Remedial Investigation Work Plan
9 North 15th Street
Brooklyn, New York
NYSDEC BCP No. TBD

November 2024
File No. 41.0163352.10

PREPARED FOR:

New York State Department of Environmental Conservation
Division of Environmental Remediation
625 Broadway | Albany, NY 12233

ON BEHALF OF:

9N15Inlet LLC;
Solstice Equities LLC; and
VagaBond Group LLC

PREPARED BY:

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November 11, 2024
File No. 41.0163352.10

New York State Department of Environmental Conservation
Division of Environmental Remediation
625 Broadway
Albany NY, 12233

Re: Remedial Investigation Work Plan
9 N. 15th Street Site
9 North 15th Street
Brooklyn, New York 11222
NYSDEC BCP No. TBD

To Whom it may concern:

GZA GeoEnvironmental of New York (GZA) is pleased to provide the Remedial Investigation Work Plan (RIWP) for the above-referenced property (Site). The RIWP is being submitted along with a New York State Brownfield Cleanup Program application.

Should you have any questions, please contact Victoria Whelan at (631) 793-8821 or Victoria.Whelan@gza.com.

Very truly yours,

GZA GEOENVIRONMENTAL OF NEW YORK

Jackson Bogach, P.E.
Assistant Project Manager

Stephen M. Kline, P.E.
Consultant Reviewer

Victoria Whelan, P.G.
Vice President

Enclosure: Remedial Investigation Work Plan

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CERTIFICATION

I, Victoria D. Whelan, certify that I am currently a Qualified Environmental Professional as defined in 6 New York Codes, Rules, and Regulations (NYCRR) Part 375 and that this Remedial Investigation Work Plan (RIWP) was prepared in accordance with all applicable statutes and regulations and substantial conformance with New York State Department of Environmental Conservation (NYSDEC) Division of Environmental Remediation (DER)-10 Technical Guidance for Site Investigation and Remediation.

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Victoria D. Whelan, QEP, NYSPG

LIST OF ACRONYMS

Acronym	Definition
111-TCA	1,1,1-Trichloroethane
11-DCE	1,1-Dichloroethene
ASP	Analytical Services Protocol
AOC	Area of Concern
BCP	Brownfield Cleanup Program
BGS	Below Ground Surface
BTEX	Benzene, Toluene, Ethyl Benzene, and Xylenes
C12-DCE	Cis-1,2-Dichloroethene
CAMP	Community Air Monitoring Plan
COC	Contaminant of Concern
CSCO	Commercial Soil Cleanup Objective
CVOC	Chlorinated Volatile Organic Compounds
EDD	Electronic Data Deliverable
DER	Division of Environmental Remediation
DUSRs	Data Usability Summary Reports
ESA	Environmental Site Assessment
ELAP	Environmental Laboratory Accreditation Program
GPR	Ground Penetrating Radar
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PCBs	Polychlorinated Biphenyls
PCE	Perchloroethylene/Tetrachloroethene/Tetrachloroethylene
PFAS	Per- and Polyfluoroalkyl Substances
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctanesulfonic Acid
PGWSCO	Protection of Groundwater Soil Cleanup Objective
PID	Photoionization Detector
QA/QC	Quality Assurance/Quality Control
QEP	Qualified Environmental Professional
RI	Remedial Investigation
SCOs	Soil Cleanup Objectives
SSDS	Sub-Slab Depressurization System
SVOCs	Semi-Volatile Organic Compounds
T12-DCE	Trans-1,2-Dichloroethene
TCE	Trichloroethene/Trichloroethylene
USDA	United States Department of Agriculture
UST	Underground Storage Tank
UUSCO	Unrestricted Use Soil Cleanup Objectives
TAL	Target Analyte List
VC	Vinyl Chloride
VOCs	Volatile Organic Compounds
WQS	Water Quality Standard

1.0 INTRODUCTION

The following Remedial Investigation Work Plan (RIWP) was prepared by Goldberg Zoino of New York P.C. d/b/a GZA GeoEnvironmental of New York (GZA) on behalf of 9N15 Inlet LLC, Solstice Equities LLC, and VagaBond Group LLC (collectively referred to herein as the “Requesters”) relative to the necessary remediation of the real property located at 9 North 15th Street, Brooklyn, New York (herein referred to as the “Site” or “Property”), Site name 9 N. 15th Street Site. The Requesters have applied to enter the New York State Department of Environmental Conservation (NYSDEC), Division of Environmental Remediation (DER), Brownfield Cleanup Program (BCP) per Title 6 of the New York State Official Compilation of Codes, Rules, and Regulation (NYCRR) Part 375-3.4 as Volunteers as defined in ECL 27-1405(1)(b).

1.1 PROJECT OBJECTIVES

On June 15, 2023, a letter from the NYSDEC, referred to as the "P" letter, was received by the current owner, indicating that the Property is potentially classified as a hazardous waste disposal Site (Site No. 224397). The Requesters intend to enter into the BCP to conduct a remedial investigation and implement remedial actions as part of the redevelopment process.

The previous investigations performed at the Site provided a preliminary understanding of the Contaminants of Concern (COCs), specifically, Volatile Organic Compounds (VOCs), Semi-Volatile Organic Compounds (SVOCs) and metals in subsurface soils, groundwater, and soil vapor. The objective of this RIWP is to collect sufficient quantity and quality data to fully characterize the nature and extent of the impacted media beneath the Site. Data collected during this RI will be utilized to develop a remedial design and the remedial activities that will allow for the beneficial redevelopment of the Property under the BCP. This RIWP is being submitted in conjunction with the BCP application.

1.2 SCOPE OF WORK

The RIWP describes the project objectives, details the Site information and location, relevant historical background, previous Site investigations, and field methodologies that will be employed during the subsurface investigation. This RIWP was prepared by GZA for the Site in general accordance with the NYSDEC, DER *Technical Guidance for Site Investigation and Remediation (DER-10)*, dated May 2010. Appended to this RIWP are plans that detail the site-specific protocols to be followed during the investigation work, which include:

- Quality Assurance Project Plan (QAPP) and Field Sampling Plan (FSP) – **Appendix A**
- Health and Safety Plan (HASP) – **Appendix B**
- Community Air Monitoring Plan (CAMP) – **Appendix C.**

2.0 PHYSICAL SITE CHARACTERISTICS

2.1 SITE DESCRIPTION

The Site is located at 9 North 15th Street, Brooklyn, New York, 11222. The Site is comprised of one New York City Tax Lot (County: Kings; Block 2614; Lot 16). The total area of the Site is 6,300 square feet (sq ft). The Site has frontage on both Gem Street and North 15th Street. A topographic map showing the Site Location is included as **Figure 1**.

The Site contains an existing 1-story warehouse building that totals 6,950 sq ft in gross floor area. The existing warehouse structure occupies the entire footprint of the Site. The building is comprised of a small office area and a large open warehouse area. The building is serviced by Con Edison and National Grid for Electricity and Gas, respectively. The Site is currently unoccupied, and the Requesters will have full Site access for the investigation.

Jackson Bogach, P.E., and Lai Wa Chu conducted a Site walkthrough inspection as part of a Phase I Environmental Site Assessment (ESA) inspection on October 23, 2024. The warehouse floor is constructed of concrete and was observed to be in fair condition. Several locations of cracking and chipping in the vicinity of floor drains was observed. Three floor drains are present within the building. The drains are all "hard-piped" and are assumed to be directed to the municipal sewer cleanout located along the west side of the building (along North 15th Street). Six existing monitoring wells (designated MW-01 through MW-06) were gauged and inspected, and appear to be in good condition. An outline exists on the floor of the abandoned Underground Storage Tank (UST) which was observed on the east side of the warehouse along Gem Street.

The Site is currently unoccupied. The current zoning designation is M1-2. The Site is generally level and has no natural or artificial surface water bodies or impoundments. The depth to groundwater is approximately 8-10 feet below ground surface (ft bgs) as measured by GZA personnel within the existing Site wells during the Phase I ESA site reconnaissance visit on October 23, 2024. A Site Map showing existing features is included as **Figure 2**.

2.2 SITE HISTORY

According to historical documentation revived during GZA's Phase I ESA, the Site was undeveloped until 1931, when the current building was constructed. According to Sanborn fire insurance maps, the Site was identified as a garage from 1942 until circa 1965. By 1965, the Site was identified as a manufacturing facility. V E 2 Plating and Preto Electro Plating Corp., an industrial plating company, occupied the Site and the northern adjoining property (12 Franklin) between 1976 to 1992. From 1992 to 1994, the property was owned by Frank M. DeBono, operating as a construction company. The Site was then occupied by Linaire Sheet Metal Corp., a sheet metal manufacturing company, between 1994 to 2021. The Site has been unoccupied since 2021.

The Site was utilized for various commercial and manufacturing operations including an electroplating facility, contractor's office with construction material storage, and sheet metal manufacturing.

The following investigations were previously performed at the Site:

1. Phase I ESA by Laurel Environmental Geosciences, DPC (Laurel), January 2022
2. Limited Phase II Subsurface Investigation by Laurel, February 2022
3. Remedial Investigation by Laurel, May 2022

4. Phase I ESA by GZA, November 2024

Phase I ESA by Laurel Environmental Geosciences, DPC (Laurel), January 2022

The Laurel Phase I ESA report determined several Recognized Environmental Conditions (RECs), which are summarized as follows:

1. A set of fill and vent pipes were observed on the eastern wall of the building leads to a previously abandoned UST located near the entrance on Gem Street. According to documents provided by the Site representative to Laurel, this 2,000-gallon UST containing heating oil was abandoned in place on July 1, 1996. The documents indicated that the contents of the UST were pumped out and the tank was cleaned and filled with sand; however, no tank tightness test documentation was provided for review.
2. The Site was potentially listed as a historical Resource Conservation and Recovery ACT (RCRA) Hazardous Waste Generator, associated with VE 2 Plating Company, located at 7-11 North 15th Street.
3. The Site is listed with the NYSDEC as a Petroleum Bulk Storage (PBS) facility due to the presence of the abandoned 2,000-gallon UST in place; and no tank testing documentation was available for review.
4. The past usage of the Site for industrial activities. Specifically, the Site was first developed around 1931 as a one-story warehouse building and has been since been occupied by several industrial and commercial tenants, including multiple electroplating operations.

In conclusion, Laurel recommended conducting a Limited Phase II Subsurface Investigation to identify any impact on the environmental quality at the Site. Based on their findings, Laurel recommended reviewing tank tightness testing documents to determine the integrity of the UST prior to being abandoned, and to conduct soil sampling around the abandoned UST if tank test documents are not available. Additionally, a soil vapor investigation was recommended to determine possible impact to the Indoor Air Quality of the Building from past use for industrial manufacturing.

Limited Phase II Subsurface Investigation by Laurel, February 2022

Laurel performed a Limited Phase II based on their Phase I ESA report recommendations. As part of the Phase II investigation, Laurel conducted subsurface soil sampling, groundwater sampling, and soil vapor intrusion sampling to determine if hazardous waste has impacted the Site subsurface. The February 2022 report findings are summarized below.

<u>Soil Vapor</u>: The scope of work included the collection of two soil vapor samples, two indoor ambient air samples, and one outdoor ambient air samples, located in the storage area in the northwest corner of the building and in the center of the building. Laboratory results indicated elevated levels of halogenated solvents including tetrachloroethylene (PCE), trichloroethylene (TCE), and cis-1,2-dichloroethylene (cis-1,2-DCE) detected in the sub-slab soil vapor and indoor air samples at concentrations requiring mitigation, according to the New York State Department of Health (NYSDOH) standard Matrices.

<u>Soil</u>: Three soil borings were advanced throughout the Site building to a depth of 10 ft bgs. One grab sample was collected from each boring at a 1-foot interval with the highest PID reading or greatest visible evidence of contamination. Laurel noted contaminate fill material to a depth of approximately 5 ft bgs at each boring location. Laboratory results indicated elevated levels of heavy metals within contaminated fill materials, and one boring location with elevated levels of halogenated solvents including PCE, TCE, and cis-1,2-DCE, at a depth of 5 ft bgs.

Groundwater: The three soil borings were converted to temporary wells and low flow sampling techniques were implemented during groundwater sampling collection. Laboratory results indicated slightly elevated levels of heavy metals and elevated levels of halogenated solvents, including PCE, TCE, cis-1,2-DCE, methylene chloride, and vinyl chloride, in two of the temporary wells.

UST Investigation: Three additional soil borings were advanced along the western (downgradient) edge of the abandoned UST to a depth of 10 ft bgs. One grab sample was collected from each boring at a 1-foot interval with the highest PID reading or greatest visible evidence of contamination, or from a 1-foot interval above the groundwater interface in the absence of visible contamination. Laboratory results indicated several petroleum SVOCs at elevated concentrations in the soil boring location on the northern end of the UST (SB-3). Petroleum VOCs or SVOCs were not detected in any other soil boring locations.

Based on their findings, Laurel recommended the following remedial steps:

- Designing and implementing a Sub-Slab Depressurization System (SSDS) to mitigate soil vapor contamination and protect current and future inhabitants of the Site building.

- Further soil delineation around soil boring 2 (SB-2) in order to characterize halogenated solvent contamination in the subsurface soils. Remedial excavation may be required in the future.

Remedial Investigation (RI) by Laurel, May 2022

Laurel performed a groundwater and soil RI to meet New York City Office of Environmental Remediation (NYCOER) protocols to further characterize and delineate contaminants of concern at the Site.

Groundwater: Laurel installed six permanent groundwater monitoring wells along the perimeter of the property to a depth of 20 ft bgs. Each well was developed, purged, and allowed to reach equilibrium over a 24-hour period before groundwater elevation readings were recorded. Low-flow sampling techniques were implemented, and each monitoring well was sampled for VOCs and Per- and Polyfluoroalkyl Substances (PFAS). Laboratory results indicated cis-1,2-DCE and vinyl chloride detections in MW-3 and MW-4 at concentrations exceeding the NYSDEC TOGS Values for Class GA Groundwater. Several PFAS were detected at concentrations exceeding the NYSDEC Part 375 Proposed Remedial Guidance Values for Polyfluoroalkyl Substances ("PFAS")[1] in each of the monitoring wells. However, concentrations of PFAS tended to be higher migrating onto the Site than leaving the Site, indicating that the Site is likely not contributing significantly to PFAS contamination in local groundwater.

Soil: Sixteen soil borings were advanced to a depth of 10 ft bgs throughout the Site. Each core was field screened, classified and logged; the soil beneath the property was determined to consist of primarily fill material from ground surface to 10 ft bgs. One grab sample was collected from each boring at the depth of greatest visible contamination or from approximately 5 ft bgs in the absence of visible contamination (DB-1, DB-3, DB-9, and DB-14). All samples were analyzed for VOCs, and two borings exhibiting the greatest visible evidence of contamination (DB-7, DB-11) were also analyzed for PFAS. Laboratory results indicated that TCE was detected at concentrations exceeding respective soil standard at depths between 5 to 8 feet in five of the borings. One PFAS analyte, perfluorooctanesulfonic acid (PFOS), was detected at concentrations exceeding the standard in both borings.

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[1] Note refers to PFAS Guidance at the time of the RI investigation in 2022.

Waste characterization was also performed as part of this remedial investigation and confirmed that halogenated solvents including PCE and TCE are present in subsurface soils at elevated concentrations. Laurel discussed potential sources of contamination, including leaking subsurface piping, of operations of the former plating company tenant and a former hazardous waste generator located on the Site.

A fate and transport analysis for soil suggested that the high porosity of shallow fill material could allow for the mobility of the contaminants of concern in the subsurface. A fate and transport analysis for groundwater suggested that natural degradation and/or dilution is likely responsible for the absence of contaminants leaving the Site. A fate and transport analysis for soil vapor suggested that the contaminants of concern have the potential to volatize and enter the Site building through cracks in the foundation walls or porous concrete if a vapor barrier is not in place.

Based on the findings of the RI, Laurel concluded that the NYSDEC would likely require a Remedial Action Work Plan be developed for the Site.

A summary of historical environmental data from the Limited Phase II Subsurface Investigation and RI was used to develop the media comparison figures of this RIWP. **Figure 4**, Historical Soil Exceedances of PGWSCOs and CUSCOS, depicts sampling locations with exceedances of the NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives (PGWSCOs) and anticipated Site Commercial Use Soil Cleanup Objectives (CUSCOs). **Figure 5**, Historical Groundwater Exceedances of AWQS, depicts sampling locations where groundwater exceedances of the NYSDEC Ambient Water Quality Standards (AWQS). **Figure 6,** Historical Soil Vapor, Indoor Air, and Outdoor Air CVOC Detections, depicts sampling locations where detections of CVOCs and analytes requiring mitigation in accordance with the NYSDOH matrices. Historical data tables from the Limited Phase II Subsurface Investigation and Remedial Investigation are presented in **Appendix D**, and existing monitoring well installation logs are included in **Appendix E**.

Phase I ESA, by GZA, November 2024

The November 2024 GZA GeoEnvironmental Phase I ESA identified several RECs related to the Site. RECs included historic Site usage; potential on-site releases and improper chemical storage identified during the Site reconnaissance; the presence of an underground storage tank with known exceedances of soil cleanup objectives; previous environmental studies with concentrations of contaminants in soil, groundwater, soil vapor, and indoor air above applicable standards and/or cleanup objectives; and the listing of the Site as a potential hazardous waste site by the NYSDEC. A summary of the RECs from the November 2024 Phase I ESA is shown below.

- REC-1 – Industrial Site Usage: According to historical Sanborn fire insurance maps, the Site was utilized for industrial manufacturing from 1965 through at least 2007. V E 2 Plating and Preto Electro Plating Corp., an industrial plating company, occupied the Site and the northern adjoining property (12 Franklin Street, NYSDEC BCP C224286), between 1976 to 1992. The Site was listed as a RCRA Generator (EPA ID No. NYD001486885) from 1976 to 1995 for corrosive wastes, chromium, and electroplating treatment sludges. From 1992 to 1994, the property was owned by Frank M. DeBono, operating as a construction company. The NY Manifest database indicates that several thousands of pounds and gallons of non-listed ignitable wastes were generated between 1992 and 1994. Multiple RCRA violations were reported for this facility between 1992 and 1994; however, compliance is listed as being achieved in 1995. The Site was then occupied by Linaire Sheet Metal Corp., a sheet metal manufacturing company, between 1994 to 2021. The Site is also listed in the multiple environmental regulatory databases.

- REC-2 – Potential on-site Release, Improper Chemical Storage, and Unlabeled Drums: During GZA's Site reconnaissance, multiple locations of staining and broken concrete were observed in the center portion of the warehouse in the vicinity of the floor drains. A discharge pipe was observed leading into the sump pit in the southeast portion of the Site. The origin of the discharge pipe was not traceable. GZA also observed unlabeled 55-gallon drums of unknown products, 55-gallon drums containing water-based insulation adhesives, hydraulic oil in 5-gallon buckets, and paints were located throughout the warehouse. Based on the past usage of the Site there is a potential for a hazardous release to the subsurface.

- REC-3 – Underground Storage Tank: An UST is located at the eastern portion of the Site on the Gem Street side. According to previous environmental reports (described above), the UST was reportedly abandoned in place in accordance with the NYSDEC requirements. Confirmatory sampling was conducted around the UST via the installation and sampling of monitoring wells during a Limited Phase II Subsurface Investigation, dated February 22, 2022. The Phase II investigation identified SVOCs in soil in the vicinity of the UST above the NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives (UUSCOs). The UST was identified during the GZA's Site reconnaissance.

- REC-4 – Previous Environmental Studies with Known Contamination: Laurel performed a Limited Phase II Environmental Investigation in February 2022 and a Remedial Investigation in May 2022 (described above). The findings included petroleum related VOCs, chlorinated VOCs and metals in soil above the NYSDEC Part 375 UUSCOs, concentrations of petroleum related VOCs and chlorinated VOCs and metals in groundwater above the NYSDEC TOGS Class GA Groundwater Guidance, and elevated concentrations of chlorinated VOCs in soil vapor and indoor air. The investigation also found concentrations of PFAS above the NYSDEC Part 375 Remedial Guidance Values in soil and groundwater.

- REC-5 – Potential Hazardous Waste Site Listing: According the available NYSDEC records the Site is listed as a "Class P-site" in the State Superfund Program. NYSDEC offers this information with the caution that it should not be used to form conclusions about subsurface contamination beyond what is implied by the classification of the P-site; namely, that there is a potential for concern about contamination on the Site. Information regarding a Class P-site (potential Registry site) is preliminary in nature and unverified because the NYSDEC's investigation of the Site is not yet complete. Due to the preliminary nature of this information, significant conclusions or decisions should not be based solely upon this summary.

2.3 AREAS OF CONCERN

Based on the Site history, GZA's Site walkthrough on October 23, 2024, and the findings of previous studies, the Areas of Concern (AOCs) to be further investigated during the RI are described below:

AOC-1 Historical Site Use

The existing building was constructed in early 1930s. Previous industrial uses include manufacturing, a construction company, a garage, and a sheet metal/locksmith facility. From 1976 to 1995, the Site was listed as a RCRA generator (EPA ID no. NYD001486885) of corrosive wastes, chromium, and electroplating treatment sludges. The facility operated as V E 2 Plating and as Presto Electro Plating Corporation. Historically the electroplating operations extended onto the adjacent BCP site, 12 Franklin Street (C224286). Based on further document review we note the following:

- The addresses and the dates do not match up with the EPA RCRA number. The RCRA number is for 7-11 North 15th Street. The Site is identified as 9 North 15th Street now but according to the historical Sanborn (1951), the Site did not include 7 North 15th Street.

The NYC ACRIS database has Presto Electro Plating Corporation (owned by Clifford Venturini for 1 year with a Sundry Agreement in 1989) because of a subdivision of the former lot 19. The new lot 16 (the Site) was subsequently sold to Frank DeBono later that year. Frank Debono operated a woodworking shop according to the current owner until the property was bought in 1996 to the current owner. The Lot north of the Site was formerly occupied by Crown Poly Corp (1991) and the referenced V-II Plating (2016).

