street from the Site, 2) Aim Charter School – located at 1495 Herkimer Street and 3) P.S. / I.S. 155 Nicholas Herkimer School. **Figure 3** shows the surrounding land usage.

2.0 SITE HISTORY

2.1. Past Uses and Ownership

The historical documents from as early as 1888 until circa 1908, show the Site as comprised of several undeveloped lots (designated as lots 3, 4, 5, 6, 7, and 8). By around 1932, the lots were combined and occupied by a 1-story commercial building (used as a garage for 100 cars) with an office. Two (2) gasoline tanks were depicted on the northern portion of the subject property. By 1940, the subject property was listed as being used by a lumber company (Bond Lumber Co.) By 1951, the subject property was used as an auto service facility with only one (1) gasoline tank shown. By 1963, the subject property was used by a paper box manufacturing company (Alpine Paper Box Co.), with no gasoline tank shown. At the time of GZA's RI work in May 2022, the subject property remained as a commercial building used by a paper box manufacturing company.

2.2. Previous Investigations

A copy of the previous investigation reports is presented in **Appendix D** and summarized below.

Phase I Environmental Site Assessment (ESA), Middleton Environmental Incorporated (MEI), January 26, 2018

At the request Alpine Paper Box, Middleton Environmental Incorporated (MEI), performed a Phase I ESA of the subject property in accordance with ASTM E-1527-13. The Phase I ESA has identified no evidence of controlled recognized environmental conditions (CRECs) or historical recognized environmental conditions (HRECs). However, the Phase identified the following recognized environmental conditions (RECs):

- The presence of two (2) 275-gallon aboveground storage tanks (ASTs) heating oil tank in the partial basement at the eastern side and one (1) 1,080-gallon heating oil tank encased in concrete in the partial basement at northwestern portion of the building. The tanks are no longer in service.
- A review of Historic Sanborn Fire Insurance Maps indicated the presence of two underground storage tanks (USTs) at the subject property. Interviews with the owner indicated the location of the two presumed USTs. No information on the condition of these tanks were provided to MEI during their assessment.

MEI indicated that the subject property has an "E-Designation" requiring the property to undergo environmental testing if sub-surface disturbance is to occur.

2.3. Site Inspection

A Site reconnaissance was performed for the Phase I ESA. The inspection included a walk-though inspection of the entire Site for the purpose of identifying RECs. On January 19, 2018, a Site reconnaissance was performed by MEI's Project Manager, Ethan Rainey, and was accompanied by the owner of the building. On May 13, 2022, GZA's Project Engineer, Geder Mena, performed a Site inspection of the property prior to the performance of the RI work.

2.4. Areas of Concern

The AOCs identified for this site include:

1. The presence of approximately 12.5 ft of historic fill at the Site.
2. The presence of petroleum storage tanks.
3. On site soil and soil vapor may have been impacted by historic off-site sources.

The Phase I Report is presented in **Appendix D**.

3.0 PROJECT MANAGEMENT

3.1. Project Organization

The Qualified Environmental Profession (QEP) responsible for preparation of this RIR is David M. Winslow, PhD, P.G. The Senior Project Manager is Reinbill Maniquez, CHMM. Fieldwork was performed by Geder Mena and Nolan Quinn under the supervision of the QEP. GZA is contracted to TOT Developers, the current Site developer.

3.2. Health and Safety

All 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.

An OSHA compliant Health and Safety Plan (HASP) that meets OSHA HAZWOPER requirements was implemented during the site work to protect worker safety. The Site Safety Coordinator ensured compliance of the HASP in accordance with health and safety laws and regulations. Field personnel involved in investigation activities participated in training required under OSHA HAZWOPER 29 Code of Federal Regulations (CFR) 1910.120, including 40-hours hazardous waste operator training and 8-hours refresher training. Emergency telephone numbers were kept at the Site. A Safety meeting was conducted before work began. Topics discussed included task hazards and protective measures (physical, chemical, environmental); emergency procedures; personal protective equipment (PPE) levels and other relevant safety topics including the route to the nearest hospital/emergency room. The meeting was documented in a logbook or specific form. Information fact sheets and/or summary tables for each contaminant group were included in the HASP. A copy of the HASP was on-site during each sampling event.