Based on the mixed information for the Site usage and the neighboring properties site usage, the historical usage of the Site is an AOC.

AOC-2 – Drainage System

A drainage system was identified in the RI. The floor drain system consists of three floor drains and a sewer cleanout. During the Phase I ESA Site inspection, a drainage pipe was observed draining to the up-gradient floor drain at the eastern end of the Site. Two of the floor drains were open in the middle of the warehouse area. Visible staining and cracked concrete were observed in the vicinity of the floor drains.

AOC-3 – Impacted Media

Two previous environmental investigations were conducted at the Site. These investigations found that soil, groundwater, and soil vapor beneath the Site have been impacted by CVOCs (TCE and PCE). Other potential COCs in soil include the petroleum-related VOCs (xylenes), the metals (arsenic and mercury), SVOCs, and PFAS. Other COCs in groundwater include the CVOCs cis-1,2-dichloroethylene, methylene chloride, and vinyl chloride; the petroleum-related VOC naphthalene; metals including lead and selenium; and PFAS.

2.4 SURROUNDING LAND USE

The Site is located between North 15th Street and Gen Street with frontage along both. The NYC Tax Block (2614) is an irregular-shaped block that is surrounded by North 15th Street, Franklin Street, Meserole Avenue and Gem Street. Neighboring properties include warehouses and various commercial/industrial properties. Directly north of the Site is a New York State Brownfield Cleanup Program Project at 12 Franklin Street (C224286). According to the NYC Planning Commission Zoning Map 12c, the Site is located in an M1-2 manufacturing district.

The following table lists the properties that adjoin the Site and describes their current use.

Direction	Street Address/Location	Name (as applicable) and Current Use
North	12 Franklin Street 7 North 15th Street	Unoccupied warehouse, NYSDEC BCP Site C224286
South	15 North 15th Street	Moving and storage service, mortgage lender services
East	14 Meserole Avenue (across Gem Street) 26 Gem Street	Industrial building, Acme Smoked Fish manufacturing facility
Southwest	22 North 15th Street (across N. 15th Street)	NYCDEP Maintenance & Parking facility with filling station

2.5 PROPOSED REDEVELOPMENT/PROJECT DESCRIPTION

This project is to investigate and remediate the Site through the NYSDEC BCP. The project development will include renovating the existing one-story warehouse structure into a commercial food production and distribution facility and a restaurant. The existing slab on grade will be removed and replaced as part of the renovation.

3.0 ENVIRONMENTAL AND PHYSIOGRAPHIC SETTING

The following subsections provide information regarding the general physiographic, hydrologic, and soil conditions around the Site.

3.1 REGIONAL PHYSIOGRAPHY

Based on a review of the U.S. Geological Survey topographic map, Brookyln Quadrangle, New York, 7.5-minute series, 2023, the Site is situated at an approximate elevation of 10 feet above mean sea level (amsl) based on the North American Vertical Datum of 1988 (NAVD88). The topographic gradient near the Site slopes gradually to the west. The nearest water body is Bushwick Inlet, leading out to the East River, which is located approximately 0.04 miles west of the Site.

3.2 GEOLOGIC, HYDROGEOLOGIC, AND HYDROLOGIC CONDITIONS

Based on the US Department of Agriculture Soil Conservation Services Web Soil Survey, overburden at the Site consists of Urban Land, tidal marsh substratum, with 0 to 3 percent slopes (UmA), fill.

Based on the 1994 US Geological Service (USGS) publication, Bedrock and Engineering Geologic Map of New York County and Parts of Kings and Queens counties, New York, and Parts of Bergen and Hudson Counties, New Jersey (Baskerville 1994), and the USGS online GIS database, bedrock near the Site is categorized as an unconsolidated sequence of glacial and alluvial deposits from the Quaternary era, Hartland formation. This bedrock consists of mostly gray and gray-weathering, fine-grained quartz-feldspar kyanite granulite with minor biotite and garnet. Based on the 2023 USGS publication, Bedrock Surface Elevation and Overburden Thickness Maps of the Five Boroughs, New York City (DeMott, et al. 2023), we anticipate bedrock to be encountered at a depth between 100 to 150 ft bgs.

Based on the NYC OpenData online GIS database and previous investigations performed at the Site, the estimated depth to groundwater is between approximately five to nine ft bgs. Based on local topography and surface water flow patterns, the inferred direction of groundwater flow is west-southwest toward the Bushwick Inlet and East River. We subsequently refer to upgradient and downgradient properties in this Phase I ESA Report based on the inferred westerly-southwesterly direction of groundwater flow. However, the localized direction of groundwater flow near the Site might vary because of underground utilities, tidal influence, subsurface preferential pathways, variations in weather, or heterogeneous geological and/or anthropogenic conditions.

According to the Remedial Investigation Report (RIR), May 2022 by Laurel the depth the groundwater at the Site is 9 feet below grade surface and is assumed to move in a westerly direction. According to the Remedial Investigation Report for 12 Franklin Street (NYSDEC BCP No. C224286, prepared by Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C. and dated March 24, 2023), the adjacent site to the north, the confining clay layer is reportedly 7.5 to 15.5 ft bgs.

3.3 HISTORICAL ENVIRONMENTAL SAMPLING RESULTS

Information from the Limited Phase II Subsurface Investigation Report dated February 22, 2022, and the RIR dated May 18, 2022, identified several contaminants of concern that may be attributed to the historical manufacturing activities at the site and adjacent properties. The laboratory analytical results for soil were compared to NYSDEC Part 375 PGWSCOs and the CUSCOs for anticipated site use; for groundwater were compared to NYSDEC AWQS; and for soil vapor/indoor air/outdoor air the CVOCs were evaluated. The primary contaminants of concern include CVOCs (specifically TCE and PCE), SVOCs, and metals in soils; CVOCs, petroleum-related VOCs, and metals in groundwater; and CVOCs in soil vapor. The previous environmental report data tables are included in **Appendix D.**

Soil Chemistry

VOCs

Four (4) CVOCs, cis-1,2-dichloroethylene (maximum concentration [max] of 1.5 milligrams per kilogram [mg/kg]), methylene chloride (max of 5.6 mg/kg), PCE (max of 100 mg/kg), and TCE (max of 400 mg/kg) were detected above the PGWSCOs. One soil sample containing the maximum concentration of TCE (400 mg/kg) was above the PGWSCO and CUSCO.

Two petroleum related VOCs, acetone (max of 0.41 mg/kg) and xylenes (max of 2.9 mg/kg), were detected above the PGWSCO.

SVOCs

Four (4) SVOCs, benzo(a)anthracene (max of 3.7 mg/kg), benzo(b)fluoranthene (max of 2.9 mg/kg), benzo(k)fluoranthene (max of 3.5 mg/kg), and chrysene (max of 4.2 mg/kg) were detected above the PGWSCOs. Two (2) SVOCs, benzo(a)pyrene (max of 4.1 mg/kg) and the dibenzo(a,h)anthracene (max of 0.9 mg/kg) were detected above the CUSCO.

The metal arsenic (max of 43 mg/kg) was detected in one sample above the PGWSCO and CUSCO. The metal mercury (max of 0.9 mg/kg) was detected in one sample above the PGWSCO.

Perfluoroalkyl Substances

The per-, and polyfluoroalkyl substance (PFAS), perfluorooctanesulfonic acid (PFOS) was detected above the PGWSCO with a maximum concentration of 0.0096 mg/kg.

A spider diagram of soil chemistry exceedances is included as **Figure 3**.

Groundwater Chemistry

VOCs

Five (5) CVOCs, cis-1,2-dichloroethylbenzene (max of 60 micrograms/liter [ug/L]), methylene chloride (max of 40 ug/L), TCE (max of 65 ug/L), PCE (max of 570 ug/L), and vinyl chloride (max of 300 ug/L) were reported at concentrations exceeding their applicable AWQS.

Two (2) petroleum VOCs, naphthalene (max of 14 ug/L) and xylenes (max of 6 ug/L) were reported at concentrations exceeding their applicable AWQS.

Metals

Two (2) metals, lead (max of 28 ug/L) and selenium (max of 68 ug/L) were reported at concentrations exceeding their applicable AWQS.

PFAS

Two PFAS, PFOS (max of 0.605 ug/L) and perfluorooctanoic acid [PFOA] (max of 0.063 ug/L) were reported at concentrations exceeding their applicable AWQS.

A spider diagram showing the groundwater exceedances is included as **Figure 4**.

Soil Vapor Chemistry

Two (2) soil vapor samples, two (2) indoor air samples, and one (1) outdoor air sample were collected and evaluated. Soil vapor samples showed elevated detections of the CVOCs cis-1,2-dichloroethylene (max of 1,500 micrograms per cubic meter [ug/m^3]), PCE (max of 32,000 ug/m^3), TCE (max of 190,000 ug/m^3), and vinyl chloride (max of 9.0 ug/m^3). Indoor air/outdoor showed elevated detections of the CVOCs PCE (max of 4.9 ug/m^3) and TCE (max of 13 ug/m^3).

A spider diagram showing the soil vapor concentrations is included as **Figure 5**.

4.0 REMEDIAL INVESTIGATION

The proposed Remedial Investigation (RI) field program will focus on collecting additional soil, groundwater, and soil gas data to delineate and characterize the property. The scope of the RI will include the collection of sufficient Site investigation data so that the entire Site will be sufficiently characterized to support the development of the Site-wide Remedial Action Work Plan (RAWP).

To accomplish this, the scope of work for the RI will include the following:

- The advancement of soil borings, collection of soil samples, installation of permanent groundwater monitoring wells, collection of groundwater samples from new monitoring wells, installation of soil vapor points, and sampling of new soil vapor points;
- The collection of soil, groundwater, and soil vapor sufficient to define the nature and extent of impacted media and current Site conditions and offsite groundwater and/or soil vapor migration potential;
- The collection of a synoptic round of groundwater level measurements and the collection of additional land survey data as needed for developing a groundwater elevation contour map;
- Investigate the existing floor drain and sewer lines using a sewer line inspection camera to identify locations of the drains and if any cracking exists;
- A tidal influence study using groundwater piezometers in the new and existing groundwater monitoring wells to measure tidal influence on groundwater elevations; and
- The performance of a Qualitative Human Health Exposure Assessment (QHHEA) to identify existing and potential exposure pathways and evaluate contaminant fate and transport.

The proposed scope of work includes:

<u>Soil</u>

- Advancement of 11 soil borings (designated SB-01 through SB-11) to a maximum depth of 20 ft bgs.
- Collection and laboratory analyses of two soil samples from each boring for a total of 22 soil samples. One from the upper fill layer (approximately 0-2 ft bgs) and one directly above the groundwater interface (approximately 7 to 9 ft bgs), or in the area of highest impacts based on visual/olfactory senses and/or photoionization detector readings above the groundwater table.
- Collection of vertical delineation soil samples for VOC analysis only.

<u>Groundwater</u>

- Two of the 20-foot borings will be converted to permanent monitoring wells. The five (5) additional soil borings will be drilled down to a maximum depth of approximately 30 ft bgs and converted to permanent monitoring wells. Groundwater monitoring wells will be installed at varying intervals as described in **Section 4.3**.
- Gauging and development of the permanent monitoring wells.
- Collection and laboratory analyses of six (6) groundwater samples for full suite analysis from the existing on-site shallow wells (MW-1-S through MW-4-S) and two newly installed shallow wells (MW-7-S and MW-8-S), and five (5) groundwater samples for VOC analysis only from the deep groundwater wells (MW-1-D, MW-3-D, MW-4-D, MW-7-D, and MW-8-D).
- Elevation survey of all well locations.
- Groundwater tidal influence study.

Soil Vapor Investigation

- Advancement of three (3) sub-slab soil vapor points.
- Collection and laboratory analyses of three soil vapor samples (SV-01 through SV-03).
- Collection and laboratory analyses of three indoor ambient air samples co-located with the soil vapor samples (IA-01 through IA-03) and one outdoor ambient air sample (OA-01).

The remedial investigation will be conducted in accordance with the applicable requirements of the DER-10. The data will be produced in accordance with the New York State Department of Health (NYSDOH) Analytical Services Protocol (ASP) Category B deliverables and will be reviewed and validated by an independent data validator. The data validator will prepare a Data Usability Summary Report (DUSR) before data is incorporated into the RIR for the Site. All data will be submitted to NYSDEC in electronic format, in accordance with DER-10.

The sample summary and rationale are provided in **Table 1**. The proposed sample locations are shown on **Figure 6**. The following sections describe the methods, rationale, and proposed sampling schedule for the soil investigation activities summarized above. Sampling will be performed in accordance with the QAPP/FSP presented in **Appendix A**.

4.1 UTILITY CLEARANCE AND FLOOR DRAIN INVESTIGATION

A geophysical survey will be completed across the entire Site to scan the shallow subsurface for the presence of anomalies (e.g., underground storage tanks and associated piping, utilities, and foundation slabs). The geophysical survey will include one or more of the following techniques to assist in detecting subsurface anomalies: Ground Penetrating Radar (GPR), electromagnetic surveys and/or subsurface utility surveys. Anomalies detected by the geophysical survey will be marked with spray paint and/or flags. A written geophysical survey report and figure will be appended to the Remedial Investigation Report (RIR).

Additionally, a mark-out of underground utility lines will be performed prior to the start of fieldwork by calling the New York City One-Call Center. A utility mark-out verification reference number for the Site will be obtained and a record of the utilities will be kept (e.g., Con Ed, Cablevision, etc.).

The floor drain and associated piping will be investigated throughout the Site. The Site contains three floor drains that reportedly leads to a sewer cleanout in the western extent of the Site. GZA will retain a contractor to investigate the floor drains and piping with a camera snake to confirm the origin and ending of the pipe and identify if there are any leaks/cracks that may have potentially resulted in historic environmental releases to the subsurface. The findings of the floor drain investigation will be reported in the RIR.

4.2 SOIL INVESTIGATION

As shown on **Figure 6**, GZA proposes to advance 11 soil borings (designated as SB-01 to SB-11) across the property. The borings will be performed under field observation of a GZA engineer or geologist. Soil samples will be obtained with a 5-foot steel MacroCore™ sampler using disposable acetate liners. The MacroCore™ sampler will be advanced through the subsurface to collect representative soil samples down to a maximum of 20 ft bgs or the confining clay layer, whichever is shallower.

As previously noted, the BCP RIR for 12 Franklin Street (the adjacent site to the north) reports the confining clay layer as 7.5 to 15.5 ft bgs. If deep monitoring wells are necessary based on the field observations, contingency soil borings, SB-07, and SB-08, will be drilled to approximately 60 ft bgs, or the deep confining layer (See **Section 4.3**). These borings will be drilled to the deep confining clay layer depth or bedrock, whichever is shallower. If refusal is encountered in a soil boring due to subsurface obstructions (e.g., boulders, construction, and fill debris) above the target depth, the drillers will attempt up to two off-set locations for each boring location. An example soil boring log is included in **Appendix F**.

GZA's drilling contractor will collect soil samples continuously from grade to the target depth and GZA will observe/document the soil samples for staining and soil characteristics. GZA will screen the soil samples for total organic vapors with a hand-held, photoionization detector (PID) with an 11.7 eV bulb (capable of detecting CVOCs) and record lithological descriptions of the soil and field screening results on the soil boring logs. GZA's visual inspection will also document for evidence of contamination including staining and/or odors.

The GZA field representative will retain selected samples for laboratory analyses from the soil samples that indicate the comparatively highest impacts based on visual, olfactory, and PID screening results, and/or based on our evaluation of relevant Site features and conditions. GZA will collect two (2) soil samples set per boring totaling 22 soil sample sets. Discrete samples will be collected with an EnCore® sampler (or similar) in compliance with EPA Method 5035 from the 6-inch interval with the highest visual, olfactory and PID evidence of environmental impacts. Composite samples will be collected in the shallow fill layer (approximately 0 to 2 ft bgs) and directly above the groundwater table interface (approximately 7 to 9 ft bgs). The soil samples will be analyzed as follows:

- Target compound list (TCL) VOCs by EPA Method 8260 with TICs (discrete);
- TCL SVOC by EPA Method 8270 with TICs, including 1,4 Dioxane;
- Target analyte list (TAL) Metals by EPA Method 6010C / 7471B, including hexavalent chromium and total cyanide;
- TCL Pesticides by EPA Method 8081;
- Herbicides by EPA Method 8151;
- Polychlorinated Biphenyls (PCBs) by EPA Method 8082A; and
- Per- and Polyfluoroalkyl Substances (PFAS) by EPA Method 1633.

GZA will collect an additional discrete sample for VOCs by EPA Method 8260 only, at the discretion of the GZA field representative, if elevated PID readings or staining/heavy odors are encountered beneath the groundwater table. GZA's field personnel will collect at least one additional discrete sample from SB-03, SB-06, SB-07, SB-08, and SB-11 to vertically delineate VOC impacts in soil from the historical environmental data. It is assumed that up to one additional sample will be collected per soil boring, for a maximum of 11 vertical delineation samples. If no impacts are encountered beneath the groundwater table, then no additional samples will be collected from the other six soil borings.

Each sample set will be labeled, sealed, and placed in a cooler for shipment under standard chain-of-custody protocol to a NYSDOH Environmental Laboratory Approval Program (ELAP)-laboratory.

4.3 GROUNDWATER INVESTIGATION

During this investigation, four (4) existing monitoring wells (MW-1-S, MW-2-S, MW-3-S, MW-4-S) will be used to collect groundwater samples. The existing monitoring wells were installed by Laurel during the May 2022 Remedial Investigation. Note, these original wells were installed with names MW-1, MW-2, MW-3, MW-4. The Laurel well construction logs are included as **Appendix E**. Seven additional monitoring wells (MW-1-D, MW-3-D, MW-4-D, MW-7-S/D, and MW-8-S/D) will be installed at the locations shown on **Figure 6**. The permanent monitoring wells will be installed at varying intervals (denoted as 'S'- Shallow and 'D' - deep). The newly installed shallow monitoring wells will be screened at approximately 5 to 15 ft bgs. The newly installed deep monitoring wells will be screened at approximately 20 to 30 ft bgs. However, the screened interval may be field adjusted to begin just below the observed depth of the clay layer (if encountered). If no confining clay layer is encountered, the deep wells will be screened from 20 to 30 ft bgs. Each well will consist of a 2-inch diameter PVC riser and at least 10 feet long of 0.02-inch slotted 2-inch diameter PVC screen (if silty clay or clay is observed, then 0.01-inch slot screen may be utilized) with the shallow screened interval designed to span across the water table to detect petroleum sheens or light non-aqueous phase liquids (LNAPL). A 2-foot bentonite plug will be placed above the filter pack. The remaining annular space will be filled with bentonite. The wells will be completed with a flush-mount manhole and locking cap. An example of a monitoring well construction log is provided in **Appendix F**. The monitoring wells will be developed (i.e., the wells will be allowed to equilibrate for at least seven days prior to sampling) in accordance with applicable methods outlined in the QAPP/FSP presented in **Appendix A**. The monitoring well schedule is shown in the table below:

Well ID	Screened Interval (ft bgs)	Proposed/Existing	Full-Suite Analysis/VOC Analysis
MW-1-S	5-20	Existing	Full-Suite
MW-1-D	20-30*	Proposed	VOCs
MW-2-S	5-20	Existing	Full-Suite
MW-3-S	5-20	Existing	Full-Suite
MW-3-D	20-30*	Proposed	VOCs
MW-4-S	5-20	Existing	Full-Suite
MW-4-D	20-30*	Proposed	VOCs
MW-5	5-20	Existing	Not Analyzed – Off-Site well
MW-6	5-20	Existing	Not Analyzed – Off-Site well
MW-7-S	5-15*	Proposed	Full-Suite
MW-7-D	20-30*	Proposed	VOCs
MW-8-S	5-15*	Proposed	Full-Suite
MW-8-D	20-30*	Proposed	VOCs

Table Notes:
Well ID: 'S' – shallow screen; = 'D' – deep screen
Ft bgs: feet below ground surface
*: Screened interval may be adjusted based on field observations

If contamination is encountered above the shallow clay layer, through either elevated PID readings, stained soil, or visible sheen in the groundwater, then a steel casing will be installed through the clay layer with the deep well screened below the steel casing. This protective measure will be taken to prevent creating a preferential pathway of contamination from the upper sand layer to a deeper lithologic section. If no elevated field screening evidence of contamination is encountered above the clay layer, the deep well will be installed without steel casing.

Well Development

Following installation, the seven new groundwater monitoring wells will be developed using a submersible pump (or equivalent) until the water is reasonably free of turbidity and field readings (pH, conductivity, temperature, and dissolved oxygen) sufficiently stabilize. In addition, the four existing on-site shallow wells will be similarly redeveloped prior to sampling. GZA will develop to 50 nephelometric turbidity units (NTUs) or less as the turbidity goal, but this will not be an absolute value. The monitoring wells will be developed aggressively to remove fines from the formation and sand pack. The wells will be allowed to equilibrate for seven days prior to sampling. The volume of water removed, the well development time, and field instrument readings will be recorded in the logbook.

Groundwater Sampling

At least seven (7) days after the groundwater monitoring wells are installed and developed, groundwater samples will be collected from the monitoring wells by peristaltic pump and with dedicated high-density polyethylene (HDPE) tubing via United States Environmental Protection Agency (USEPA) low-flow sampling methodology. Prior to sample collection, a minimum of three well screen volumes will be purged from each well point with the pump intake placed at the approximate midpoint of the screened interval. At the ground surface, the water will pass through a sealed flow through cell containing probes which will measure the water temperature, pH, specific conductivity, turbidity, oxidation-reduction potential (ORP), and dissolved oxygen (DO). One groundwater sample will be collected after the water quality parameters have stabilized and turbidity is less than 10 Nephelometric Turbidity Units (NTUs). If less than 10 NTUs cannot be reasonably achieved, samples will be collected at less than 50 NTUs. Stabilization is defined by three successive readings that are within ± 0.1 for pH, ± 3% for conductivity, ± 10 mv for ORP, and ± 10% for turbidity and DO. GZA will field filter all groundwater samples (e.g., metals analyses) if the turbidity measurement is greater than 50 NTU following the purging of three well screen volumes. An example well purge log is provided in **Appendix F**.

The full-suite groundwater samples will be analyzed for the following parameters:

- TCL VOCs with TICs by EPA Method 8260;
- TCL SVOC with TICs by EPA Method 8270 including 1-4 Dioxane by EPA Method 8270 SIM;
- Total and dissolved TAL Metals by EPA Method 6010C / 7471B, cyanide by EPA method 9010/9012, and hexavalent chromium;
- Pesticides by EPA Method 8081;
- PCBs by EPA Method 8082A;
- Herbicides by EPA method 8151; and
- PFAS by EPA Method 1633

One trip blank sample will accompany the groundwater sample (at a frequency of one per day of sampling with a sample submitted to the laboratory for TCL VOC analysis) and will be analyzed for TCL VOCs.

Groundwater Tidal Study

GZA will conduct a tidal study of the existing and proposed shallow groundwater monitoring wells (except MW-5 and MW-6) as part of the Remedial Investigation. MW-5-S and MW-6-S will not be utilized as part of the tidal study investigation as these are in a public right-of-way. GZA will utilize piezometers in the six shallow groundwater monitoring wells to log groundwater elevation data for one week (7 days). The piezometer will have the capacity to collect groundwater elevation data every 10-minutes over the week of study. This data will be used to establish an understanding of the tidal influence on groundwater elevations and identify if tidal influence effects the direction of groundwater flow. GZA will also collect a round of groundwater depth measurement data, using an oil/water interface probe, after all the piezometers have been installed and prior to removing the piezometers at the end of the study. The piezometric data and the weather data (rain fall, temperature, barometric pressure) collected during the tidal influence study will be presented in the RIR. GZA proposes to conduct the groundwater tidal study beginning three days after groundwater sampling.

4.4 SOIL VAPOR AND OUTDOOR AIR SAMPLING

As shown on **Figure 6**, GZA proposes to install three sub-slab soil vapor probes (designated as SV-01 to SV-03) to 6-inches below the existing slab. GZA will collect each of the soil vapor samples using methods consistent with the NYSDOH Guidance for Evaluating Soil Vapor Intrusion, dated October 2006 (as amended). Soil vapor samples will be collected using a stainless-steel probe, consisting of a drive point and internal perforated sampling port with a retractable tip, connected to an HDPE sampling tube. GZA proposes to collect soil vapor samples in 6-liter Summa® canisters equipped with 8-hour flow regulators. The soil vapor samples will be submitted to a NYSDOH ELAP-accredited laboratory. The soil vapor samples will be submitted for TCL VOCs analysis via EPA Method TO-15. The analytical results will be compared to 8-hour exposure standards (Commercial) and NYSDOH-specified guidance values. Following soil vapor sample collection, the soil vapor sampling point materials will be removed from the ground. An example soil vapor sampling log is included in **Appendix F**.

GZA will also collect three co-located indoor air samples (designated as IA-01 to IA-03) at the same locations as the sub-slab soil vapor samples, as shown on **Figure 6**. One (1) outdoor ambient air sample will be collected. GZA will collect ambient indoor and outdoor samples in 6-liter Summa® canisters equipped with 8-hour flow regulators. The ambient air samples will be submitted to a NYSDOH ELAP-accredited laboratory for TCL VOC analysis via EPA Method TO-15.

4.5 GREEN AND SUSTAINABLE REMEDIATION (GSR) PRACTICES

According to NYSDEC DER-31 Green Remediation guidance document, green Remediation approaches should be considered during site remediation. GZA and its subcontractors will incorporate sustainability practices to reduce the environmental footprint of the investigation and cleanup. In accordance with ASTM E2893-16e1 the project GSR goals include the following:

- To minimize total energy use and maximize use of renewable energy,
- To minimize air pollutants and greenhouse gas emissions,
- To minimize water, use and impact to water resources,
- To reduce, reuse and recycle materials and waste; and
- To protect land and ecosystems

GZA will incorporate best management practices to lower our environmental footprint during the investigation and remediation phase of the project. GZA will incorporate the following practicable measures during the planned scope of work:

1. Limit the use of generators, excavation equipment, and vehicles to reduce emissions.
2. Minimize truck travel for disposal of waste generated by selecting local disposal facilities, where possible.
3. Manage onsite resources and materials efficiently.
4. Use local subcontractors during to minimize vehicle emissions during commute.
5. Request IRM implementation subcontractors to use clean diesel equipment to reduce emissions.
6. Request project staff and subcontractors to use public transportation during RI implementation to the extent practicable.
7. Reducing waste, increasing recycling, and increasing reuse of materials that otherwise be considered waste.

As required a Climate screen checklist and an environmental footprint analysis has been completed for the project and are attached in **Appendix G**.

4.6 QUALITY ASSURANCE /QUALITY CONTROL

As part of the field investigation, GZA will also collect Quality Assurance/Quality Control (QA/QC) samples in accordance with the QAPP, presented in **Appendix A**, to confirm the usability of the data. QA/QC samples include equipment rinsate/field blanks, trip blanks, sample duplicates and matrix spike/matrix spike duplicates (MS/MSDs).

When applicable, the sample result summary tables will list the laboratory method detection limit (MDL) at which a compound was non-detectable. The laboratory results will be reported to the sample-specific practical quantitation limit (PQL), equal to the sample-specific MDL, supported by the instrument calibrations. The reliability of laboratory data is supported by compliance with sample holding times and laboratory MDLs below cleanup criteria. Accuracy and precision of the laboratory analytical methods will be maintained using calibration and calibration verification procedures, laboratory control samples, and surrogate, matrix, and analytical spikes.

4.7 DATA MANAGEMENT AND VALIDATION

GZA will coordinate with the laboratory to prepare the laboratory analytical reports in accordance with NYSDEC ASP Category B data deliverables, which include:

- Sample Delivery Group Narrative;
- Contract Lab Sample Information sheets;
- NYSDEC Data Package Summary Forms;
- Chain-of-custody forms; and,
- Test analyses results (including TICs for analysis of VOCs and SVOCs).

Plus, related QA/QC information and documentation consisting of:

- Calibration standards;
- Surrogate recoveries;
- Blank results;
- Spike recoveries
- Duplicate results;
- Confirmation (lab check/QC) samples;
- Internal standard area and retention time summary;
- Chromatograms;
- Raw data files; and
- Other specific information as described in the most current NYSDEC ASP

GZA will coordinate with the laboratory to prepare the results in Electronic Data Deliverables (EDDs) format compatible with EQuIS that can be uploaded into an EQuIS database for storage and development of tables or output to other data analysis tools and GIS as needed. GZA will have a third-party data validator evaluate the data package for inclusion into a DUSR that will subsequently be prepared to document the usability of the data. Additional details regarding QA/QC and data management and validation are included in **Appendix A – QAPP/FSP**.

4.8 CHAIN OF CUSTODY AND SHIPPING

A chain-of-custody form will trace the path of sample containers from the Site to the laboratory. The project manager will notify the laboratory of upcoming field sampling events and the subsequent transfer of samples. This notification will include information concerning the number and type of samples, and the anticipated date of arrival. Insulated sample shipping containers (typically coolers) will be provided by the laboratory for shipping samples. All sample bottles within each shipping container will be individually labeled with an adhesive identification label provided by the laboratory. Project personnel receiving the sample containers from the laboratory will check each cooler for the condition and integrity of the bottles prior to field work.

The field sampler will indicate the sample designation/location number in the space provided on the chain-of-custody form for each sample. The chain of custody forms will be signed and placed in a sealed plastic Ziploc bag in the cooler. If sent via third party carrier, the shipping container will be closed for transport with nylon strapping, or a similar shipping tape, and a paper custody seals will be affixed to the lid. The seals must be broken to open the cooler and will indicate tampering if the seals are broken before receipt at the laboratory. A label may be affixed identifying the cooler as containing "Environmental Samples" and the cooler will be shipped via courier or by an overnight delivery service to the laboratory. When the laboratory receives the coolers, the custody seals will be checked, and lab personnel will sign the chain-of-custody form.

The following typical Chain-Of-Custody procedures will be implemented by GZA during the soil sampling:

A. The samples are under custody of the GZA field personnel, if:
   1. they are in his/her possession,
   2. they are in view after being in possession,
   3. they are locked up or sealed securely to prevent tampering, or
   4. they are in a designated secure area.

B. The original of the chain-of-custody form must accompany the samples at all times after collection, until receipt at the analytical laboratory. A copy of the chain-of-custody form will be kept by the sample collector until it is filed in the project file.

C. When the possession of samples is transferred, the individuals relinquishing and receiving the samples will sign, date, and note the time on the Chain-Of-Custody form.

D. When samples are shipped, the GZA personnel, or designated representative, will note the courier's name, and air bill number, if applicable, on the Chain-Of-Custody form. Prior to shipping, coolers will be secured with signed custody seals so the laboratory may confirm coolers were not opened during shipping.

The chain-of-custody form will contain information to distinguish each sample from any other sample. This information will include:

A. The project name and address for which sampling is being conducted;
B. The name(s) and signature(s) of sampler(s);
C. The matrix being sampled (groundwater, soil, etc.);
D. The sampling date and time;
E. The specific sampling location in sufficient detail to allow re-sampling at the same location;
F. The number of containers and the volume of sample collected, and
G. The analytical method to be performed.

4.9 STORAGE AND DISPOSAL OF INVESTIGATION-DERIVED WASTE

Investigation derived waste (IDW) generated during the RI will be containerized and properly characterized and disposed of. Containers, which are USDOT approved storage containers (55-gallon drums) or a small bulk roll-off container, will be properly labeled and grouped by environmental matrix (soil, water, PPE/plastic, etc.). All drums or roll-offs will be staged in a central location on-Site prior to off-Site disposal.

If drums are used, they will be tracked as they are filled and given unique identification codes based on the following:

- A prefix indicating the drum's contents: i.e., S – Soil, W – Water, P – PPE/Plastic, and C&D – Construction Debris.
- Following the prefix and a hyphen will be the origin of the drum's contents. For example, drum SB-1, SB-2, SB-3 is a generated drum filled with soil from soil boring locations SB-1, SB-2, and SB-3; drum MW-1-S is water generated from monitoring well MW-1-S.
- As drums are generated, their identification code, date of generation, contents, source (i.e., drill cuttings from location x, purge water from well y), and date sampled will be entered on a tracking table.

The drums will be centrally stored on-Site. Subsequently, the waste soils and/or water will be characterized with laboratory analyses for proper disposal.

5.0 QUALITATIVE HUMAN HEALTH EXPOSURE ASSESSMENT

A QHHEA will be performed following the collection of all RI data. The Exposure Assessment (EA) will be performed in accordance with Section 3.3(c)4 of DER-10 and the NYSDOH guidance for performing a qualitative EA (DER-10; Appendix 3B). The QHHEA will characterize the exposure setting, identify potentially complete exposure pathways, and qualitatively evaluate potential fate and transport of constituents from one medium to another (i.e., soil-to-air or soil-to-groundwater).

An exposure pathway is considered complete when the following five conditions are met:

1. Source identified (i.e., metals in paint on exterior building surfaces);
2. Release and transport mechanism from source to environmental media (i.e., into the subsurface or volatilization to the air of an overlying building);
3. Point of human exposure (i.e., an occupied building or surface soil);
4. A route of exposure (ingestion, dermal contact, or inhalation), and
5. A receptor population (i.e., on-Site workers).

Once potentially complete exposure pathways are identified, the QHHEA will characterize Site conditions to determine whether the Site poses an existing or potential future hazard to the potentially exposed population. The evaluation will include a qualitative discussion of potential fate and transport mechanisms at the Site. The results of the QHHEA will be included as part of the RIR.

According to Section 3.10 of DER-10, and the Fish and Wildlife Resources Impact Analysis Decision Key in DER-10 Appendix 3C, a Fish and Wildlife exposure assessment will be performed (if needed) based on the results of the RI.

6.0 HEALTH AND SAFETY

The work outlined above will be completed under a GZA Site-specific Health and Safety Plan (HASP)**,** attached as **Appendix B** in accordance with OSHA Hazardous Waste Operations and Emergency Response (HAZWOPER) regulations. A PID will be used to monitor the breathing zone of workers performing investigative activities in areas where there is a potential for the presence of organic vapors (i.e., groundwater and soil vapor sampling). A dust meter will also be used to screen for dust in the breathing zone that has the potential presence of metal contamination. GZA anticipates the work will be completed in Modified Level D personal protective equipment (PPE); however, workers will be prepared to elevate to more protective PPE based on the conditions encountered during field activities.

6.1 PROJECT KICKOFF AND UTILITY CLEARANCE

A project kick-off meeting will be held prior to initiating field work to orient field team members and subcontractors with the Site background, scope of work, potential hazards, health and safety requirements, emergency contingencies and other field procedures.

Prior to performing any subsurface work, a utility clearance survey will be performed in accordance with New York State Dig-Safe protocol. Sample locations will be screened using surface geophysical techniques such as electromagnetic (EM), ground penetrating radar (GPR) and/or radiofrequency (RF) techniques.

6.2 COMMUNITY AIR MONITORING PLAN (CAMP)

Real-time air monitoring for VOCs and particulate levels at the perimeter of the exclusion zone or work area will be performed in accordance with the CAMP (see **Appendix C**).

Continuous air monitoring will be required during ground intrusive activities and other activities where equipment is disturbing the ground surface. Ground intrusive activities include, but are not limited to, soil/fill excavation and handling, test pitting or trenching, grading of existing Site soils and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. Periodic monitoring during sample collection would generally consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well bailing/purging, and taking a reading prior to leaving a sample location.

VOC Monitoring, Response Levels, and Actions

VOCs will be monitored at the Site perimeter on a continuous basis during earthwork activities unless otherwise specified in the CAMP. Upwind concentrations will be measured at the start of each workday and periodically thereafter to establish background conditions, particularly if wind direction changes. The VOC monitoring work will be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment will be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment will be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

1. If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities will be

temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities will resume with continued monitoring.

2. If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities will be halted, the source of vapors will be identified, corrective actions will be taken to abate emissions, and monitoring will be continued. After these steps, work activities will resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet - is below 5 ppm over background for the 15-minute average.

3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities will be shut down until the source of the problem is identified and corrective action is taken to reduce organic vapor levels.

4. Fifteen-minute readings will be recorded and be available for State (NYSDEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes will also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations will be monitored at the Site perimeter and in work zones on a continuous basis during earthwork. The particulate monitoring will be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment will be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration will be visually assessed during all work activities. Visible dust from the work area will trigger the initiation of dust suppression procedures. Dust suppression equipment will be on Site, functional and available at the work zone prior to commencing work.

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques will be employed. Work will continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m3 above the upwind level and provided that no visible dust is migrating from the work area.

2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m3 above the upwind level, work will be stopped, and a re-evaluation of activities initiated. Work will resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m3 of the upwind level and in preventing visible dust migration.

3. Readings will be recorded and be available for State (NYSDEC and NYSDOH) and County Health personnel to review.

7.0 REPORTING

During the duration of the Remedial Investigation activities, daily and monthly field reports will be completed and submitted to the NYSDEC. Upon completion of the field activities, a Remedial Investigation Report (RIR) will be prepared to document the findings of the investigations performed at the Site and the proposed remedy. The RIR will be consistent with the specifications presented in the DER-10 document and will include:

- An executive summary;
- A Site description and history;
- Summary information regarding previous investigations and remedial work performed at the Site;
- Descriptions of field activities performed;
- A summary of pertinent field observations, field measurements, and laboratory analytical data summarized in tabular format - analytical results will be compared to appropriate NYSDEC guidance and standards;
- Spider diagrams for analytical results showing exceedances and comparisons to applicable standards;
- Plan view and cross-section figures presenting laboratory analytical data and field observations of surface and subsurface soil and groundwater impacts. A minimum of two profiles will be developed, one perpendicular to and one parallel with groundwater flow direction at the Site;
- A qualitative human health risk assessment which assesses the sources of impact, on and off-Site human and ecological receptors, and exposure pathways;
- A data usability review and DUSRs for the laboratory data collected during the RI;
- An integration of field observations and measurements with laboratory analytical data to evaluate the nature and extent of impacts and to develop a site conceptual model of potential contaminant migration;
- A set of conclusions for the investigation; and
- Recommendations

Data collected during the RI will be submitted in the Department's Environmental Information Management System (EIMS) format for Electronic Data Delivery (EDD).

8.0 PROJECT SCHEDULE AND PROJECT PERSONNEL

Our anticipated schedule to perform the investigation activities described in the Gantt chart on the following page:

BROWNFIELD CLEANUP PROGRAM

9 North 15th Street, Brooklyn

Project Milestones	Start	End	2024		2025												2026											
			Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
BCP Application and RIWP Submission to NYSDEC	11/10/2024	12/10/2024																										
NYSDEC BCP Application Review and Determination of Completeness	12/10/24	1/10/2025																										
Revisions to BCP Application and RIWP	12/10/2024	1/10/2025																										
CPP Submission and Review	1/10/2025	2/10/2025																										
30-Day Public Comment for BCP Application	1/10/2025	2/10/2025																										
NYSDEC and NYSDOH Review of RIWP and Submission of Revisions	2/1/2025	3/1/2025																										
BCA Execution	2/15/2025	3/1/2025																										
RIWP Implementation	3/15/2025	4/15/2025																										
RIR Preparation	6/1/2025	7/1/2025																										
RAWP Preparation	7/1/2025	8/30/2025																										
NYSDEC and NYSDOH Review of RIR and RAWP, Submission of Revisions and 45-Day Comment Period	9/1/2025	11/30/2025																										
Approval of the RIR and RAWP, Issuance of Decision Document	12/1/2025	1/1/2026																										
Pre-construction Meeting with NYSDEC	1/1/2026	1/15/2026																										
RAWP Implementation, Documentation of Engineering Controls	1/15/2026	6/15/2026																										
Preparation of FER and SMP	6/15/2026	9/15/2026																										
NYSDEC Review of FER and SMP	10/1/2026	11/30/2026																										
Issuance of COC	12/16/2026	12/16/2026																										

* The chart above presents a schedule for the proposed BCP Project Implementation and Reporting. If the schedule for remediation and development activities changes, it will be updated and submitted to NYSDEC, as necessary.

We note that the proposed schedule may be adjusted if unforeseen delays occur due to inclement weather, Department of Transportation (DOT) permit approval, drill rig availability or other conditions that are beyond GZA's control.

The following GZA project personnel are proposed to be involved as part of the remedial investigation activities. Qualifications of personnel are provided in **Appendix H**. Drilling and laboratory subcontractors have not yet been retained.

Personnel	**Role**	**Contact Information**
Victoria D. Whelan, P.G.	Qualified Environmental Professional / Vice President	631-793-8821
Stephen M. Kline, P.E.	Consultant Reviewer	347-242-7109
Jackson Bogach, P.E.	Project Manager	332-215-6349
Mark Frey	Field Geologist	347-213-8324

TABLES

Sample Name	Location	Sample / Boring Termination Depth (feet below ground level)	Approximate Number of Samples	Rationale for Sampling	Laboratory Analysis
Soil					**Analyses**
SB-01	Approximately 20 feet east and 10 feet south of the northwest property corner, on the western portion of the Site, at the location of existing MW-01	30	2 - Full Suite 1 - Discrete	To characterize soil conditions and delineate extent and depths of contamination underneath the building structure	SB-01 (0-2 ft bgs) - Full Suite; SB-01 (6-8 ft bgs) - Full Suite; SB-01 (30 ft) - Discrete
SB-02	Approximately 50 feet east and 15 feet north of the northwest property corner, at the location of existing MW-02	20	2 - Full Suite 1 - Discrete		SB-02 (0-2 ft bgs) - Full Suite; SB-02 (6-8 ft bgs) - Full Suite; SB-02 (20 ft) - Discrete
SB-03	Approximately 75 feet east and 10 feet south from the northwest property corner, at the location of existing MW-03	30	2 - Full Suite 1 - Discrete		SB-03 (0-2 ft bgs) - Full Suite; SB-03 (6-8 ft bgs) - Full Suite; SB-03 (20 ft) - Discrete
SB-04	Approximately 85 feet east and 20 feet north from the northwest property corner, at the location of existing MW-04	30	2 - Full Suite 1 - Discrete		SB-04 (0-2 ft bgs) - Full Suite; SB-04 (6-8 ft bgs) - Full Suite; SB-04 (30 ft) - Discrete
SB-05	Approximately 30 feet east and 25 feet south from the northwest property corner	20	2 - Full Suite 1 - Discrete		SB-05 (0-2 ft bgs) - Full Suite; SB-05 (6-8 ft bgs) - Full Suite; SB-05 (20 ft) - Discrete
SB-06	Approximately 45 feet west and 7 feet north from the southeast property corner	20	2 - Full Suite 1 - Discrete		SB-06 (0-2 ft bgs) - Full Suite; SB-06 (6-8 ft bgs) - Full Suite; SB-06 (20 ft) - Discrete
SB-07	Approximately 35 feet west and 35 feet north of the southeast property corner	30	2 - Full Suite 1 - Discrete		SB-07 (0-2 ft bgs) - Full Suite; SB-07 (6-8 ft bgs) - Full Suite; SB-07 (20 ft) - Discrete
SB-08	Approximately 75 feet east from the northwest property corner	30	2 - Full Suite 1 - Discrete		SB-08 (0-2 ft bgs) - Full Suite; SB-08 (6-8 ft bgs) - Full Suite; SB-08 (20 ft) - Discrete
SB-09	Approximately 105 feet east and 5 feet south from the northwest property corner	20	2 - Full Suite 1 - Discrete		SB-09 (0-2 ft bgs) - Full Suite; SB-09 (6-8 ft bgs) - Full Suite; SB-09 (20 ft) - Discrete
SB-10	Approximately 20 feet west and 4 feet south from the southeast property corner	20	2 - Full Suite 1 - Discrete		SB-10 (0-2 ft bgs) - Full Suite; SB-10 (6-8 ft bgs) - Full Suite; SB-10 (20 ft) - Discrete
SB-11	Approximately 25 feet west and 20 feet north from the southeast property corner	20	2 - Full Suite 1 - Discrete		SB-11 (0-2 ft bgs) - Full Suite; SB-11 (6-8 ft bgs) - Full Suite; SB-11 (20 ft) - Discrete