3.3. Materials Management

All material encountered during the RI was managed in accordance with applicable laws and regulations. Investigation-derived waste (IDW), soil cuttings were returned to the boreholes.

4.0 REMEDIAL INVESTIGATION ACTIVITIES

The RI was conducted in accordance with the NYC OER-approved Phase II Work Plan (Short Form) prepared by GZA GeoEnvironmental of New York (GZA) and dated January 11, 2022. The RI field work was performed on May 13, 2022, and included the following scope of work:

- GZA performed a geophysical survey of the Site to locate the subsurface anomalies which may be consistent with underground utilities, other subsurface structure, or USTs.
- GZA conducted a Site inspection to identify AOCs and physical obstructions (i.e., structures, buildings, etc).
- GZA installed eight soil borings across the entire project Site and collected sixteen (16) soil samples for chemical analysis from the soil borings to evaluate soil quality.
- GZA installed seven soil vapor probes around Site perimeter and collected seven (7) samples for chemical analysis.

Site features and sample locations are shown in **Figure 2**. A summary of RI sample collection and chemical analysis is provided in **Table 1**. Representative photographs of the field investigation activities are included in **Appendix E**.

4.1. Geophysical Investigation

GZA subcontracted Nova Geophysical Services (NOVA) to perform a geophysical survey at accessible areas of the Site on May 13, 2022, to locate and identify anomalies consistent with underground utilities, storage tanks, and other substructures. The geophysical survey equipment consisted of a ground penetrating radar (GPR) with a shielded antenna, a Radio Detection Electromagnetic utility locator, and a magnetometer to detects ferromagnetic objects at the depth to approximately eight feet. The GPR profiles were collected over anomalies and inspected for reflection which could be indicative of USTs or subsurface utilities. Sample locations were established in areas that did not conflict with potential subsurface structures or utilities. Additionally, prior to invasive work, GZA drilling subcontractors contacted New York 811 and requested a utility mark out to locate underground utilities on the sidewalk and street fronting the Site. The geophysical survey did not identify anomalies / subsurface signatures that are indicative of underground storage tanks at accessible areas of the Site.

4.2. Borings and Vapor Probes

Drilling and Soil Logging

GZA subcontracted EPhase2, LLC of Huntington Station, New York (EP2) to advance eight soil borings, SB-1, SB-2, SB-4, SB-6, SB-7, SB-8, SB-9, and SB-10, at the Site on May 13, 2022. The eight borings were advanced to between 10 and 25 ft bgs (between EL 67 and EL 77.25) using a direct-push Geoprobe® 6712 DT direct-push technology rig with a 2-inch inside MacroCore™ sampler liner. EP2 utilized a Geoprobe® 6712DT direct-push technology drill rig equipped with a 2-inch inside MacroCore ™ soil sampling unit with an acetate liner sleeve. Soil cores were collected at 5-foot intervals.

Soil was classified using the modified Burmister soil classification system. Soil boring locations are shown in **Figure 2**. The boring completion depth and elevations are shown on **Table 1**. Boring logs were prepared by GZA's Field Engineer and are provided in **Appendix F**.

Soil Vapor Probe Installation

At seven boring locations, EP2 off-set between three to five feet and installed seven temporary soil vapor probes (SG-1, SG-2, SG-3, SG-5, SG-6, SG-7, and SG-8) using a Geoprobe ® 6712DT direct-push technology drill rig equipped with a 2-inch diameter hammer rod. One soil vapor probe (SG-1) was installed to a depth of approximately 12 ft. bgs. (EL 75.25) while two soil vapor probes (SG-2 and SG-6) were installed to depths of 10 ft. bgs. (EL 77 and EL 72, respectively). Four soil vapor probes (SG-3, SG-5, SG-7, and SG-8) were installed to a depth of approximately 15 ft. bgs. (between EL 67.5 to 71). Polyethylene tubing (1/4-inch) retrofitted with moisture filters were placed in each borehole and backfilled with sand. Bentonite was placed at the top of each soil vapor point to create a seal. Prior sampling, a helium leak-detection test was performed at each soil vapor were purged at a flowrate less than 0.2 liters per minute (L/min) to minimize ambient air infiltration. Methodologies used for soil vapor assessment conformed to the NYSDOH Final Guidance on Soil Vapor Intrusion, October 2006. The soil vapor sampling locations are shown on **Figure 2**. The soil vapor probe completion depth and elevations are shown on **Table 1**. The soil vapor sampling logs are presented on **Appendix G**.