Soil Analysis Description

Full Suite : TCL VOCs + TICs, including 1-4 Dioxane (EPA Method SW 846 8260, isotope dilution for 1-4 Dioxane), TCL SVOCs + TICs (EPA Method 8270), TAL metals (EPA Methods SW 846 6010/6020/7470) + cyanide (EPA Method SW 846 9010/9012) and hexavalent chromium, pesticides/herbicides/PCBs (EPA Methods SW 846 8081/8151/8082), Per- and polyfluoroalkyl substances (EPA Method 1633)

Discrete : TCL VOCs + TICs (EPA Method SW 846 8260)

Notes:
ft bgs = feet below ground surface
TCL = Target Compound List
TAL = Target Analyte List
VOCs + TICs = volatile organic compounds plus tentatively identified compounds
SVOCs + TICs = semi-volatile organic compounds plus tentatively identified compounds
PCBs = polychlorinated biphenyls
PFAS = per and polyfluoroalkyl substances

Table1 - Sample Summary and Rationale
Remedial Investigation Work Plan
9 N. 15th Street Site
9 North 15th Street
Brooklyn, New York

Sample Name	Location	Sample / Boring Termination Depth	Approximate Number of Samples	Rationale for Sampling	Laboratory Analysis
Soil Vapor					**Analysis**
SV-01	Center of existing building, on western side	6-inches below slab	1	To characterize the soil vapor and delineate the extent of impacts	EPA Method TO-15 for VOCs
SV-02	Center of existing building	6-inches below slab	1		
SV-03	Center of existing building, on eastern side	6-inches below slab	1		
Sample Name	**Location**	**Sample / Boring Termination Depth (feet above ground surface)**	**Approximate Number of Samples**	**Rationale for Sampling**	**Laboratory Analysis**
Ambient Air/Indoor Air					**Analysis**
IA-01	Center of existing building, on western side - Co-located with SV-01	4	1	To characterize the concentration of VOCs in ambient air at co-locations of the soil vapor samples and outside of the building extent	EPA Method TO-15 for VOCs
IA-02	Center of existing building - Co-located with SV-02	4	1		
IA-03	Center of existing building, on eastern side - Co-located with SV-03	4	1		
OA-01	Outside of building on the western side along North 15th Street	4	1		

Sample Name	Location	Sample / Boring Termination Depth (feet below ground surface)	Approximate Number of Samples	Rationale for Sampling	Laboratory Analysis
Groundwater - Permanent Wells					**Analyses**
MW-1-S (existing)	Approximately 20 feet east and 10 feet south of the northwest property corner, on the western portion of the Site.	20	1	To characterize the groundwater conditions at the Site	Full Suite
MW-1-D	Approximately 20 feet east and 10 feet south of the northwest property corner, on the western portion of the Site, within 5 feet of the existing MW-01-S	30	1		Focused
MW-2-S (existing)	Approximately 50 feet east and 15 feet north of the northwest property corner.	20	1		Full Suite
MW-3-S (existing)	Approximately 75 feet east and 10 feet south from the northwest property corner.	20	1		Full Suite
MW-3-D	Approximately 75 feet east and 10 feet south from the northwest property corner, within 5 feet of the existing MW-03-S	30	1		Focused
MW-4-S (existing)	Approximately 85 feet east and 20 feet north from the northwest property corner, at the location of existing MW-04	20	1		Full Suite
MW-4-D	Approximately 85 feet east and 20 feet north from the northwest property corner, within 5 feet of the existing MW-04-S	30	1		Focused
MW-5 (existing offsite)	Off the northeastern building corner, on the sidewalk on the eastern portion of the site, along Gem Street	20	0		Not Sampled - Off-Site well
MW-6 (existing offsite)	Off the southeastern building corner, on the sidewalk on the eastern portion of the site, along Gem Street	20	0		Not Sampled - Off-Site well
MW-7-S	Approximately 35 feet west and 35 feet north of the southeast property corner	15	1		Full Suite
MW-7-D	Approximately 35 feet west and 35 feet north of the southeast property corner, within 5 feet of the existing MW-07-S	30	1		Focused
MW-8-S	Approximately 75 feet east from the northwest property corner	15	1		Full Suite
MW-8-D	Approximately 75 feet east from the northwest property corner within 5 feet of the existing MW-08-S	30	1		Focused

Notes:

Based on the previous environmental reports, the water table is anticipated to be approximately 8 to 10 feet below ground surface

Groundwater Analysis Description

Full Suite: TCL VOCs + TICs, including 1-4 Dioxane (EPA Method SW 846 8260, isotope dilution for 1-4 Dioxane), TCL SVOCs + TICs (EPA Method SW 846 8270), pesticides/herbicides/PCBs (EPA Methods SW 846 8081/8151/8082), total and dissolved TAL metals (EPA Methods SW 846 6010/6020/7470), cyanide (EPA Method SW 846 9010/9012), hexavalent chromium; PFAS (EPA Method 1633)

Focused: TCL VOCs + TICs (EPA Method SW 846 8260)

FIGURES

SOURCE:

USGS TOPOGRAPHIC MAPS: BROOKLYN, NEW YORK (2023). CONTOUR INTERVAL 10FT., NAVD-1988, ORIGINAL SCALE 1:24,000 (1IN.=2,000FT.).

N
W E
S

9 N. 15TH STREET SITE 9 NORTH 15TH STREET, BROOKLYN, NY	PREPARED BY: GZA GeoEnvironmental of NY Engineers and Scientists www.gza.com	PREPARED FOR: 9N15INLET LLC SOLSTICE EQUITIES LLC VAGABOND GROUP LLC

SITE LOCATION MAP	PROJ MGR: JB	REVIEWED BY: VW	CHECKED BY: SK	FIGURE
	DESIGNED BY: JB	DRAWN BY: JB	SCALE: 1"=2000'	1
	DATE: NOVEMBER 2024	PROJECT NO. 41.0163352.10	REVISION NO. -	SHEET NO.

GENERAL NOTES

1. AERIAL IMAGERY PROVIDED BY ©2024 MICROSOFT CORPORATION © MAXAR © CNES(2024) DISTRIBUTION AIRBUS DS.
2. PARCELS DEVELOPED FROM NEW YORK CITY DEPARTMENT OF PLANNING MAPPLUTO.

LEGEND

APPROXIMATE SITE BOUNDARY

APPROXIMATE LIMITS OF SURROUNDING TAX PARCELS

N
W E
S

0 25 50 100
SCALE IN FEET

NO.	ISSUE/DESCRIPTION	BY	DATE

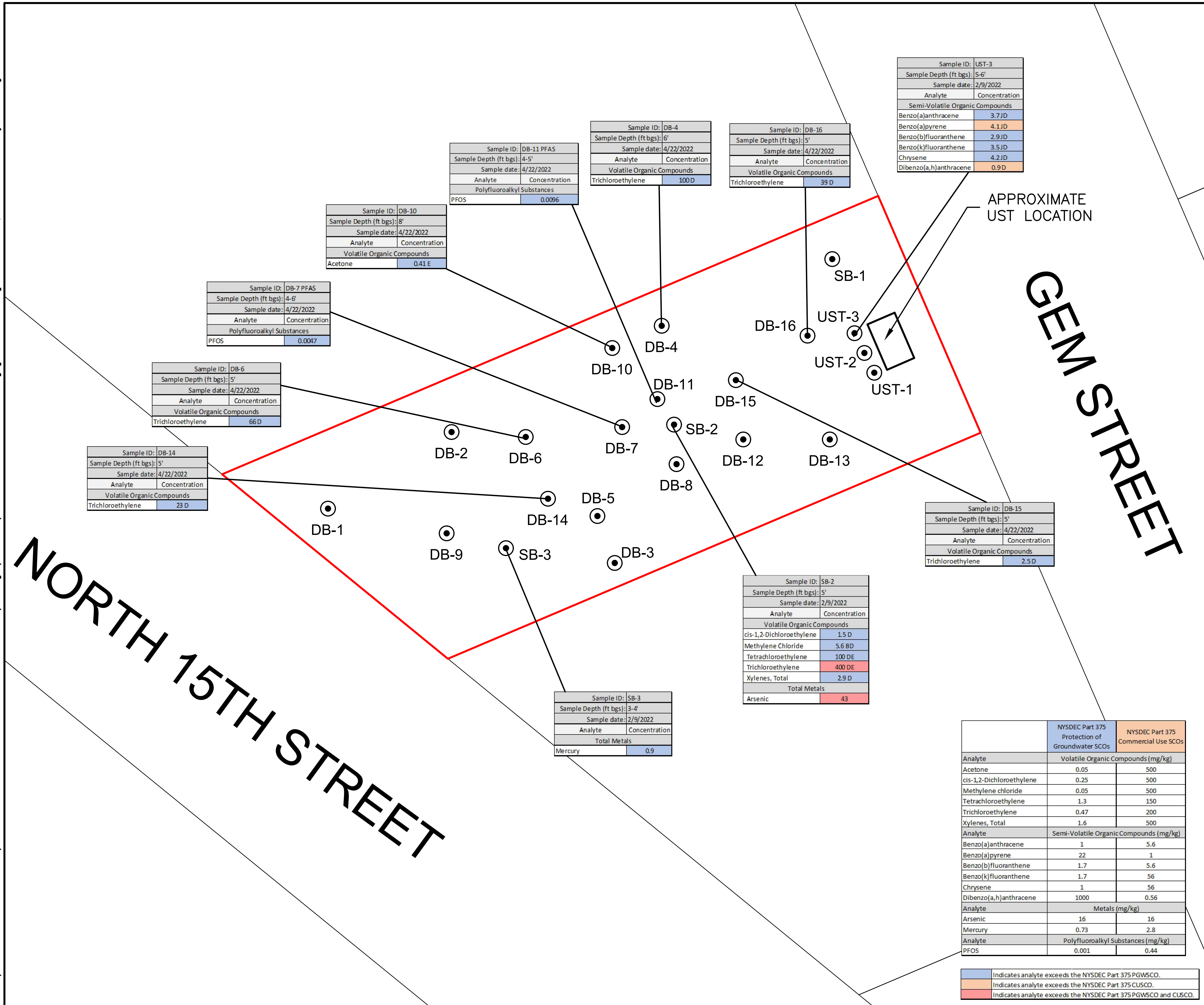
9 N. 15TH STREET SITE
9 NORTH 15TH STREET, BROOKLYN, NEW YORK

SITE PLAN

PREPARED BY:
GZA GeoEnvironmental of NY
Engineers and Scientists
www.gza.com

PREPARED FOR:
9N15INLET LLC
SOLSTICE EQUITIES LLC
VAGABOND GROUP LLC

PROJ MGR: JB	REVIEWED BY: VW	CHECKED BY: SK	FIGURE
DESIGNED BY: JB	DRAWN BY: JB	SCALE: 1"=50'	2
DATE: NOVEMBER 2024	PROJECT NO. 41.0163352.10	REVISION NO.	SHEET NO.



Sample ID:	DB-11 PFAS
Sample Depth (ft bgs):	4-5'
Sample date:	4/22/2022
Analyte	Concentration
Polyfluoroalkyl Substances	
PFOS	0.0096

Sample ID:	DB-4
Sample Depth (ft bgs):	6'
Sample date:	4/22/2022
Analyte	Concentration
Volatile Organic Compounds	
Trichloroethylene	100 D

Sample ID:	DB-16
Sample Depth (ft bgs):	5'
Sample date:	4/22/2022
Analyte	Concentration
Volatile Organic Compounds	
Trichloroethylene	39 D

Sample ID:	UST-3
Sample Depth (ft bgs):	5-6'
Sample date:	2/9/2022
Analyte	Concentration
Semi-Volatile Organic Compounds	
Benzo(a)anthracene	3.7JD
Benzo(a)pyrene	4.1JD
Benzo(b)fluoranthene	2.9JD
Benzo(k)fluoranthene	3.5JD
Chrysene	4.2JD
Dibenzo(a,h)anthracene	0.9D

Sample ID:	DB-10
Sample Depth (ft bgs):	8'
Sample date:	4/22/2022
Analyte	Concentration
Volatile Organic Compounds	
Acetone	0.41 E

Sample ID:	DB-7 PFAS
Sample Depth (ft bgs):	4-6'
Sample date:	4/22/2022
Analyte	Concentration
Polyfluoroalkyl Substances	
PFOS	0.0047

Sample ID:	DB-6
Sample Depth (ft bgs):	5'
Sample date:	4/22/2022
Analyte	Concentration
Volatile Organic Compounds	
Trichloroethylene	66 D

Sample ID:	DB-14
Sample Depth (ft bgs):	5'
Sample date:	4/22/2022
Analyte	Concentration
Volatile Organic Compounds	
Trichloroethylene	23 D

Sample ID:	DB-15
Sample Depth (ft bgs):	5'
Sample date:	4/22/2022
Analyte	Concentration
Volatile Organic Compounds	
Trichloroethylene	2.5 D

Sample ID:	SB-2
Sample Depth (ft bgs):	5'
Sample date:	2/9/2022
Analyte	Concentration
Volatile Organic Compounds	
cis-1,2-Dichloroethylene	1.5 D
Methylene Chloride	5.6 BD
Tetrachloroethylene	100 DE
Trichloroethylene	400 DE
Xylenes, Total	2.9 D
Total Metals	
Arsenic	43

Sample ID:	SB-3
Sample Depth (ft bgs):	3-4'
Sample date:	2/9/2022
Analyte	Concentration
Total Metals	
Mercury	0.9

	NYSDEC Part 375 Protection of Groundwater SCOs	NYSDEC Part 375 Commercial Use SCOs
Analyte	Volatile Organic Compounds (mg/kg)	
Acetone	0.05	500
cis-1,2-Dichloroethylene	0.25	500
Methylene chloride	0.05	500
Tetrachloroethylene	1.3	150
Trichloroethylene	0.47	200
Xylenes, Total	1.6	500
Analyte	Semi-Volatile Organic Compounds (mg/kg)	
Benzo(a)anthracene	1	5.6
Benzo(a)pyrene	22	1
Benzo(b)fluoranthene	1.7	5.6
Benzo(k)fluoranthene	1.7	56
Chrysene	1	56
Dibenzo(a,h)anthracene	1000	0.56
Analyte	Metals (mg/kg)	
Arsenic	16	16
Mercury	0.73	2.8
Analyte	Polyfluoroalkyl Substances (mg/kg)	
PFOS	0.001	0.44

(blue)	Indicates analyte exceeds the NYSDEC Part 375 PGWSCO.
(orange)	Indicates analyte exceeds the NYSDEC Part 375 CUSCO.
(red)	Indicates analyte exceeds the NYSDEC Part 375 PGWSCO and CUSCO.

GENERAL NOTES

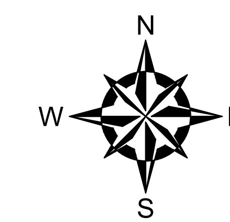
1. PARCELS DEVELOPED FROM NEW YORK CITY DEPARTMENT OF PLANNING MAPPLUTO.
2. SAMPLE LOCATIONS ARE APPROXIMATED FROM "LIMITED PHASE II SUBSURFACE INVESTIGATION", DATED FEBRUARY 22, 2022 AND "REMEDIAL INVESTIGATION REPORT", DATED MAY 18, 2022, PREPARE BY LAUREL ENVIRONMENTAL GEOSCIENCES DPC.
3. ALL CONCENTRATIONS ARE SHOWN IN MILLIGRAMS PER KILOGRAM (MG/KG).
4. FOR LABORATORY QUALIFIERS, SEE LABORATORY DATA WITHIN THE HISTORICAL REPORTS.
5. CUSCO – NYSDEC PART 375 COMMERCIAL USE SOIL CLEANUP OBJECTIVE
6. PGWSCO – NYSDEC PART 375 PROTECTION OF GROUNDWATER SOIL CLEANUP OBJECTIVE,

LEGEND

APPROXIMATE SITE BOUNDARY

APPROXIMATE LIMITS OF SURROUNDING TAX PARCELS

APPROXIMATE FORMER SOIL SAMPLING LOCATION



0 10 20 40

SCALE IN FEET

NO.	ISSUE/DESCRIPTION	BY	DATE

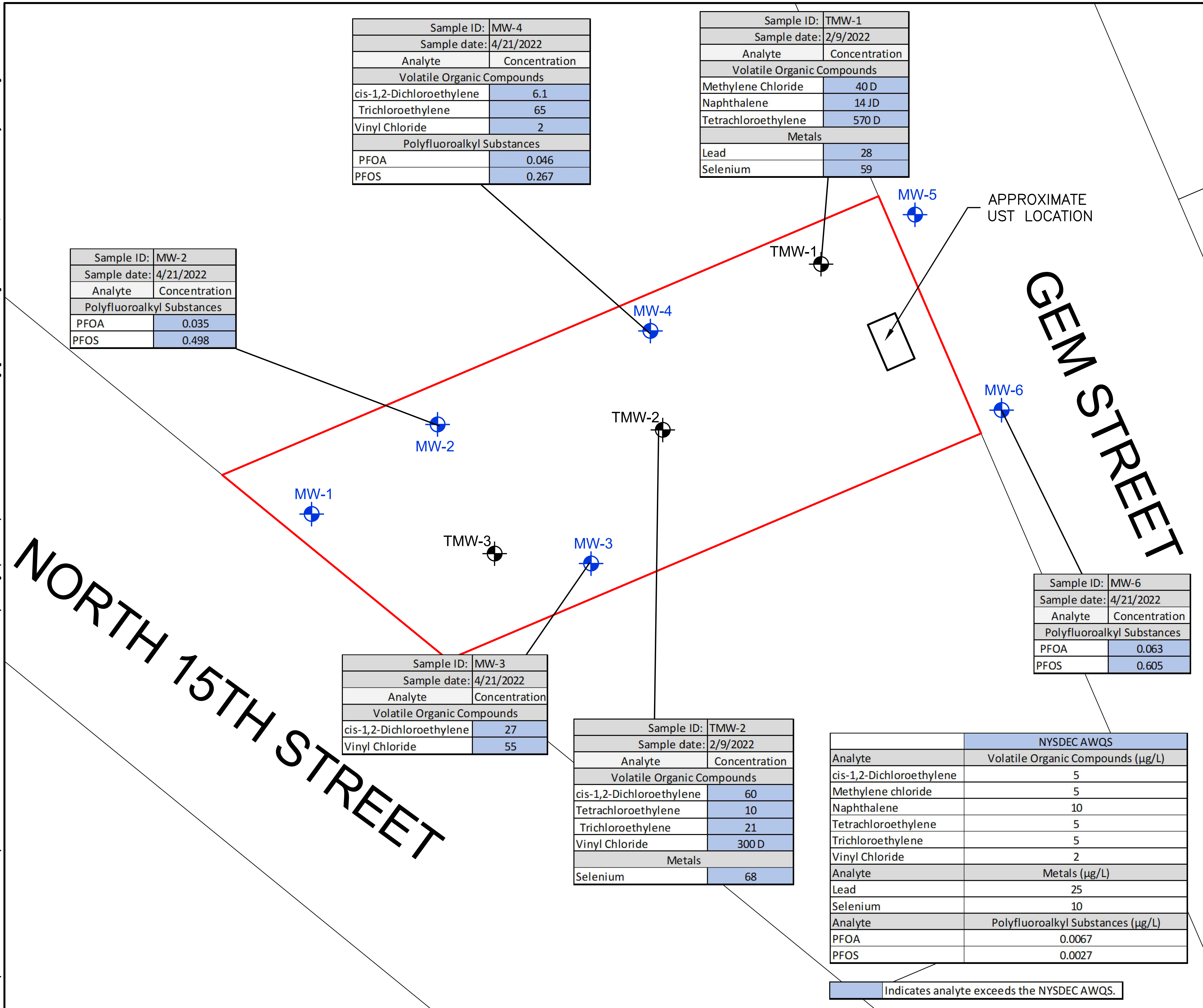
9 N. 15TH STREET SITE
9 NORTH 15TH STREET, BROOKLYN, NEW YORK

HISTORICAL SOIL EXCEEDANCES OF PGWSCOs AND CUSCOs

PREPARED BY:
GZA GeoEnvironmental of NY
Engineers and Scientists
www.gza.com

PREPARED FOR:
9N15INLET LLC
SOLSTICE EQUITIES LLC
VAGABOND GROUP LLC

PROJ MGR: JB	REVIEWED BY: VW	CHECKED BY: SK	FIGURE 3
DESIGNED BY: JB	DRAWN BY: JB	SCALE: 1"=20'	
DATE: NOVEMBER 2024	PROJECT NO. 41.0163352.10	REVISION NO.	SHEET NO.



Sample ID:	MW-4
Sample date:	4/21/2022
Analyte	Concentration
Volatile Organic Compounds	
cis-1,2-Dichloroethylene	6.1
Trichloroethylene	65
Vinyl Chloride	2
Polyfluoroalkyl Substances	
PFOA	0.046
PFOS	0.267

Sample ID:	TMW-1
Sample date:	2/9/2022
Analyte	Concentration
Volatile Organic Compounds	
Methylene Chloride	40 D
Naphthalene	14 JD
Tetrachloroethylene	570 D
Metals	
Lead	28
Selenium	59

Sample ID:	MW-2
Sample date:	4/21/2022
Analyte	Concentration
Polyfluoroalkyl Substances	
PFOA	0.035
PFOS	0.498

Sample ID:	MW-6
Sample date:	4/21/2022
Analyte	Concentration
Polyfluoroalkyl Substances	
PFOA	0.063
PFOS	0.605

Sample ID:	MW-3
Sample date:	4/21/2022
Analyte	Concentration
Volatile Organic Compounds	
cis-1,2-Dichloroethylene	27
Vinyl Chloride	55

Sample ID:	TMW-2
Sample date:	2/9/2022
Analyte	Concentration
Volatile Organic Compounds	
cis-1,2-Dichloroethylene	60
Tetrachloroethylene	10
Trichloroethylene	21
Vinyl Chloride	300 D
Metals	
Selenium	68

	NYSDEC AWQS
Analyte	Volatile Organic Compounds (µg/L)
cis-1,2-Dichloroethylene	5
Methylene chloride	5
Naphthalene	10
Tetrachloroethylene	5
Trichloroethylene	5
Vinyl Chloride	2
Analyte	Metals (µg/L)
Lead	25
Selenium	10
Analyte	Polyfluoroalkyl Substances (µg/L)
PFOA	0.0067
PFOS	0.0027

Indicates analyte exceeds the NYSDEC AWQS.

GENERAL NOTES

1. PARCELS DEVELOPED FROM NEW YORK CITY DEPARTMENT OF PLANNING MAPPLUTO.
2. SAMPLE LOCATIONS ARE APPROXIMATED FROM "LIMITED PHASE II SUBSURFACE INVESTIGATION", DATED FEBRUARY 22, 2022 AND "REMEDIAL INVESTIGATION REPORT", DATED MAY 18, 2022, PREPARE BY LAUREL ENVIRONMENTAL GEOSCIENCES DPC.
3. ALL CONCENTRATIONS ARE SHOWN IN MICROGRAMS PER LITER (µG/L).
4. FOR LABORATORY QUALIFIERS, SEE LABORATORY DATA WITHIN THE HISTORICAL REPORTS.
5. AWQS – NYSDEC AMBIENT WATER QUALITY STANDARDS.

LEGEND

- APPROXIMATE SITE BOUNDARY
- APPROXIMATE LIMITS OF SURROUNDING TAX PARCELS
- APPROXIMATE PERMANENT MONITORING WELL LOCATION
- APPROXIMATE TEMPORARY MONITORING WELL SAMPLE LOCATION

NO.	ISSUE/DESCRIPTION	BY	DATE

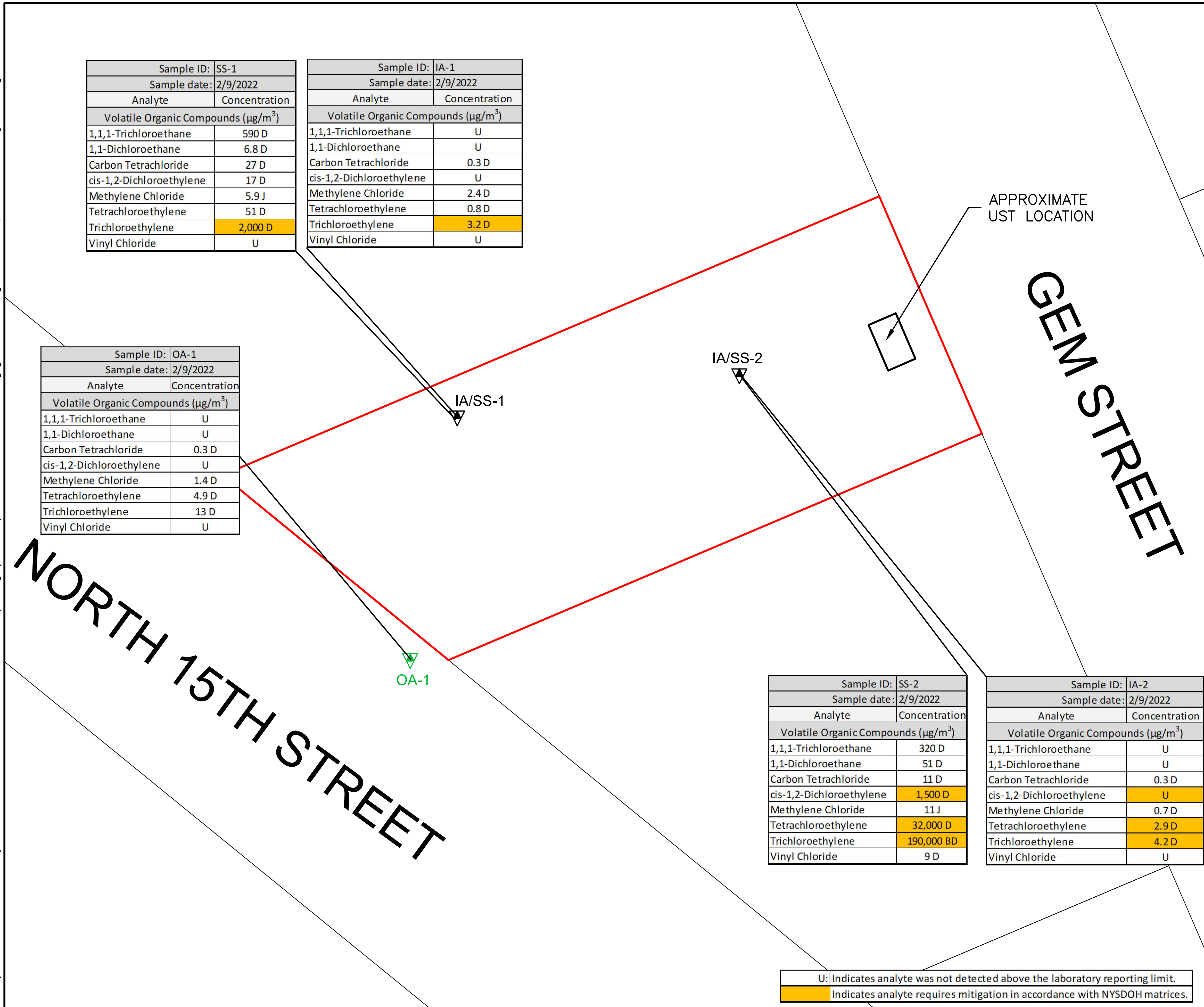
9 N. 15TH STREET SITE
9 NORTH 15TH STREET, BROOKLYN, NEW YORK

HISTORICAL GROUNDWATER EXCEEDANCES OF AWQS

PREPARED BY:
GZA GeoEnvironmental of NY
Engineers and Scientists
www.gza.com

PREPARED FOR:
9N15INLET LLC
SOLSTICE EQUITIES LLC
VAGABOND GROUP LLC

PROJ MGR: JB	REVIEWED BY: VW	CHECKED BY: SK	FIGURE
DESIGNED BY: JB	DRAWN BY: JB	SCALE: 1"=20'	4
DATE: NOVEMBER 2024	PROJECT NO. 41.0163352.10	REVISION NO.	SHEET NO.



Sample ID:	SS-1
Sample date:	2/9/2022
Analyte	Concentration
Volatile Organic Compounds (μg/m³)	
1,1,1-Trichloroethane	590 D
1,1-Dichloroethane	6.8 D
Carbon Tetrachloride	27 D
cis-1,2-Dichloroethylene	17 D
Methylene Chloride	5.9 J
Tetrachloroethylene	51 D
Trichloroethylene	2,000 D
Vinyl Chloride	U

Sample ID:	IA-1
Sample date:	2/9/2022
Analyte	Concentration
Volatile Organic Compounds (μg/m³)	
1,1,1-Trichloroethane	U
1,1-Dichloroethane	U
Carbon Tetrachloride	0.3 D
cis-1,2-Dichloroethylene	U
Methylene Chloride	2.4 D
Tetrachloroethylene	0.8 D
Trichloroethylene	3.2 D
Vinyl Chloride	U

Sample ID:	OA-1
Sample date:	2/9/2022
Analyte	Concentration
Volatile Organic Compounds (μg/m³)	
1,1,1-Trichloroethane	U
1,1-Dichloroethane	U
Carbon Tetrachloride	0.3 D
cis-1,2-Dichloroethylene	U
Methylene Chloride	1.4 D
Tetrachloroethylene	4.9 D
Trichloroethylene	13 D
Vinyl Chloride	U

Sample ID:	SS-2
Sample date:	2/9/2022
Analyte	Concentration
Volatile Organic Compounds (μg/m³)	
1,1,1-Trichloroethane	320 D
1,1-Dichloroethane	51 D
Carbon Tetrachloride	11 D
cis-1,2-Dichloroethylene	1,500 D
Methylene Chloride	11 J
Tetrachloroethylene	32,000 D
Trichloroethylene	190,000 BD
Vinyl Chloride	9 D

Sample ID:	IA-2
Sample date:	2/9/2022
Analyte	Concentration
Volatile Organic Compounds (μg/m³)	
1,1,1-Trichloroethane	U
1,1-Dichloroethane	U
Carbon Tetrachloride	0.3 D
cis-1,2-Dichloroethylene	U
Methylene Chloride	0.7 D
Tetrachloroethylene	2.9 D
Trichloroethylene	4.2 D
Vinyl Chloride	U

U:	Indicates analyte was not detected above the laboratory reporting limit.
(highlighted)	Indicates analyte requires mitigation in accordance with NYSDOH matrices.

GENERAL NOTES

1. PARCELS DEVELOPED FROM NEW YORK CITY DEPARTMENT OF PLANNING MAPPLUTO.
2. SAMPLE LOCATIONS ARE APPROXIMATED FROM "LIMITED PHASE II SUBSURFACE INVESTIGATION", DATED FEBRUARY 22, 2022, PREPARED BY LAUREL ENVIRONMENTAL GEOSCIENCES DPC.
3. ALL CONCENTRATIONS ARE SHOWN IN MICROGRAMS PER CUBIC METER (μG/M³).
4. FOR LABORATORY QUALIFIERS, SEE LABORATORY DATA WITHIN THE HISTORICAL REPORTS.
5. CVOCS – CHLORINATED VOLATILE ORGANIC COMPOUNDS.
6. NYSDOH – NEW YORK STATE DEPARTMENT OF HEALTH

LEGEND

- APPROXIMATE SITE BOUNDARY
- APPROXIMATE LIMITS OF SURROUNDING TAX PARCELS
- APPROXIMATE CO-LOCATED SOIL VAPOR/INDOOR AIR SAMLING LOCATION
- APPROXIMATE OUTDOOR AIR SAMPLING LOCATION

NO.	ISSUE/DESCRIPTION	BY	DATE

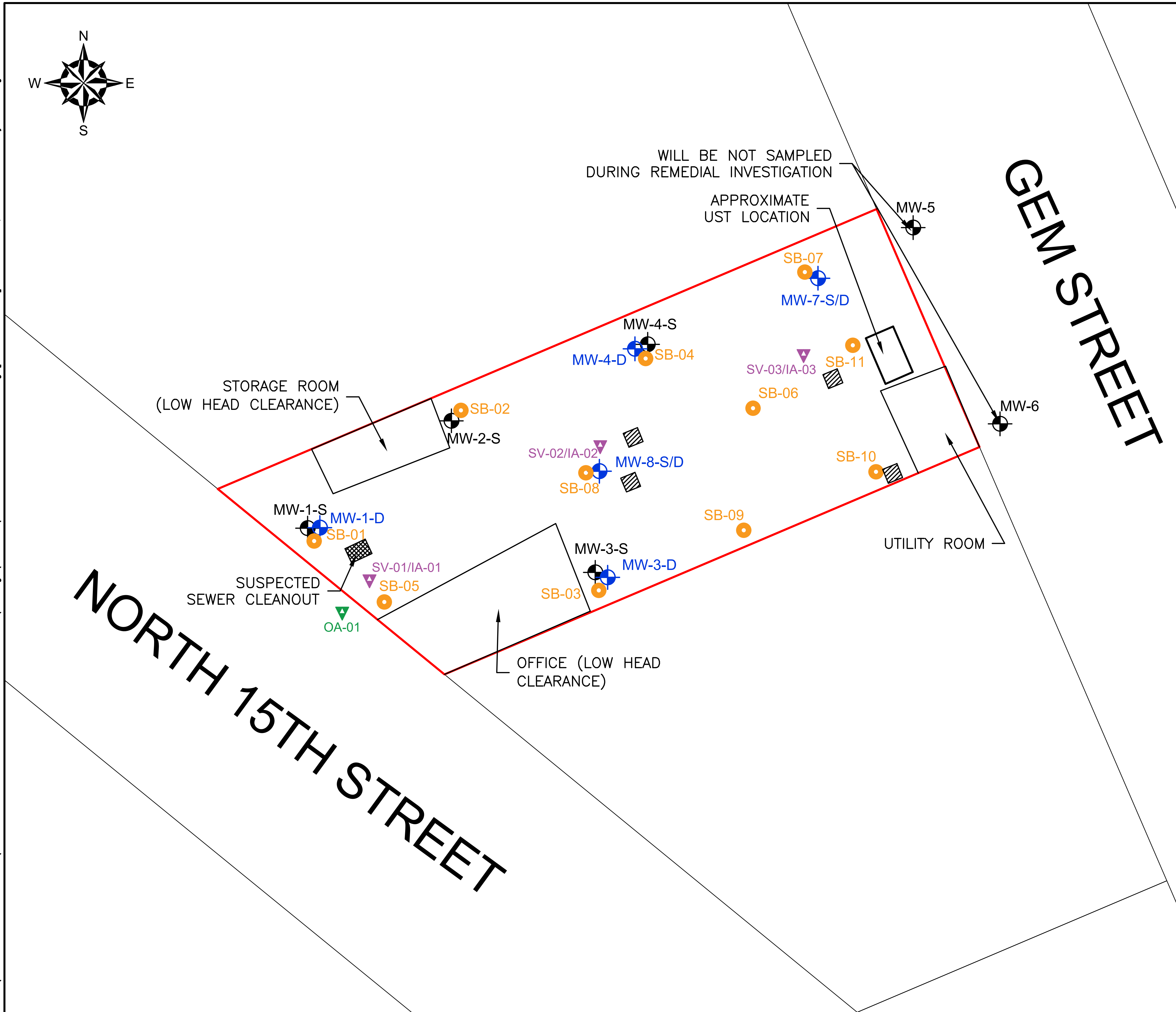
9 N. 15TH STREET SITE
9 NORTH 15TH STREET, BROOKLYN, NEW YORK

HISTORICAL SOIL VAPOR, INDOOR AIR, OUTDOOR AIR CVOC DETECTIONS

PREPARED BY:
GZA GeoEnvironmental of NY
Engineers and Scientists
www.gza.com

PREPARED FOR:
9N15INLET LLC
SOLSTICE EQUITIES LLC
VAGABOND GROUP LLC

PROJ MGR: JB	REVIEWED BY: VW	CHECKED BY: SK	FIGURE
DESIGNED BY: JB	DRAWN BY: JB	SCALE: 1"=20'	5
DATE: NOVEMBER 2024	PROJECT NO. 41.0163352.10	REVISION NO.	SHEET NO.



GENERAL NOTES

1. PARCELS DEVELOPED FROM NEW YORK CITY DEPARTMENT OF PLANNING MAPPLUTO.
2. EXISTING MONITORING WELL LOCATIONS ARE APPROXIMATED FROM "LIMITED PHASE II SUBSURFACE INVESTIGATION", DATED FEBRUARY 22, 2022, PREPARED BY LAUREL ENVIRONMENTAL GEOSCIENCES DPC.
3. PROPOSED SAMPLING LOCATIONS ARE APPROXIMATE AND MAY BE SHIFTED IN THE FIELD DUE TO THE PRESENCE OF SUBSURFACE UTILITIES OR OTHER OBSTRUCTIONS.
4. GROUNDWATER MONITORING WELL LOCATIONS ARE DENOTED AS 'S' – SHALLOW SCREEN 'M' AND 'D' – DEEP SCREEN.
5. MW–1–S, MW–2–S, MW–3–S, AND MW–4–S WERE PREVIOUSLY INSTALLED BY LAUREL ENVIRONMENTAL GEOSCIENCES AS MW–1, MW–2, MW–3, MW–4.

LEGEND

- APPROXIMATE SITE BOUNDARY
- APPROXIMATE LIMITS OF SURROUNDING TAX PARCELS
- APPROXIMATE FLOOR DRAIN LOCATION
- SB-01 — APPROXIMATE PROPOSED SOIL BORING LOCATION
- MW-1-M/D — APPROXIMATE PROPOSED PERMANENT GROUNDWATER MONITORING WELL LOCATION – SEE NOTE 4 FOR DENOTATIONS
- MW-1-S — APPROXIMATE LOCATION OF EXISTING GROUNDWATER MONITORING WELL
- SV-01/IA-01 — APPROXIMATE PROPOSED CO–LOCATED SOIL VAPOR/INDOOR AIR SAMLING LOCATION
- OA-01 — APPROXIMATE OUTDOOR AIR SAMPLING LOCATION

0 10 20 40
SCALE IN FEET

NO.	ISSUE/DESCRIPTION	BY	DATE

9 N. 15TH STREET SITE
9 NORTH 15TH STREET, BROOKLYN, NEW YORK

PROPOSED SAMPLING LOCATIONS

PREPARED BY:
GZA GeoEnvironmental of NY
Engineers and Scientists
www.gza.com

PREPARED FOR:
9N15INLET LLC
SOLSTICE EQUITIES LLC
VAGABOND GROUP LLC

PROJ MGR: JB	REVIEWED BY: VW	CHECKED BY: SK	FIGURE 6
DESIGNED BY: JB	DRAWN BY: JB	SCALE: 1"=20'	
DATE: NOVEMBER 2024	PROJECT NO. 41.0163352.10	REVISION NO.	SHEET NO.

APPENDIX A – QUALITY ASSURANCE PROJECT PLAN (QAPP) / FIELD SAMPLING PLAN (FSP)

QUALITY ASSURANCE PROJECT PLAN (QAPP) / FIELD SAMPLING PLAN (FSP)

9 N. 15th Street Site
Block 2614, Lot 16
Brooklyn, New York
NYSDEC BCP Site No. TBD

November 2024

PREPARED FOR:
9N15Inlet LLC;
Solstice Equities LLC; and
VagaBond Group LLC

PREPARED BY:
GZA GeoEnvironmental of New York
104 West 29th Street, 10th Floor
New York, NY 10001

File No. 41.0163352.10

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FIGURES

TABLE

ATTACHMENTS

1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) and Field Sampling Plan (FSP) presents the organization, objectives, planned activities, and specific quality assurance/quality control (QA/QC) procedures associated with the Remedial Investigation Work Plan (RIWP) at 9 Noth 15th Street, Brooklyn, New York (Site). **Figure 1** presents a Site location map.

This QAPP/FSP describes specific protocols for field sampling, sample handling and storage, chain-of-custody, laboratory analysis, and data handling and management. Preparation of the Plan was based on EPA Quality Assurance Project Plan guidance documents, including:

EPA Requirements for Quality Assurance Project Plans (EPA QA/R-5, March 2001); and

Guidance for Quality Assurance Project Plans (EPA QA/G-5, December 2002).

The data generated from the analysis of samples will be used to determine the extent of contamination, identify impacted targets, and to compare the results of the remedial actions to site-specific cleanup goals. Potential parameters to be analyzed, including their respective quantitation limits (QLs), and data quality levels (DQLs), are provided in **Tables 1A through 1C**.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITY

A qualified person will coordinate and manage the Site sampling and analysis program, data reduction, QA/QC, data validation, analysis, and reporting. Victoria Whelan, P.G. is a qualified environmental professional (QEP), as defined by the New York State Department of Environmental Conservation (NYSDEC) and will direct the sampling activities and coordinate laboratory and drilling activities. The intent of this QAPP/FSP is to be performed the RI in accordance with the technical guidance applicable to Technical Guidance for Site Investigation and Remediation (DER-10), and Sampling, Analysis and Assessment of Per- and Polyfluoroalykly Substances (PFAS) under NYSDEC's Part 375 Remedial Programs dated April 2023.

A qualified person will ensure that the QA/QC plan is implemented and will oversee data validation. GZA's Senior Technical Specialist, Dr. Chunhua Liu will provide oversight and technical support for the sampling and analytical procedures followed acting as the project QA Officer. This individual has the broad authority to approve or disapprove project plans, specific analyses, and final reports. The QEP is independent from the data generation activities. In general, the QA officer will be responsible for reviewing and advising on all QA/QC aspects of this program.

Laboratories used will be New York State Department of Health Environmental (NYSDOH) Laboratory Approval Program (ELAP) certified laboratories. The laboratories will communicate directly with the sampler regarding the analytical results and reporting and will be responsible for providing all labels, sample containers, field blank water, trip blanks, shipping coolers, and laboratory documentation. Qualifications of the QA officer are provided in **Attachment A.**

3.0 QA OBJECTIVES FOR DATA MANAGEMENT

The analytical data will be provided by the laboratory using the NYSDEC Category B deliverable format. Analytical data collected for disposal characteristics that may be requested by off-site soil or wastewater disposal facilities will be provided in the format that the facility requests.

All analytical measurements will be made so that the results are representative of the media sampled and the conditions measured. Data will be reported in consistent dry weight units for solid samples [i.e., micrograms per kilogram (µg/kg) and/or milligram per kilogram (mg/kg), micrograms per liter (µg/L) or milligrams per liter (mg/L) for aqueous samples and in micrograms per cubic meter (µg/m^3) for soil vapor and air samples. **Table 2** presents the proposed samples, sampling and analytical parameters, analytical methods, sample preservation requirements and containers.

Quantitation Limits (QLs) are laboratory-specific and reflect those values achievable by the laboratory performing the analyses. Data Quality Levels (DQLs) are those reporting limits required to meet the objectives of the program (i.e., program action levels, cleanup standards, etc.). Data Quality Objectives (DQOs) define the quality of data and documentation required to support decisions made in the various phases of the data collection activities. The DQOs are dependent on the end uses of the data to be collected and are also expressed in terms of objectives for precision, accuracy, representativeness, completeness, and comparability.

The analytical methods to be used at this Site provide the highest level of data quality and can be used for purposes of risk assessment, evaluation of remedial alternatives and verification that cleanup standards have been met. However, in order to ensure that the analytical methodologies are capable of achieving the DQOs, measurement performance criteria have been set for the analytical measurements in terms of accuracy, precision, and completeness.