Groundwater Monitoring Well Construction

Groundwater was not encountered during this RI. Based on available online information from NYC OER's Searchable Property Environmental E-Database (SPEED) 2.0 for other E-

Designation Sites in the vicinity of the Site, the water table was anticipated to be at approximately between 65 to 82 ft bgs. Therefore, groundwater was not sampled and analyzed. Three permanent groundwater monitoring wells were not installed along the sidewalk of Sackman Street and Fulton Street and groundwater samples were not collected. On May 6, 2022, in consultation with OER, well installation will be deferred based on the results of this RI.

Sample Location Survey

The samples were located using a tape measure from fix locations at the Site and elevations were based on the architectural survey, dated May 12, 2021.

4.3. Sample Collection and Chemical Analysis

Sampling performed as part of the field investigation was conducted for all Areas of Concern and also considered other means for bias of sampling based on professional judgment, area history, discolored soil, stressed vegetation, drainage patterns, field instrument measurements, odor, or other field indicators. All media including soil, groundwater and soil vapor have been sampled and evaluated in the RIR. Discrete (grab) samples have been used for final delineation of the nature and extent of contamination and to determine the impact of contaminants on public health and the environment. The sampling performed and presented in this RIR provides sufficient basis for evaluation of remedial action alternatives, establishment of a qualitative human health exposure assessment, and selection of a final remedy.

Soil Sampling

Soil samples were collected continuously at five-foot intervals from grade to a maximum depth of 16 ft bgs. GZA personnel screened the soils samples for the presence of total organic vapors using a photoionization detector (PID) equipped with a 10.6 electron volts (eV) lamp and observed for evidence of impacts (e.g., odor, staining). At a minimum, two soil samples (one shallow and one deep) were collected for laboratory analysis from soil boring locations within the proposed building footprint. Eight (8) shallow soil samples were collected from 0 to 2 ft bgs. Eight (8) deep samples were collected from depths ranging from 8 to 16 ft bgs. Soil boring SB-02, SB-03 and SB-04 were located near the vicinity of the tanks identified in the Phase I ESA.

For quality assurance/quality control (QA/QC), one trip blank sample was included in the shipment to the analytical laboratory for VOCs analysis. Representative portions of the soil were collected

into laboratory-supplied containers. Discrete soil samples being submitted for volatile organic compounds (VOCs) were collected using laboratory supplied TerraCore™ samplers. In total, 16 soil samples were collected for chemical analysis during this RI. Each soil sample was collected and placed into pre-cleaned, laboratory-prepared containers using disposable, one-time use nitrile gloves. The sampler jars were uniquely labeled and placed in insulating coolers with ice and submitted under standard chain of custody protocol to Alpha Analytical Laboratories of Westborough, Massachusetts (Alpha), an Environmental Laboratory Approval Program (ELAP)-certified laboratory.

Data on soil sample collection for chemical analyses, including dates of collection and sample depths, is reported in **Table 1**. **Figure 2** shows the location of samples collected in this investigation. Laboratories and analytical methods are shown below.

Groundwater Sampling

Because of the depth of the water table (anticipated to be between 65 to 82 feet bgs) three permanent groundwater monitoring wells were not installed along the sidewalk of Sackman Street and Fulton Street and groundwater samples were not collected. Based on the consultation with OER on July 12, 2022, well installation and groundwater sampling were not performed.

Soil Vapor Sampling

Soil vapor samples were collected by connecting the soil vapor probes to 2.7-Liter stainless steel SUMMA® canister with 2-hour flow regulators via Teflon™ sampling tubing. Soil vapor samples were submitted under standard chain of custody protocol to Alpha. Seven soil vapor probes were installed, and seven vapor samples (SG-1 through SG-3), and (SG-5 through SG-8) were collected for chemical analysis during this RI. The soil vapor sampling locations are shown in **Figure 2**. Soil vapor sample collection for chemical analyses, including dates of collection and sample depths, is reported in **Table 1**. Soil vapor sampling logs are included in **Appendix G**. Methodologies used for soil vapor assessment conform to the *NYS DOH Final Guidance on Soil Vapor Intrusion, October 2006.*

Chemical Analysis

Chemical analytical work presented in this RIR has been performed in the following manner:

Factor	Description
Quality Assurance Officer	The chemical analytical quality assurance is directed by Reinbill P. Maniquez
Chemical Analytical Laboratory	Chemical analytical laboratory(s) used in the RI is NYS ELAP certified and was Alpha Laboratories of Westborough, Massachusetts.
Chemical Analytical Methods	Soil analytical methods: • VOCs by EPA Method 8260C (rev. 2006); • SVOCs by EPA Method 8270D (rev. 2007); • TAL Metals by EPA Method 6010/7000 (rev. 2018); • Pesticides by EPA Method 8081B (rev. 2007); • PCBs by EPA Method 8082A (rev. 2007); • Per- and polyfluoroalkyl substances (PFAS) by EPA Method 537.1 (Jan 2021) Soil vapor analytical methods: • VOCs by TO-15 (rev. 1999).

Results of Chemical Analyses

Laboratory data are summarized for soil in **Table 2 to Table 6**, and soil vapor in **Table 7**. Laboratory data deliverables for soil and soil vapor samples evaluated in this RIR are provided in digital form in **Appendix H**.

Deviation from Work Plan

The RI was conducted in accordance with the OER-approved January 2022 Phase II Workplan with the following deviations:

- Three permanent groundwater monitoring wells were not installed along the sidewalk of Sackman Street and Fulton Street and groundwater samples were not collected. On May 6, 2022, in consultation with OER, well installation will be deferred based on the results of this RI.
- Several locations (SG-4, SB-03, and SB-05) were not advanced due to on-site obstructions.
- Several locations were advanced to shallower depths due to refusals; these includes SB-1, SB-9, and SB-2 from proposed of 16 ft bgs to 10 ft bgs, SB-6 from proposed of 20 ft bgs to 14.5 ft bgs, SB-4, and SB-10 from proposed of 16 ft bgs to 15 ft bgs, SB-7 from proposed of 16 ft bgs to 13 ft bgs.

5.0 ENVIRONMENTAL EVALUATION

5.1. Geological and Hydrogeological Conditions

Stratigraphy

Based on a review of the United States Geological Survey (USGS) 7.5 Minute Series topographic map of Brooklyn, New York Quadrangle the Site is located at 86 ft above mean sea level (msl) based on the North American Datum of 1988 (NAVD88). The topographic gradient near the Site slopes gradually downward to the southeast. The nearest water body is the Fresh Creek, north of Jamaica Bay, located approximately 2.1 miles to the southeast of the Site.

The RI showed a subsurface profile consisting of fill material to a depth of approximately 1 to 12.5 ft bgs, underlain by a sand stratum down to boring termination depth of about 13 to 16 ft bgs. According to the 1994 USGS publication 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 (Baskerville 1994), bedrock in this area is comprised on interbedded units of gray, fine-grained quartz-feldspar, gray to tan muscovite-biotite garnet schist, and dark greenish black amphibolite (Hartland Formation) and is anticipated to be greater than 300 feet below mean sea level based on the National Geodetic Vertical Datum of 1929 (NGVD29).

No elevated PID readings were observed during purging of soil vapor samples. PID readings and slight odors were noted (maximum of 54 ppm) at several boring location (SB-1, SB-6 through SB-8). However, no visual evidence of contamination (i.e., staining) was observed in the soil samples.

Hydrogeology

According to the USGS Fact Sheet 134-97, Water Table Altitude in Kings and Queens Counties, New York, in March 1997 (Monti and Chu, November 1997) groundwater is anticipated to be at approximately 10 to 12 feet above mean sea level. However, groundwater was not encountered during the RI. Based on existing available information from other E-Designation Sites available on the NYC OER SPEED 2.0, there are multiple projects near our site that showed the water table at approximately between 65 feet bgs to 82 bgs.

- 2440 Fulton Street (Block 1554 Lot 16) – depth to groundwater measured at 65.18 feet bgs

- 33 Truxton Streets (Block 1543 Lot 1) – regional groundwater depth 82 feet bgs
- 1860 Eastern Parkway (Block 1436 and Lot 6) – depth to groundwater measured at 72 feet bgs during geotechnical investigation.

Groundwater flow is generally to the southeast towards Fresh Creek and Jamaica Bay.