The overall QA objective is to develop and implement procedures for field sampling, chain-of-custody, laboratory analysis, and reporting which will provide results that are scientifically valid, and the levels of which are sufficient to meet DQOs. Specific procedures for sampling, chain of custody, laboratory instrument calibration, laboratory analysis, reporting of data, internal quality control, and corrective action are described in other sections of this QAPP/FSP.

Tables 3, **4**, and **5** present the precision and accuracy requirements for each parameter to be analyzed. For quantitation limits for parameters associated with soil, sediment, and solid waste samples, the laboratory will be required to attempt to meet or surpass the parameter-specific limits listed in 6 NYCRR Part 375.

For quantitation limits for parameters associated with groundwater samples, the laboratory will be required to attempt to meet or surpass the parameter-specific limits for groundwater from the Division of Water Technical and Operational Guidance Series (TOGS 1.1.1) Ambient Water Quality Standards and Guidance Values. In certain instances, if the TOGS criteria are not achievable due to analytical limitations, the laboratory will report the lowest possible quantitation limit.

For quantitation limits for parameters associated with soil gas samples, the laboratory will be required to meet the parameter-specific limits from EPA's Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance), Table 3c-SG:

Question 5 Soil Gas Screening Levels for Scenario-Specific Vapor Attenuation Factors (**α=**2H10^{-3}), November 2002. In certain instances, if these criteria are not achievable due to analytical limitations, the laboratory will report the lowest possible quantitation limits (see **Tables 1A through 1C** for affected analytes).

The QA objectives are defined as follows:

Accuracy is the closeness of agreement between an observed value and an accepted reference value. The difference between the observed value and the reference value includes components of both systematic error (bias) and random error.

Accuracy in the field is assessed through the adherence to all field instrument calibration procedures, sample handling, preservation, and holding time requirements, and through the collection of equipment blanks prior to the collection of samples for each type of equipment being used (e.g., split spoons, groundwater sampling pumps).

The laboratory will assess the overall accuracy of their instruments and analytical methods (independent of sample or matrix effects) through the measurement of "standards," materials of accepted reference value. Accuracy will vary from analysis to analysis because of individual sample and matrix effects. In an individual analysis, accuracy will be measured in terms of blank results, the percent recovery (%R) of surrogate compounds in organic analyses, or %R of spiked compounds in matrix spikes (MSs), matrix spike duplicates (MSDs) and/or laboratory control samples (LCSs). This gives an indication of expected recovery for analytes tending to behave chemically like the spiked or surrogate compounds. **Tables 3**, **4**, and **5** summarize the laboratory accuracy requirements.

Precision is the agreement among a set of replicate measurements without consideration of the "true" or accurate value: i.e., variability between measurements of the same material for the same analyte. Precision is measured in a variety of ways including statistically, such as calculating variance or standard deviation.

Precision in the field is assessed through the collection and measurement of field duplicates (one extra sample in addition to the original field sample). Field duplicates will be collected at a frequency of one per twenty investigative samples per matrix per analytical parameter, with the exception of the Toxicity Characteristic Leaching Procedure (TCLP) parameters and parameters associated with wastewater samples. Precision will be measured through the calculation of relative percent differences (RPDs). The resulting information will be used to assess sampling and analytical variability. Field duplicate RPDs must be $\leq$ 50 for soil samples and $\leq$ 30 for aqueous samples. These criteria apply only if the sample and/or duplicate results are >5x the quantitation limit; if both results are $\leq$ 5x the quantitation limit, the criterion will be doubled. Due to the uncertainty of available representative soil gas volume, field duplicates will not be collected for this matrix.

Precision in the laboratory is assessed through the calculation of RPD for duplicate samples. For organic soil, sediment and water analyses, laboratory precision will be assessed through the analysis of MS/MSD samples and field duplicates. For the inorganic analyses, laboratory precision will be assessed through the analysis of matrix duplicates and field duplicates. For soil gas analyses, laboratory precision will be assessed through the analysis of matrix duplicates. MS/MSD samples or matrix duplicates will be performed at a frequency of one per twenty investigative samples per matrix per parameter. **Tables 3**, **4**, and **5** summarize the laboratory precision requirements.

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under normal conditions. "Normal conditions" are defined as the conditions expected if the sampling plan was implemented as planned.

Field completeness is a measure of the amount of (1) valid measurements obtained from all the measurements taken in the project and (2) valid samples collected. The field completeness objective is greater than 90 percent.

Laboratory completeness is a measure of the amount of valid measurements obtained from all valid samples submitted to the laboratory. The laboratory completeness objective is greater than 95 percent.

Representativeness is a qualitative parameter that expresses the degree to which data accurately and precisely represent either a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition within a defined spatial and/or temporal boundary. To ensure representativeness, the sampling locations have been selected to provide coverage over a wide area and to highlight potential trends in the data. In addition, field duplicate samples will provide an additional measure of representativeness at a given location.

Representativeness is dependent upon the proper design of the sampling program and will be satisfied by ensuring that the Work Plans and QAPP are followed, and that proper sampling, sample handling, and sample preservation techniques are used.

Representativeness in the laboratory is ensured by using the proper analytical procedures, appropriate methods, and meeting sample holding times.

Comparability expresses the confidence with which one data set can be compared to another. Comparability is dependent upon the proper design of the sampling program and will be satisfied by ensuring that the Work Plans and QAPP are followed and that proper sampling techniques are used. Maximization of comparability with previous data sets is expected because the sampling design and field protocols are consistent with those previously used.

Comparability is dependent on the use of recognized EPA or equivalent analytical methods and the reporting of data in standardized units. Laboratory procedures are consistent with those used for previous sampling efforts.

4.0 SAMPLING PLAN

Environmental sampling may include soil, groundwater, soil vapor and sediment sampling. Additionally, wastes generated during remediation or development will be sampled and tested for characterization for disposal. Direct push drilling (GeoProbe®), sonic drilling, and/or test pit excavations will be the preferred methods for obtaining subsurface soil samples. However, other drilling methods including mud rotary and drive and wash may also be used if warranted by site conditions. Hand auger and/or hand-held sampling equipment will be the preferred method for collecting surficial and/or shallow soil samples. Groundwater samples will be collected using bailers or peristaltic, bladder or submersible pumps. Soil vapor samples will be collected in SUMMA® canisters. Performing grab or composite sampling using appropriate hand-held sampling equipment will be the preferred method for waste characterization sampling.

4.1. Utility Clearance

New York State law requires that New York 811 be notified at least three working days prior to subsurface work is conducted to initiate the utility locating activities. Companies with subsurface utilities present will locate and mark out subsurface utility lines. However, New York 811 contractors will only locate utilities on public property and rights-of-way.

GZA will subcontract a subsurface utility locator to perform a geophysical survey of the warehouse's interior prior to commencement of the Remedial Investigation. Subsurface anomalies, including utilities, will be clearly marked with spray paint. A GZA representative will be on-site during the subsurface investigation to record the locations of subsurface anomalies with the subcontractor.

4.2. Test Pit Soil Sampling

Test pitting and/or excavating may be conducted during the RI, if necessary. Test pits will allow for visual characterization of subsurface soil conditions and the collection of grab soil samples. Prior to soil sample collection, headspace screening will be conducted to evaluate whether analysis of soil samples is warranted, and if so, which soils should be collected.

Prior to completing a test pit or excavation, underground utilities should be identified as discussed in **Section 4.1**. Should active, underground utilities be located in the vicinity of the intended excavation, hand or vacuum excavation methods should be employed, as appropriate, to confirm the location and depth prior to initiating the excavation.

The size and type of excavator used to complete the test pits will be selected based on the anticipated depth and overall size of the excavation required to meet the project objectives. At no time will field personnel enter a test pit/excavation unless it has been deemed safe to enter by an Excavation Competent person based on training and experience required by 29CFR 1926.652.

Grab soil/solid samples will be collected from the material or interval in question by retrieving a volume for analysis using a clean stainless steel, aluminum, or mild steel/ disposable scoop, trowel, spoon, or bucket auger and placing the soil in a cleaned stainless-steel pan for homogenization before inserting into the sample container. Samples collected for analysis for volatile organic compounds and total organic halides will not be homogenized. Samples for volatile organics analysis and total organic halides will be placed directly into the sample container.

Composite samples will be collected in the same manner described above, except that the discrete sample volumes will be placed in a clean stainless-steel pan and mixed to form the composite. Composite sampling will be performed for the following objectives:

- Waste characterization;
- Determination of the suitability of the soil for on-site re-use; and
- Evaluation of health and safety requirements for workers that will disturb the soil during subsequent construction work.

4.3. Direct Push Drilling Soil Sampling

This drilling method is typically used to collect shallow overburden soils and create boreholes for temporary monitoring well installations, or soil vapor sampling points. Sampling will be performed using four or five-foot-long acetate sleeves that will be advanced continuously to the desired depth below the surface. Soil samples from each sleeve will be screened using a photoionization detector (PID) to detect possible organic vapors. Organic vapor screening will be performed by slicing open the acetate sleeve, making a small slice in the soil column with a clean knife or sampling tool, inserting the PID probe and pushing the slice closed, and monitoring the soil for approximately 5 to 10 seconds. This procedure will be repeated at intervals along the soil column at the field geologist's discretion.

The samples will be examined for staining, discoloration, odors, and debris indicative of contamination (ash, coal fragments, wood chips, cinders, petroleum staining, etc.). Samples for laboratory analysis will be collected from the six-inch interval most likely to be contaminated, based on PID readings, discoloration, staining, and the field geologist's judgment (field conditions may require a section longer than six inches to make sufficient sample; however, this decision will be field based).

The samples will be collected by cutting the soil in two places with a decontaminated steel, stainless steel, or aluminum trowel, spoon, or knife and homogenized in a decontaminated stainless-steel pan before being placed in the sample bottles. Samples collected for analysis for VOCs and total organic halides will be placed directly into the sample containers without homogenization (as per EPA sampling method 5035A). Samplers will wear phthalate-free gloves such as nitrile (no latex will be used) and will avoid contact of the gloves with the sample. Clean metal/disposable instruments will be used to transfer samples. If there is insufficient soil volume in the spoon, then this will be made up by attempting a second direct push sleeve at the same depth, or by using the next immediate sample interval above or below this depth, if appropriate. If there is no recovery, then the sample depth will be skipped, and drilling will progress to the next depth interval.

Soil samples will be collected in laboratory provided containers and transported to a NYSDOH ELAP certified laboratory, under proper chain of custody procedures for analysis. Once the sample containers are filled, they will be immediately placed in the cooler with ice (in Ziploc plastic bags to prevent leaking) or synthetic ice packs to maintain the samples at below 4^oC.

4.4. Sonic Drill Rig Soil Sampling

The sonic drilling system employs simultaneous high frequency vibration and low speed rotational motion along with down pressure to advance the cutting shoes of the drill string. This technique provides a continuous soil core and generates minimal cuttings. Due to the continuous sampling of the system, accurate depictions of the stratigraphy and lithology of the overburden are obtained (minimal sloughing). Additionally, few cuttings are mobilized to the surface. Most of the formation material enters the core barrel, except small amounts, which are pushed into the borehole wall.

Drilling operations take place from the drill platform, which is about 4 feet above ground. Steel drill casing and core barrel are connected to the head from the work platform/support truck and are then hoisted to vertical in the derrick. Tool joints are connected and broken by a hydraulic vise/wrench that is in the base of the derrick. The sonic head is able to pivot 90 degrees to facilitate connection of the drilling rods.

The sonic drilling system uses an override core barrel system and can create a 4- or 6-inch diameter borehole. This is followed by the override casing drilled to the same depth as the core barrel cutting shoe. The core barrel is then removed, and cores are extruded into plastic sleeves. The outer casing prevents cross contamination and formation mixing and allows for a very controlled placement of wells.

GZA proposes to use a track-mounted sonic drill rig collecting soil continuously from either five-foot long or 10-foot-long cores. Samples will be extruded from the core barrel into polyethylene sleeves. Once the plastic sleeve is cut open, soil will be screened using a PID to detect possible organic vapors. Organic vapor screening will be performed by making a small slice in the soil column with a clean knife or sampling tool, inserting the PID probe and pushing the slice closed, and monitoring the soil for approximately 5 to 10 seconds. This procedure will be repeated at intervals along the soil column at the field geologist's discretion.

The samples will be examined for staining, discoloration, odors, and debris indicative of contamination (ash, coal fragments, wood chips, cinders, petroleum staining, etc.) Samples for laboratory analysis will be collected from the six-inch interval most likely to be contaminated, based on PID readings, discoloration, staining, and the field geologist's judgment (field conditions may require a section longer than six inches to make sufficient sample; however, this decision will be field based).

The samples will be collected by cutting the soil in two places with a decontaminated steel, stainless steel, or aluminum trowel, spoon, or knife and homogenized in a decontaminated stainless-steel pan before being placed in the sample bottles. Samples collected for analysis for VOCs and total organic halides will be placed directly into the sample containers without homogenization (as per EPA sampling method 5035A). Samplers will wear phthalate-free gloves such as nitrile (no latex will be used) and will avoid contact of the gloves with the sample. Clean metal/disposable instruments will be used to transfer samples. If there is insufficient soil volume in the spoon, then this will be made up by attempting a second direct push sleeve at the same depth, or by using the next immediate sample interval above or below this depth, if appropriate. If there is no recovery, then the sample depth will be skipped, and drilling will progress to the next depth interval.

Soil samples will be collected in laboratory provided containers and transported to a NYSDOH ELAP certified laboratory, under proper chain of custody procedures for analysis. Once the sample containers are filled, they will be immediately placed in the cooler with ice (in Ziploc plastic bags to prevent leaking) or synthetic ice packs to maintain the samples at below 4°C.

4.5. Temporary Well Point Installation and Sampling

If proposed for site characterization, temporary well points will be immediately installed in drilled soil direct-push soil borings by placing a one-inch diameter PVC screen and riser pipe directly into the borehole. No additional materials will be placed around the annual space. The screen will be set to straddle the water table. Temporary wells will not be purged prior to sample collection. Depth to water will be measured in each well point to provide data to approximate groundwater flow direction.

Groundwater samples will be collected from the temporary well point using a dedicated microbailer. The samples will be collected in sample bottles (pre-preserved, if appropriate), placed in iced coolers, and removed from light immediately after collection. In addition, all sample bottles must be filled to the top so that no aeration of the samples occurs during transport. All bottles will be filled to avoid cascading and aeration of the samples, the goal being to minimize any precipitation of colloidal matter. Samples for dissolved metals will be collected in unpreserved containers and will be filtered and preserved at the laboratory within 24 hours of sampling. Samples will be transported to a NYSDOH ELAP certified laboratory under proper chain of custody procedures for analysis.

Screen and riser pipes will be removed from the borehole and the borehole will be backfilled.

4.6. Permanent Well Installation and Sampling

Groundwater sampling of permanent monitoring wells is described according to the following distinct phases of this work: well installation/construction, well development, well purging, and well sampling.

4.6.1. *Well Installation/Construction*

To collect representative groundwater samples, soil borings drilled with the direct push or sonic drilling method will be converted into permanent two-inch diameter monitoring wells. Groundwater monitoring wells will be constructed of threaded two-inch diameter PVC well casing and 20-slot well screen (to investigate the potential of floating product). The 10-foot screen will be set seven feet below the measured water table. Clean silica sand, Morie No. 1 or equivalent, will be placed in the annular space around the well to a minimum of one foot above the top of the well screen, two feet being optimal. Solid PVC riser, attached to the well screen, will extend to grade or above if the well is a stick-up. For a two-inch diameter well, the annular space for the filter pack should be 4 inches thick meaning a minimum six-inch diameter soil boring. In general, direct push borings will be enlarged by running hollow stem augers after soil sampling is complete and the permanent wells will be installed within the augered borehole. A two-foot-thick bentonite seal will then be placed above the sand pack and moistened with potable water for a minimum of 15 minutes before backfilling the remaining space with a cement-bentonite grout. If warranted by depth, filling will be completed using a tremie pipe placed below the surface of the grout. A stick-up or flush-mount protective casing with a locking well cap will then be installed, and a measuring point marked on each PVC well riser. Well construction diagrams will be prepared for each well.

4.6.2. Well Development

Following installation, the groundwater monitoring wells will be developed using a submersible pump (or equivalent) until the water is reasonably free of turbidity and field readings (pH, conductivity, temperature, and dissolved oxygen) sufficiently stabilize. Fifty nephelometric turbidity units (NTUs) or less will be the turbidity goal but not an absolute value. The wells will be developed aggressively to remove fines from the formation and sand pack. The wells will be allowed to equilibrate for seven days prior to sampling. The volume of water removed, the well development time, and field instrument readings will be recorded in the logbook.

4.6.3. Well Purging

The objective is to purge monitoring wells until turbidity stabilizes to a level as low as possible and this parameter will be given the greatest weight in determining when groundwater sampling may begin. With this objective in mind, a low-flow pump will be used to avoid entrainment of particulates within the well or from the formation. Groundwater from each well will be purged until parameters have stabilized. A turbidity level of fifty NTUs or less is the well purging goal, but not an absolute value before sampling. Other field parameters including temperature, conductivity, pH, and dissolved oxygen (DO) will also be monitored. As practical, all field measurements will be taken from the flow cell and will be recorded during and after purging, and before sampling. Field parameters should generally be within ±10 percent for three consecutive readings, one minute apart, prior to sampling.

Upon opening each monitoring well and point, the concentration of VOCs in the headspace will be measured using a PID and water level measurements will be recorded using an electronic interface probe. The depth to product (if present), depth to water, and the total depth will be measured from the top of the marked PVC casings. Water level and free product measurements will first be made and the volume of water in the well determined. The volume of water in the well will be calculated so that the number of well volumes purged and an estimate of the time required to purge the well can be made. Before sampling, the wells will be purged utilizing a low-flow submersible stainlesssteel pump using high-density polyethylene (HDPE) tubing connected to a flow cell. Very low purging rates are proposed, on the order of 100 ml/minute to 500 ml/minute, to minimize suspension of particulate matter in the well.

Purging will be done with the pump intake placed at the midpoint of the well screen or the midpoint of the water column (to be determined based on the depth and length of the screen interval) to ensure that all stagnant water in the well is removed, while not stirring up sediment that may have accumulated on the bottom of the well. Equipment will be lowered into the well very carefully to prevent suspension of bottom sediment and subsequent entrainment onto sampling equipment. Surging will be avoided. Tubing will be replaced between each well. Pumps must be carefully cleaned between wells according to the procedures specified in **Section 4.15,** below. It is anticipated that no more than three well volumes will be purged in order for turbidity to reach a minimum and the other parameters to stabilize. Ideally, pumping rates will be at a rate so that no drawdown of the groundwater level occurs (i.e., pumping rate is less than recharge rate). During purging, the sampler will actively monitor and track the volume of water purged and the field parameter readings. Data will be recorded in the field logbook. For example, the sampler will record the running total volume purged from each well and note the readings for the corresponding field parameters.

4.6.4. Well Sampling

Once groundwater conditions have stabilized and groundwater levels have recovered, samples will be collected from the flow cell outlet (connected to the low-flow peristaltic pump) vis United States Environmental Protection Agency (USEPA) low-flow sampling methods. All non-disposable/non-dedicated (re-usable) sampling equipment will be cleaned according to the procedures specified in **Section 4.15**.

Sampling will be performed with the pump intake at the same location used for purging. Pumping rates for withdrawing the samples will be similar to those followed for well purging.

The samples will be collected in sample bottles (pre-preserved, if appropriate), placed in iced coolers, and removed from light immediately after collection. In addition, all sample bottles must be filled to the top so that no aeration of the samples occurs during transport. All bottles will be filled to avoid cascading and aeration of the samples, the goal being to minimize any precipitation of colloidal matter. Samples will be transported to a NYSDOH ELAP certified laboratory under proper chain of custody procedures for analysis. Samples for dissolved metals will be collected in unpreserved containers and will be filtered and preserved at the laboratory within 24 hours of sampling.

4.7. Borehole Abandonment

Soils extracted during the advancement of the borings will be used to backfill the borings, provided that the borings are not to be used for installation of permanent monitoring wells. However, soils that exhibit "gross" contamination, as evidenced by staining or free-phase product, or any visual, olfactory, or PID readings greater than 50 ppm above background, will be managed in accordance with **Section 9**. In this event, bentonite chips or pellets to within 0.5 feet below ground surface. The ground surface will be restored to a similar condition as the surrounding grade (e.g., topsoil, asphalt, or concrete).

4.8. Monitoring Well Abandonment

There may be occasions when monitoring wells will require abandonment. For temporary monitoring wells, the approach will be to pull the PVC well materials from the borehole and backfill the remaining open portion of the borehole with cement/bentonite grout to approximately 0.5 feet below the ground surface. The ground surface will be restored to a similar condition as the surrounding grade (e.g., topsoil, asphalt, or concrete). For permanent overburden and bedrock monitoring wells, depending on the site-specific subsurface geologic conditions and nature of contamination, the abandonment approach will be in accordance with NYSDEC Policy CP-43 – Groundwater Monitoring Well Decommissioning Policy.

4.9. Soil Reuse Sampling and Worker Health & Safety Sampling

Soil reuse sampling may be performed to determine whether the soil can be reused elsewhere on the Site, or to determine whether contaminant levels in the soil would warrant OSHA 40-hour HAZWOPER training for workers disturbing the soil during post-remediation construction activities. This sampling would consist of compositing discrete soil samples from borings advanced by direct push (see **Section 4.3**), or during test pits following the procedures outlined in **Section 4.2**.

4.10. Waste Characterization Sampling

Waste classification sampling may be conducted to characterize soil, liquids, and/or groundwater for the purpose of proper off-site waste disposal. Specific methods for sampling liquid and solid wastes are briefly discussed below.

4.10.1. Solid Waste

Solid sampling methods include utilizing dedicated stainless steel or HDPE scoops/shovels, triers, and thiefs. Scoops and shovels are the preferred method for sampling solids from piles or containers. Stainless steel triers are similar to a scoop and are used for the collection of a core sample of a solid material.