5.2. Soil Chemistry

Soil/fill samples collected during the RI were compared to the New York State Department of Environmental Conservation (NYSDEC) Title 6 of the New York Codes Rules, Regulations (6NYCRR) Part 375 Section 6.8(a) Unrestricted Use Soil Cleanup Objectives (UUSCOs) Residential Use SCOs (RUSCOs), and Protection of Groundwater Resources SCOs (PGWSCOs).

- VOCs and Emerging Contaminants were either below detection limits or detected below UUSCOs, RUSCOs, and PGWSCOs;
- SVOCs were either below detection limits or detected below UUSCOs, RUSCOs, and PGWSCOs from the soil samples except for one sample. The sample collected at SB-7 (11-13') showed benzo(a)pyrene (maximum [max.] of 2.5 mg/kg), benzo(k)fluoranthene (max. of 1 mg/kg), dibenzo(a,h)anthracene (max. of 0.38 mg/kg) and indeno (1,2,3-cd)pyrene (max. of 1.6 mg/kg) were detected above UUSCOs and RUSCOs. The sample collected at SB-7 (11-13') also showed that benzo(a)anthracene (max. of 3.4 mg/kg), benzo(b)fluoranthene (max. of 2.8 mg/kg), and chrysene (max of 3.3 mg/kg) were detected above UUSCOs, RUSCOs, and PGWSCOs;
- Several Metals were detected above UUSCOs including copper (max of 123 mg/kg), zinc (max of 514 mg/kg); and above UUSCOs, RUSCOs, and PGWSCOs including lead (max of 4,150 mg/kg) and mercury (max of 0.829 mg/kg);
- One pesticide, 4,4'-DDE, (max of 0.0036 mg/kg at SB-6 [12.5-14.5']) was detected in at concentration above its Unrestricted Use SCOs.

Data collected during the RI is sufficient to delineate the vertical and horizontal distribution of contaminants in soil/fill at the Site. A summary Table of data for chemical analyses performed on soil samples is included in **Table 2** through **Table 6**. **Figure 4** shows the location and posts the values for soil/fill that exceed the 6NYCRR Part 375-6.8 Soil Cleanup Objectives.

5.3. Groundwater Chemistry

Due to groundwater not being encountered at the deepest boring during this RI, groundwater samples were not collected. Because of the depth of the water table (anticipated to be between 65 to 82 feet bgs) three permanent groundwater monitoring wells were not installed along the sidewalk of Sackman Street and Fulton Street and groundwater samples were not collected. Based on the consultation with OER on July 12, 2022, well installation and groundwater sampling were not performed.

5.4. Soil Vapor Chemistry

Soil vapor samples collected during the RI were compared to the New York State Department of Health (NYSDOH) Final Guidance for Evaluating Soil Vapor Intrusion matrices date October 2006.

- Soil vapor results indicated low levels of petroleum-related VOCs and low levels of chlorinated VOCs.
- The total concentration of petroleum-related VOCs (e.g., benzene, toluene, ethylbenzene, and xylenes [BTEX]) ranged from 156.12 micrograms per cubic meter (µg/m^3) to 2,011.6 µg/m^3, with the maximum concentration in SG-8.
- Several chlorinated VOCs (CVOCs) including 1,1,1-trichloroethane, 1,1-dichloroethene, carbon tetrachloride, cis-1,2-dichloroethene, methylene chloride, trichloroethene (TCE), and vinyl chloride were either below detection limits or were detected below the NYSDOH Air Guideline Values (AGVs), except for tetrachloroethene (PCE). PCE concentrations ranged from 11.9 µg/m3 to 41.9 µg/m^3, with two samples SG-3 and SG-7 (41.9 µg/m^3 and 33 µg/m^3, respectively) detected above NYSDOH AGV of 30 µg/m^3.

Data collected during the RI is sufficient to delineate the distribution of contaminants in soil vapor at the Site. A summary table of data for chemical analyses performed on soil vapor samples is included in **Table 7**. **Figure 5** shows the location and the values for soil vapor samples with detected concentrations.

5.5. Prior Activity

Based on an evaluation of the data and information from the RIR, disposal of significant amounts of hazardous waste is not suspected at this site.

5.6. Impediments to Remedial Action

There are no known impediments to remedial action at this property.