4.10.2. Liquid Waste

Liquid sampling methods include utilizing dedicated dippers, glass tube samplers, pump, and tubing, kemmerer bottles, and Bacon Bomb samplers. Dippers are used to collect samples from the surface of the liquid and are appropriate for wastes that are homogeneous. Glass tube samplers consist of glass tubes of varying length and diameter used to collect a full-depth liquid sample from a drum or similar container. Pump and tubing (e.g., bladder pump or peristaltic pump) are used to collect liquid samples from a depth (up to approximately 20 feet below grade), and are typically relied upon for sampling subsurface structures, such as underground storage tanks. To minimize the loss of volatile organic components in the liquid, the lowest achievable flow rate is utilized for collecting the sample by this method. Kemmerer bottles and Bacon Bomb samplers are discrete-depth samplers. These samplers are lowered into the liquid and opened to collect a sample at a desired depth.

4.10.3. Grab versus Composite Sampling

Waste characterization of a liquid or a solid can involve grab or composite sampling depending upon the homogeneity and the volume of the waste. Grab sampling consists of collecting a discrete sample or samples of a material and submitting each sample for separate analysis. Grab sampling is appropriate for characterizing small quantities of waste as well as waste streams of varying content (e.g., drums of different contents). Composite sampling consists of taking discrete grab samples of a material and combining them into a smaller number of samples for analysis. Composite sampling generally is appropriate for large volumes of a homogenous waste material, such as a pile of soil or construction debris. The specific number of composite and grab samples will depend upon the size and nature of the waste pile (i.e., cubic yards) as well as the analysis required for characterization of the waste.

4.11. Sub-Slab Soil Gas Sampling

A direct-push drill rig will be utilized to drive rods with a decontaminated stainlesssteel probe to the desired sample depth, which will be approximately 6-inches below the existing slab. The soil gas probe will then be purged at a flow rate not greater than 0.2 liters/minute to evacuate one to three volumes using a photoionization detector (PID) with an integrated vacuum pump (MiniRAE 3000 or appropriate alternate). Peak and stabilized PID readings will be recorded prior to sample collection. Following the stabilization period, each probe will be connected to an evacuated laboratory-supplied 6-liter SUMMA® canister. SUMMA® canisters are passivated stainless steel vessels that have been cleaned and certified contaminant-free by the contract laborer. After connecting the SUMMA® canister to the soil gas probe, a regulator valve on the canister will be opened and the vacuum will slowly draw the sample into the canister over a period of 20 minutes. The samples will not be drawn at greater than 0.2 liters per minute. Quantitation limits for all analytes range between 1.6 ppbV and 4.0 ppbV, depending on the compound. After collecting the soil gas sample, the valve will be closed and disconnected from the soil gas probe. The soil-gas samples will be transported to a NYSDOH ELAP certified laboratory for TO-15 analysis.

Prior to sample collection, helium will be used as a tracer gas to evaluate the potential for infiltration of outdoor air into the sample. Subsequent rounds of soil gas sampling would include the use of tracer gas only if the initial round of sampling indicates that outdoor air has the potential to influence soil gas sample results.

When soil vapor samples are collected, the following conditions that may influence the interpretation of results will be documented:

- Identification of any nearby commercial or industrial buildings that likely uses volatile organic compounds;
- A sketch of the Site, showing streets, neighboring commercial or industrial facilities (with estimated distances to the Site, and soil-gas sampling locations);

- Weather conditions (e.g., precipitation, outdoor temperature, barometric pressure, wind speed and direction); and
- Any pertinent observations, such as odors or readings from field instrumentation.

4.12. Ambient Air Sampling

Ambient air samples will be collected with an evacuated laboratory-supplied 6-liter SUMMA® canister. SUMMA® canisters are passivated stainless steel vessels that have been cleaned and certified contaminant-free by the contract laborer. The sample will be set at an elevation of approximately 4 to 5 feet above grade, to represent breathing zone air quality conditions. The samples will not be drawn at greater than 0.2 liters per minute. After collecting the ambient air sample, the valve will be closed, and the canister will be labeled with the necessary information. The soil-gas samples will be transported to a NYSDOH ELAP certified laboratory for TO-15 analysis.

When ambient air samples are collected, the following conditions that may influence the interpretation of results will be documented:

- Identification of any nearby commercial or industrial buildings that likely uses volatile organic compounds;
- A sketch of the Site, showing streets, neighboring commercial or industrial facilities (with estimated distances to the Site, and soil-gas sampling locations);
- Weather conditions (e.g., precipitation, outdoor temperature, barometric pressure, wind speed and direction); and
- Any pertinent observations, such as odors or readings from field instrumentation.

4.13. QC Sample Collection

QC samples will include equipment blanks, trip blanks, field duplicates and MS/MSDs.

Equipment blanks will consist of distilled water and will be used to check for potential contamination of the equipment that may cause sample contamination. Equipment blanks will be collected by routing the distilled water through the sampling equipment prior to sample collection. Equipment blanks will be submitted to the laboratory at a frequency of one per day per matrix per type of equipment being used per parameter. Equipment blanks will not be collected with samples for analysis for TCLP parameters, parameters associated with wastewater samples, samples collected for disposal purposes, soil gas samples, chip samples, wipe samples and samples collected for grain size analyses.

Trip blanks will consist of distilled water (supplied by the laboratory) and will be used to assess the potential for volatile organic compound contamination of groundwater samples due to contaminant migration during sample shipment and storage. Trip blanks will be transported to the site unopened, stored with the investigative samples, and kept closed until analyzed by the laboratory. Trip blanks will be submitted to the laboratory at a frequency of one per cooler that contains groundwater samples for analysis for VOCs.

Field duplicates are an additional aliquot of the same sample submitted for the same parameters as the original sample. Field duplicates will be used to assess the sampling and analytical reproducibility. Field duplicates will be collected by alternately filling sample bottles from the source being sampled. Field duplicates will be submitted at a frequency of one per 20 samples for all matrices and all parameters with the exception of TCLP parameters, parameters associated with wastewater samples, samples collected for waste characterization purposes, chip samples, wipe samples and samples collected for grain size analyses. Soil gas field duplicates will be obtained by using a tubing a T-splitter.

MSs and MSDs are two additional aliquots of the same sample submitted for the same parameters as the original sample. However, the additional aliquots are spiked with the compounds of concern. Matrix spikes provide information about the effect of the sample matrix on the measurement methodology. MS/MSDs will be submitted at a frequency of one per 20 investigative samples per matrix for organic parameters for soil, sediment, and groundwater. MSs will be submitted at a frequency of one per 20 investigative samples per matrix for inorganic parameters.

4.14. Sample Preservation and Containerization

The analytical laboratory will supply the sample containers for the chemical samples. These containers will be cleaned by the manufacturer to meet or exceed all analyte specifications established in the latest U.S. EPA's *Specifications and Guidance for Contaminant-Free Sample Containers*. Certificates of analysis are provided with each bottle lot and maintained on file to document conformance to EPA specifications. The containers will be pre-preserved, where appropriate (see **Table 2**).

Table 6 presents a summary of QC sample preservation and container requirements.

4.15. Equipment Decontamination

4.15.1. Reuseable Sampling Equipment

Stainless steel and aluminum sampling equipment shall be cleaned between each use in the following manner:

- Wash/scrub with a biodegradable degreaser ("Simple Green") if there is oily residue on equipment surface
- Tap water rinse
- Wash and scrub with Alconox and water mixture

- Tap water rinse
- Distilled/deionized water rinse
- Air dry

Cleaned equipment shall be wrapped in aluminum foil if not used immediately after air-drying.

Groundwater sampling pumps will be cleaned by washing and scrubbing with an Alconox/water mixture, rinsing with tap water, and irrigating with distilled/deionized water.

4.15.2. Disposable Sampling Equipment

Disposable sampling equipment includes disposable gloves, bailers, string, tubing associated with groundwater sampling/purging pumps, or polyethylene sampling spatulas. Disposable sampling equipment will be used only once, and following its use, will be properly drummed or bagged for off-site disposal (see Section 4.6, below).

4.15.3. Heavy Equipment

Certain heavy equipment such as drilling augers may be used to obtain samples. Such equipment will be subject to high-pressure hot water or steam cleaning between uses. A member of the sampling team will visually inspect the equipment to check that visible contamination has been removed by similar procedure listed above prior to sampling and between drilling locations. The drilling casing and down-hole equipment will be cleaned prior to arrival on Site and between soil test borings. Drilling equipment decontamination will be performed on-site in temporary, bermed decontamination pads.

4.16. <u>Investigation Derived Waste</u>

Field investigation derived waste (IDW) generated during drilling will be collected in properly labeled USDOT approved storage containers (55-gallon drums) and grouped by environmental matrix (soil, water, PPE/plastic, construction debris).

Drums will be tracked and given unique identification codes based on the following:

- A prefix indicating the site where the drum was generated and the drum's contents: i.e., S – Soil, W – Water, and P – PPE/Plastic.
- Following the prefix and a hyphen will be the drum's chronological number of generation. For example, drum S-1 will be the first drum filled with soil for the project; while drum W-8 will be the eighth drum generated and contains water.
- As drums are generated, their identification code, date of generation, contents, source (i.e., drill cuttings from location x, purge water from well y), and date sampled will be entered on a tracking table.

- For example, the full nomenclature of S-2/SB-2 110724 would be the second drum produced during the program with its contents from Soil Boring No. 2 generated on November 7, 2024.

The drums will be centrally stored on-Site. Subsequently, the waste soils and/or water will be characterized with laboratory analyses for proper disposal. Waste transportation and disposal of all contaminated wastes will be managed by GZA and the subcontractor. GZA anticipates that drummed IDW will be disposed of off the Site to a permitted disposal facility. GZA will retain copies of each waste disposal manifest for documentation.

5.0 DOCUMENTATION AND CHAIN-OF-CUSTODY

5.1. Sample Collection Documentation

5.1.1. Field Notes

Field team members will keep a field logbook to document all field activities. Field logbooks will provide the means of recording the chronology of data collection activities performed during the remediation. As such, entries will be described in as much detail as possible so that a particular situation could be reconstructed without reliance on memory.

The logbook will be a bound notebook with water-resistant pages. Logbook entries will be dated, legible, and contain accurate and inclusive documentation of the activity. The title page of each logbook should contain the following:

- Person to whom the logbook is assigned
- The logbook number
- Project name and number
- Site name and location
- Project start date
- End date

Entries into the logbook will contain a variety of information. At the beginning of each entry, the date, start time, weather, and names of sampling team members present will be entered. Each page of the logbook will be signed and dated by the person making the entry. All entries will be made in permanent ink, signed, and dated and no erasures or obliterations will be made. If an incorrect entry is made, the information will be crossed out with a single strike mark that is signed and dated by the sampler. The correction shall be written adjacent to the error.

Field activities will be fully documented. Information included in the logbook should include, but may not be limited to, the following:

- Chronology of activities, including entry and exit times

- Names of all people involved in sampling activities
- Level of personal protection used
- Any changes made to planned protocol
- Names of visitors to the site during sampling and reason for their visit
- Sample location and identification
- Changes in weather conditions
- Dates (month/day/year) and times (military) of sample collection
- Measurement equipment identification (model/manufacturer) and calibration information
- Sample collection methods and equipment
- Sample depths
- Whether grab or composite sample collected
- How sample composited, if applicable
- Sample description (color, odor, texture, etc.)
- Sample identification code
- Tests or analyses to be performed
- Sample preservation and storage conditions
- Equipment decontamination procedures
- QC sample collection
- Unusual observations
- Record of photographs
- Sketches or diagrams
- Signature of person recording the information

Field logbooks will be reviewed on a daily basis by the Field Team Leader. Logbooks will be supported by standardized forms.

5.1.2. Chain-of-Custody Records

On a regular basis (daily or on such a basis that all holding times will be met), samples will be transferred to the custody of the respective laboratories, via third-party commercial carriers or via laboratory courier service.

Chain-of-custody records are initiated by the samplers in the field. The field portion of the custody documentation should include: (1) the project name; (2) signatures of samplers; (3) the sample number, date and time of collection, and whether the sample is grab or composite; (4) signatures of individuals involved in sampling; and (5) if applicable, air bill or other shipping number. Sample receipt and log-in procedures at the laboratory are described in **Section 5.2.2** of this Plan.

5.1.3. Sample Labeling

Immediately upon collection, each sample will be labeled with a pre-printed adhesive label, which includes the date and time of collection, sampler's initials, tests to be performed, preservative (if applicable), and a unique identifier.

A. The following identification scheme will be used:

Soil borings will be assigned sequential numbers. For soil samples collected from soil borings, sample numbers will be assigned as follows:

SB-#(sampling interval)

Example:
Sample SB-4(4-6') = soil sample collected from soil boring #4 at a depth of 5-6' below grade.

Groundwater wells will be assigned sequential numbers. Groundwater samples will be identified by the well that the sample was collected from.

Examples:
MW-01 = groundwater sample collected from permanent well point #1

Sub-slab soil vapor/soil vapor/ambient air will be assigned numbers coordinating with the adjacent soil boring or a sequential number due to sample names being identical to a previous Site sampling event. Vapor samples will be identified by the soil gas point that the sample was collected from.

Examples:
SV-01 = Soil vapor sample collected from the soil gas point
OA-01 = Outdoor ambient air sample

Duplicate samples will be labeled as blind duplicates by giving them sample numbers indistinguishable from a normal sample.

Blanks should be spelled out and identify the associated matrix, e.g., Equipment Blank, Soil

MS/MSDs will be noted in the Comments column of the COC.

B. The analysis required will be indicated for each sample.

Example: SVOC

C. Date taken will be the date the sample was collected, using the format: MM-DD-YY.

Example: 11-07-24

D. Time will be the time the sample was collected, using military time.

Example: 14:30

E. The sampler's name will be printed in the "Sampled By" section.

F. Other information relevant to the sample.

Example: Equipment Blank

An example sample label is presented below:

Job No:	XXXXXXXXX
Client:	Name
Sample No:	SB-01(5-5.5')
Matrix:	Soil
Date Taken:	11/07/24
Time Taken:	14:30
Sampler:	M. Frey
Analysis:	SVOC

Job No. ____
Client: ____
Sample Number ______________________________________
Date ____________________ Sample Time ____________________
Sample Matrix ______________________________________
Grab or Composite (explain) ___________________________
Preservatives _______________________________________
Analyses ____
Sampler Signature____________________________________

This sample label contains the authoritative information for the sample. Inconsistencies with other documents will be settled in favor of the vial or container label unless otherwise corrected in writing from the field personnel collecting samples or the QEP.

5.2. Sample Custody

Custody is one of several factors that are necessary for the admissibility of environmental data as evidence in a court of law. Custody procedures help to satisfy the two major requirements for admissibility: relevance and authenticity. Sample custody is addressed in three parts: field sample collection, laboratory analysis, and final evidence files.

A sample or evidence file is considered to be under a person's custody if

- the item is in the actual possession of a person
- the item is in the view of the person after being in actual possession of the person
- the item was in the actual physical possession of the person but is locked up to prevent tampering
- the item is in a designated and identified secure area

5.2.1. Field Custody Procedures

Samples will be collected following the sampling procedures documented in **Section 4.0** of this Plan. Documentation of sample collection is described in **Section 5.1** of this Plan. Sample chain-of-custody and packaging procedures are summarized below. These procedures are intended to ensure that the samples will arrive at the laboratory with the chain-of-custody intact.

- The field sampler is personally responsible for the care and custody of the samples until they are transferred or dispatched properly. Field procedures have been designed such that as few people as possible will handle the samples.

- All bottles will be identified by the use of sample labels with sample numbers, sampling locations, date/time of collection, and type of analysis.

- Sample labels will be completed for each sample using waterproof ink unless prohibited by weather conditions. For example, a logbook notation would explain that a pencil was used to fill out the sample label because the pen would not function in wet weather.

- Samples will be accompanied by a properly completed chain-of-custody form. The sample numbers and locations will be listed on the chain-of-custody form. When transferring the possession of samples, the individuals relinquishing and receiving will sign, date, and note the time on the record. This record documents the transfer of custody of samples from the sampler to another person, to a mobile laboratory, to the permanent laboratory, or to/from a secure storage location.

- All shipments will be accompanied by the chain-of-custody record identifying the contents. The original record will accompany the shipment, and copies will be retained by the sampler and placed in the project files.

- Samples will be properly packaged for shipment and dispatched to the appropriate laboratory for analysis, with a separate signed custody record enclosed in and secured to the inside top of each sample box or cooler. If third party commercial carriers are used for transfer to the laboratory, shipping containers will be secured with strapping tape and custody seals prior to shipment. The custody seals will be attached to the front right and back left of the cooler and covered with clear plastic tape after being signed by field personnel. The cooler will be strapped shut with strapping tape in at least two locations.

- If the samples are sent by third party commercial carrier, the air bill will be used. Air bills will be retained as part of the permanent documentation. Commercial carriers are not required to sign off on the custody forms since the custody forms will be sealed inside the sample cooler and the custody seals will remain intact.

- Samples remain in the custody of the sampler until transfer of custody is completed. This consists of delivery of samples to the laboratory courier or sample custodian, and signature of the laboratory courier or sample custodian on chain-of-custody document as receiving the samples and signature of sampler as relinquishing samples.

5.2.2. Laboratory Custody Procedures

Samples will be received and logged in by a designated sample custodian or his/her designee. Upon sample receipt, the sample custodian will

- Examine the shipping containers to verify that the custody tape is intact,
- Examine all sample containers for damage,
- Determine if the temperature required for the requested testing program has been maintained during shipment and document the temperature on the chain-of-custody records,
- Compare samples received against those listed on the chain-of-custody,
- Verify that sample holding times have not been exceeded,
- Examine all shipping records for accuracy and completeness,
- Determine sample pH (if applicable) and record on chain-of-custody forms,
- Sign and date the chain-of-custody immediately (if shipment is accepted) and attach the air bill,
- Note any problems associated with the coolers and/or samples on the cooler receipt form and notify the Laboratory Project Manager, who will be responsible for contacting the QEP,
- Attach laboratory sample container labels with unique laboratory identification and test, and
- Place the samples in the proper laboratory storage.

Following receipt, samples will be logged in according to the following procedure:

- The samples will be entered into the laboratory tracking system. At a minimum, the following information will be entered: project name or identification, unique sample numbers (both client and internal laboratory), type of sample, required tests, date and time of laboratory receipt of samples, and field ID provided by field personnel.
- The Laboratory Project Manager will be notified of sample arrival.
- The completed chain-of-custody, air bills, and any additional documentation will be placed in the final evidence file.

6.0 CALIBRATION PROCEDURES

6.1. Field Instruments

Field instruments will be calibrated according to the manufacturer's specifications. Calibration procedures performed will be documented in the field logbook and will include the date/time of calibration, name of person performing the calibration, reference standard used, temperature at which the readings were taken, and the readings.

6.2. Laboratory Instruments

Calibration procedures for a specific laboratory instrument will consist of initial calibrations, initial calibration verifications, and/or continuing calibration verification. Detailed descriptions of the calibration procedures for a specific laboratory instrument are included in the laboratory's standard operating procedures (SOPs), which describe the calibration procedures, their frequency, acceptance criteria, and the conditions that will require recalibration. These procedures are as required in the respective analytical methodologies (summarized in **Table 2** of this Plan). The initial calibration associated with all analyses must contain a low-level calibration standard which is less than or equal to the quantitation limit.

7.0 SAMPLE PREPARATION AND ANALYTICAL PROCEDURES

No field analyses are anticipated for this program. If site conditions were to warrant field analysis, the responsible contractor will prepare an addendum establishing the field analytical procedures. Analyses of all samples will be performed by NYSDOH ELAP certified laboratories. **Table 2** summarizes the analytical methods to be used during the remediation.

8.0 DATA REDUCTION, VALIDATION, AND REPORTING

Appropriate QC measures will be used to ensure the generation of reliable data from sampling and analysis activities. Proper collection and organization of accurate information followed by clear and concise reporting of the data is a primary goal in this project. Complete data packages suitable for data validation will be provided by the analytical laboratory.

For all analyses, the laboratory will report results that are below the laboratory's reporting limit; these results will be qualified as estimated (J) by the laboratory. The laboratory may be required to report tentatively identified compounds (TICs) for the VOC and SVOC analyses; this will be requested by the sampler on an as-needed basis. A Data Usability Summary Report (DUSR) will be prepared and will be included in the Remedial Investigation Report (RIR). A DUSR preparer for the Remedial Investigation has not been employed.

8.1. Data Evaluation/Validation

8.1.1. Field Data Evaluation

Measurements and sample collection information will be transcribed directly into the field logbook or onto standardized forms. If errors are made, results will be legibly crossed out, initialed, and dated by the person recording the data, and corrected in a space adjacent to the original (erroneous) entry. Daily reviews of the field records by the Field Team Leader will ensure that:

- Logbooks and standardized forms have been filled out completely and that the information recorded accurately reflects the activities that were performed.
- Records are legible and in accordance with good record keeping procedures, i.e., entries are signed and dated, data are not obliterated, changes are initialed, dated, and explained.
- Sample collection, handling, preservation, and storage procedures were conducted in accordance with the protocols described in the Plan, and that any deviations were documented and approved by the appropriate personnel.

8.1.2. Data Usability

A Data Usability Summary Report (DUSR) will be prepared in accordance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

The data usability evaluation will include reviewing the quality assurance/quality control (QA/QC) information including: (1) chain-of-custody; (2) the summary QA/QC information provided by the laboratory; and (3) the project narrative.

For each data package the following questions will be evaluated:

- Is the data package complete as defined under the requirements for the NYSDEC ASP Category B, USEPA CLP deliverables or other standards/guidance?
- Have all holding times and preservation requirements been met?
- Do the quality control (QC) data fall within the laboratory and project established limits and specifications?

8.2. Identification and Treatment of Outliers

Any data point which deviates markedly from others in its set of measurements will be investigated; however, the suspected outlier will be recorded and retained in the data set. One or both of the following tests will be used to identify outliers.

Dixon's test for extreme observations is an easily computed procedure for determining whether a single very large or very small value is consistent with the remaining data. The one-tailed t-test for difference may also be used in this case. It should be noted that these tests are designed for testing a single value. If more than one outlier is suspected in the same data set, other statistical sources may be consulted and the most appropriate test of hypothesis will be used and documented, if warranted.

Since an outlier may result from unique circumstances at the time of sample analysis or data collection, those persons involved in the analysis and data reduction will be consulted. This may provide an experimental reason for the outlier. Further statistical analysis may be performed with and without the outlier to determine its effect on the conclusions. In many cases, two data sets may be reported, one including, and one excluding the outlier.

In summary, every effort will be made to include the outlying values in the reported data. If the value is rejected, it will be identified as an outlier, reported with its data set and its omission noted.

9.0 INTERNAL QUALITY CONTROL

The subcontracting laboratories' Quality Assurance Project Plans will identify the supplemental internal analytical quality control procedures to be used. At a minimum, this will include:

- Matrix spike and/or matrix spike duplicate samples
- Matrix duplicate analyses
- Laboratory control samples
- Instrument calibrations
- Instrument tunes for SW-846 8260B and 8270C and EPA Method TO-15 analyses
- Method and/or instrument blanks
- Surrogate spikes for organic analyses
- Internal standard spikes for SW-846 8260B and 8270C and EPA Method TO-15 analyses
- Quantitation limit determination and confirmation by analysis of low-level calibration standard

As outline on **Table 5** and summarized in **Section 4.13**, field quality control samples will include:

- Equipment blanks
- Field duplicate samples
- Trip blanks
- MS/MSDs

10.0 CORRECTIVE ACTION

The entire sampling program will be under the direction of the QEP. The emphasis in this program is on preventing problems by identifying potential errors, discrepancies, and gaps in the data-collection-laboratory-analysis-interpretation process. Any problems identified will be promptly resolved. Likewise, follow-up corrective action is always an option in the event that preventative corrective actions are not totally effective.

The acceptance limits for the sampling and analyses to be conducted in this program will be those stated in the method or defined by other means in the Plan. Corrective actions are likely to be immediate in nature and most often will be implemented by the contracted laboratory analyst or the Program Manager. The corrective action will usually involve recalculation, reanalysis, or resampling.

10.1. <u>Immediate Corrective Action</u>

Corrective action in the field may be needed when the sample network is changed (i.e., more/less samples, sampling locations other than those specified in the Plan), or when sampling procedures and/or field analytical procedures require modification, etc. due to unexpected conditions. The field team may identify the need for corrective action. The Field Team Leader will approve the corrective action and notify the Program Manager. The Program Manager will approve the corrective measure. The Field Team Leader will ensure that the corrective measure is implemented by the field team.

Corrective actions will be implemented and documented in the field logbook. Documentation will include:

- A description of the circumstances that initiated the corrective action,
- The action taken in response,
- The final resolution, and
- Any necessary approvals

No staff member will initiate corrective action without prior communication of findings through the proper channels.

Corrective action in the laboratory may occur prior to, during, and after initial analyses. A number of conditions such as broken sample containers, omissions or discrepancies with chain-of-custody documentation, low/high pH readings, and potentially high concentration samples may be identified during sample log-in or just prior to analysis. Following consultation with laboratory analysts and Laboratory Section Leaders, it may be necessary for the Laboratory QA Manager to approve the implementation of corrective action. The laboratory SOPs specify some conditions during or after analysis that may automatically trigger corrective action or optional procedures. These conditions may include dilution of samples, additional sample extract cleanup, automatic reinjection/reanalysis when certain QC criteria are not met, loss of sample through breakage or spillage, etc.

The analyst may identify the need for corrective action. The Laboratory Section Leader, in consultation with the staff, will approve the required corrective action to be implemented by the laboratory staff. The Laboratory QA Manager will ensure implementation and documentation of the corrective action. If the nonconformance causes project objectives not to be achieved, the QEP will be notified. The QEP will notify the Program Manager, who in turn will contact all levels of project management for concurrence with the proposed corrective action.

These corrective actions are performed prior to release of the data from the laboratory. The corrective action will be documented in both the laboratory's corrective action files, and the narrative data report sent from the laboratory to the Program Manager. If the corrective action does not rectify the situation, the laboratory will contact the Program Manager, who will determine the action to be taken and inform the appropriate personnel.

If potential problems are not solved as an immediate corrective action, the contractor will apply formalized long-term corrective action, if necessary.

TABLES

Table 1 A
Soil Criteria Table

9 N. 15th Street Site
Brooklyn, New York
BCP Site No. TBD
QAPP/FSP

Contaminant	Protection of Public Health					Protection of Ecological Resources[n]	Protection of Groundwater
	Unrestricted Use	Residential	Restricted-Residential	Commercial	Industrial		
All soil cleanup objectives (SCOs) are in parts per million (ppm); approximately equivalent to mg/kg.							
Metals							
Arsenic	13 [m]	16 [f]	17 [f]	18 [f]	19 [f]	13 [f]	16 [f]
Barium	350 [m]	350 [f]	400	400	10,000 [d]	433	820
Beryllium	7.2	14	72	590	2,700	10	47
Cadmium	2.5 [m]	2.5 [f]	4.3	9.3	60	4	7.5
Chromium, hexavalent [h]	1 [l]	22	110	400	800	1 [e]	19
Chromium, trivalent[h]	30 [m]	36	180	1,500	6,800	41	NS
Copper	50	270	270	270	10,000 [d]	50	1,720
Total Cyanide [h]	27	27	27	27	10,000 [d]	NS	40
Lead	63 [m]	400	400	1,000	3,900	63 [f]	450
Manganese	1600 [m]	2,000 [f]	2,000 [f]	10,000 [d]	10,000 [d]	1600 [f]	2,000 [f]
Total Mercury	0.18 [m]	0.81 [j]	0.81 [j]	2.8 [j]	5.7 [j]	0.18 [f]	0.73
Nickel	30	140	310	310	10,000 [d]	30	130
Selenium	3.9 [m]	36	180	1,500	6,800	3.9 [f]	4 [f]
Silver	2	36	180	1,500	6,800	2	8.3
Zinc	109 [m]	2200	10,000 [d]	10,000 [d]	10,000 [d]	109 [f]	2,480
PCBs/Pesticides							
2,4,5-TP Acid (Silvex)	3.8	58	100 [a]	500 [b]	1,000 [c]	NS	3.8
4,4'-DDE	0.0033 [l]	1.8	8.9	62	120	0.0033 [e]	17
4,4'-DDT	0.0033 [l]	1.7	7.9	47	94	0.0033 [e]	136
4,4'-DDD	0.0033 [l]	2.6	13	92	180	0.0033 [e]	14
Aldrin	0.005 [m]	0.019	0.097	0.68	1.4	0.14	0.19
alpha-BHC	0.02	0.097	0.48	3.4	6.8	0.04 [g]	0.02
beta-BHC	0.036	0.072	0.36	3	14	0.6	0.09
Chlordane (alpha)	0.094	0.91	4.2	24	47	1.3	2.9
delta-BHC	0.04	100 [a]	100 [a]	500 [b]	1,000 [c]	0.04 [g]	0.25
Dibenzofuran	7	14	59	350	1,000 [c]	NS	210
Dieldrin	0.005 [m]	0.039	0.2	1.4	2.8	0.006	0.1
Endosulfan I	2.4	4.8 [i]	24 [i]	200 [i]	920 [i]	NS	102
Endosulfan II	2.4	4.8 [i]	24 [i]	200 [i]	920 [i]	NS	102
Endosulfan sulfate	2.4	4.8 [i]	24 [i]	200 [i]	920 [i]	NS	1,000 [c]
Endrin	0.014	2.2	11	89	410	0.014	0.06
Heptachlor	0.042	0.42	2.1	15	29	0.14	0.38
Lindane	0.1	0.28	1.3	9.2	23	6	0.1
Polychlorinated biphenyls	0.1	1	1	1	25	1	3.2
Semivolatiles							
Acenaphthene	20	100 [a]	100 [a]	500 [b]	1,000 [c]	20	98
Acenapthylene	100 [k]	100 [a]	100 [a]	501 [b]	1,000 [c]	NS	107
Anthracene	100 [k]	100 [a]	100 [a]	502 [b]	1,000 [c]	NS	1,000 [c]
Benz(a)anthracene	1 [m]	1 [f]	1 [f]	5.6	11	NS	1[f]
Benzo(a)pyrene	1 [m]	1 [f]	1 [f]	1 [f]	1.1	2.6	22
Benzo(b)fluoranthene	1 [m]	1 [f]	1 [f]	5.6	11	NS	1.7
Benzo(g,h,i)perylene	100	100 [a]	100 [a]	500 [b]	1,000 [c]	NS	1,000 [c]
Benzo(k)fluoranthene	0.8 [m]	1	3.9	56	110	NS	1.7
Chrysene	1 [m]	1[f]	3.9	56	110	NS	1[f]
Dibenz(a,h)anthracene	0.33 [l]	0.33 [e]	0.33 [e]	0.56	1.1	NS	1,000 [c]
Fluoranthene	100 [k]	100 [a]	100 [a]	500 [b]	1,000 [c]	NS	1,000 [c]
Fluorene	30	100 [a]	100 [a]	500 [b]	1,000 [c]	30	386
Indeno(1,2,3-cd)pyrene	0.5 [m]	0.5 [f]	0.5 [f]	5.6	11	NS	8.2
m-Cresol	0.33 [l]	100 [a]	100 [a]	500 [b]	1,000 [c]	NS	0.33 [e]
Naphthalene	12	100 [a]	100 [a]	500 [b]	1,000 [c]	NS	12
o-Cresol	0.33 [l]	100 [a]	100 [a]	500 [b]	1,000 [c]	NS	0.33 [e]
p-Cresol	0.33 [l]	34	100 [a]	500 [b]	1,000 [c]	NS	0.33 [e]
Pentachlorophenol	0.8 [l]	2.4	6.7	6.7	55	0.8 [e]	0.8 [e]
Phenanthrene	100	100 [a]	100 [a]	500 [b]	1,000 [c]	NS	1,000 [c]
Phenol	0.33 [l]	100 [a]	100 [a]	500 [b]	1,000 [c]	30	0.33 [e]
Pyrene	100	100 [a]	100 [a]	500 [b]	1,000 [c]	NS	1,000 [c]

Table 1 A
Soil Criteria Table

9 N. 15th Street Site
Brooklyn, New York
BCP Site No. TBD
QAPP/FSP

Contaminant	Protection of Public Health					Protection of Ecological Resources[n]	Protection of Groundwater
	Unrestricted Use	Residential	Restricted-Residential	Commercial	Industrial		
All soil cleanup objectives (SCOs) are in parts per million (ppm); approximately equivalent to mg/kg.							
Volatiles							
1,1,1-Trichloroethane	0.68	100 [a]	100 [a]	500 [b]	1,000 [c]	NS	0.68
1,1-Dichloroethane	0.27	19	26	240	480	NS	0.27
1,1-Dichloroethene	0.33	100 [a]	100 [a]	500 [b]	1,000 [c]	NS	0.33
1,2-Dichlorobenzene	1.1	100 [a]	100 [a]	500 [b]	1,000 [c]	NS	1.1
1,2-Dichloroethane	0.02 [m]	2.3	3.1	30	60	10	0.02 [f]
cis-1,2-Dichloroethene	0.25	59	100 [a]	500 [b]	1,000 [c]	NS	0.25
trans-1,2-Dichloroethene	0.19	100 [a]	100 [a]	500 [b]	1,000 [c]	NS	0.19
1,3-Dichlorobenzene	2.4	17	49	280	560	NS	2.4
1,4-Dichlorobenzene	1.8	9.8	13	130	250	20	1.8
1,4-Dioxane	0.1 [l]	9.8	13	130	250	0.1 [e]	0.1 [e]
Acetone	0.05	100[a]	100[b]	500 [b]	1,000 [c]	2.2	0.05
Benzene	0.06	2.9	4.8	44	89	70	0.06
Butylbenzene	12	100[a]	100[a]	500 [b]	1,000 [c]	NS	12
Carbon tetrachloride	0.76	1.4	2.4	22	44	NS	0.76
Chlorobenzene	1.1	100[a]	100[a]	500 [b]	1,000 [c]	40	1.1
Chloroform	0.37	10	49	350	700	12	0.37
Ethylbenzene	1	30	41	390	780	NS	1
Hexachlorobenzene	0.33 [l]	0.33[e]	1.2	6	12	NS	3.2
Methyl ethyl ketone	0.12	100 [a]	100 [a]	500 [b]	1,000 [c]	100 [a]	0.12
Methyl tert-butyl ether	0.93	62	100 [a]	500 [b]	1,000 [c]	NS	0.93
Methylene chloride	0.05	51	100 [a]	500 [b]	1,000 [c]	12	0.05
n-Propylbenzene	3.9	100 [a]	100 [a]	500 [b]	1,000 [c]	NS	3.9
sec-Butylbenzene	11	100 [a]	100 [a]	500 [b]	1,000 [c]	NS	11
tert-Butylbenzene	5.9	100 [a]	100 [a]	500 [b]	1,000 [c]	NS	5.9
Tetrachloroethene	1.3	5.5	19	150	300	2	1.3
Toluene	0.7	100 [a]	100 [a]	500 [b]	1,000 [c]	36	0.7
Trichloroethene	0.47	10	21	200	400	2	0.47
1,2,4-Trimethylbenzene	3.6	47	52	190	380	NS	3.6
1,3,5- Trimethylbenzene	8.4	47	52	190	380	NS	8.4
Vinyl chloride	0.02	0.21	0.9	13	27	NS	0.02
Xylene (mixed)	0.26	100 [a]	100 [a]	500 [b]	1,000 [c]	0.26	1.6
Per-and Polyfluoroalkyl Substances (PFAs)[o]							
PFOA	0.00066	0.0066	0.033	0.5	0.6	NS	0.0011
PFOS	0.00088	0.0088	0.044	0.44	0.44	NS	0.0037

Notes:
[a] The SCOs for residential, restricted-residential and ecological resources use were capped at a maximum value of 100 ppm.
[b] The SCOs for commercial use were capped at a maximum value of 500 ppm.
[c] The SCOs for industrial use and the protection of groundwater were capped at a maximum value of 1000 ppm.
[d] The SCOs for metals were capped at a maximum value of 10,000 ppm.
[e] For constituents where the calculated SCO was lower than the contract required quantitation limit (CRQL), the CRQL is used as the SCO value.
[f] For constituents where the calculated SCO was lower than the rural soil background concentration as determined by the Department and Department of Health rural soil survey, the rural soil background concentration is used as the Track 2 SCO value for this use of the site.
[g] This SCO is derived from data on mixed isomers of BHC.

[h] The SCO for this specific compound (or family of compounds) is considered to be met if the analysis for the total species of this contaminant is below the specific SCO.
[i] This SCO is for the sum of endosulfan I, endosulfan II, and endosulfan sulfate.
[j] This SCO is the lower of the values for mercury (elemental) or mercury (inorganic salts).
[k] The SCOs for unrestricted use were capped at a maximum value of 100 ppm.
[l] For constituents where the calculated SCO was lower than the contract required quantitation limit (CRQL), the CRQL is used as the Track 1 SCO value.
[m] For constituents where the calculated SCO was lower than the rural soil background concentration, as determined by the Department and Department of Health rural soil survey, the rural soil background concentration is used as the Track 1 SCO value for this use of the site.
[n] Protection of ecological resources SCOs were not developed for contaminants identified in Table 375-6.8(b) with "NS". Where such contaminants appear in Table 375-6.8(a), the applicant may be required by the Department to calculate a protection of ecological resources SCO according to the TSD.
[o] SCOs for PFAs are taken from the NYSDEC Sampling, Analysis, and Assessment of Per-and-Polyfluoroalkyl Substances (PFAS) under NYSDEC's Part 375 Remedial Programs, dated April 2023.

Table 1B
Groundwater Criteria Table
9 N. 15th Street Site
Brooklyn, New York
BCP Site No. TBD

Contaminant	Aqueous Water Quality Standards[1], ug/L
Metals	
Antimony	3
Arsenic	---
Arsenic	25
Barium	1,000
Beryllium	3
Cadmium	5
Chromium, hexavalent	---
Chromium, trivalent	50
Copper	200
Cyanide	---
Iron	300
Lead	25
Magnesium	35,000
Manganese	300
Mercury	0.7
Nickel	100
Selenium	10
Silver	50
Sodium	20,000
Thallium	0.5
Zinc	2000
PCBs/Pesticides	
alpha-BHC	0.01
2,4,5-TP Acid (Silvex)	---
4,4'-DDD	0.3
4,4'-DDE	0.2
4,4'-DDT	0.2
Aldrin	---
beta-BHC	0.04
Chlordane (alpha)	---
Dibenzofuran	---
Dieldrin	0.004
Endosulfan I	0.12
Endosulfan II	0.12
Endosulfan sulfate	0.12
Endrin	---
Endrin aldehyde	5
Endrin ketone	5
gamma-BHC (Lindane)	0.05

Table 1B
Groundwater Criteria Table
9 N. 15th Street Site
Brooklyn, New York
BCP Site No. TBD

Contaminant	Aqueous Water Quality Standards[1], ug/L
PCBs/Pesticides, Con't.	
gamma-Chlordane	0.12
Heptachlor	0.04
Heptachlor epoxide	0.03
Lindane	---
Methoxychlor	35
Polychlorinated biphenyls	---
Toxaphene	0.06
Semivolatiles	
1,1'-Biphenyl	5
2,2'-oxybis(1-Chloropropane)	5
2,4,5-Trichlorophenol	1
2,4-Dichlorophenol	1
2,4-Dimethylphenol	50
2,4-Dinitrophenol	10
2,4-Dinitrotoluene	5
2,6-Dinitrotoluene	5
2-Chloronaphthalene	10
2-Chlorophenol	1
2-Methylnaphthalene	502
2-Methylphenol	1
2-Nitroaniline	5
2-Nitrophenol	1
3,3'-Dichlorobenzidine	5
3-Nitroaniline	5
4-Chloro-3-methylphenol	1
4-Chloroaniline	5
4-Methylphenol	1
4-Nitroaniline	5
4-Nitrophenol	1
Acenaphthene	20
Acenapthylene	202
Anthracene	50
Atrazine	7.5
Benz(a)anthracene	0.002
Benzo(a)pyrene	---
Benzo(b)fluoranthene	0.002
Benzo(g,h,i)perylene	52
Benzo(k)fluoranthene	0.002
bis(2-Chloroethoxy)methane	5

Table 1B
Groundwater Criteria Table
9 N. 15th Street Site
Brooklyn, New York
BCP Site No. TBD

Contaminant	Aqueous Water Quality Standards[1], ug/L
Semivolatiles, Con't.	
Bis(2-Chloroethyl)ether	1
bis(2-Ethylhexyl)phthalate	5
Butylbenzylphthalate	50
Chrysene	0.002
Dibenz(a,h)anthracene	502
Dibenzofuran	52
Diethylphthalate	50
Dimethylphthalate	50
Di-n-butylphthalate	50
Di-n-octylphthalate	50
Fluoranthene	50
Fluorene	50
Hexachlorobenzene	0.04
Hexachlorobutadiene	0.5
Hexachlorocyclopentadiene	5
Hexachloroethane	5
Indeno(1,2,3-cd)pyrene	0.002
Isophorone	50
m-Cresol	---
Naphthalene	10
Nitrobenzene	0.4
N-Nitrosodiphenylamine	50
o-Cresol	---
p-Cresol	---
Pentachlorophenol	1
Phenanthrene	50
Phenol	1
Pyrene	50
Volatiles	
1,1,1-Trichloroethane	5
1,1,2,2-Tetrachloroethane	5
1,1,2-Trichloro-1,2,2-trifluoroethane	5
1,1,2-Trichloroethane	1
1,1-Dichloroethane	5
1,1-Dichloroethene	5
1,1-Dichloroethylene	---
1,2,4-Trichlorobenzene	---

Table 1B
Groundwater Criteria Table
9 N. 15th Street Site
Brooklyn, New York
BCP Site No. TBD

Contaminant	Aqueous Water Quality Standards[1], ug/L
Volatiles, Con't.	
1,2,4-Trimethylbenzene	5
1,2-Dibromo-3-chloropropane	0.04
1,2-Dibromoethane	0.0006
1,2-Dichlorobenzene	3
1,2-Dichloroethane	0.6
1,2-Dichloropropane	1
1,3,5- Trimethylbenzene	---
1,3-Butadiene	---
1,3-Dichlorobenzene	3
1,3-Dichlorobenzene	---
1,4-Dichlorobenzene	3
1,4-Dichlorobenzene	---
1,4-Dioxane	0.35[2]
2-Butanone	50
2-Hexanone	50
4-Methyl-2-pentanone	502
Acetone	50
Benzene	1
Bromodichloromethane	50
Bromoform	50
Bromomethane	5
Butylbenzene	---
Carbon Disulfide	60
Carbon tetrachloride	5
Chlorobenzene	5
Chloroethane	5
Chloroform	7
Chloromethane	5
Cis- 1,3-Dichloropropene	0.4
cis-1,2-Dichloroethene	5
cis-1,2-Dichloroethylene	---
Cyclohexane	---
Dibromochloromethane	50
Dichlorodifluoromethane	5
Ethyl Acetate	---
Ethylbenzene	5
Freon 113	---
Hexachlorobenzene	---

Table 1B
Groundwater Criteria Table
9 N. 15th Street Site
Brooklyn, New York
BCP Site No. TBD

Contaminant	Aqueous Water Quality Standards[1], ug/L
Volatiles, Con't.	
Hexachlorobutadiene	---
Hexane	---
Isopropylbenzene	5
m,p-Xylene	---
m-Dichlorobenzene	---
Methyl Acetate	NS
Methyl ethyl ketone	---
Methyl Isobutyl Ketone	---
Methyl tert-butyl ether	10
Methylcyclohexane	---
Methylene chloride	5
n-Propylbenzene	---
o-Dichlorobenzene	---
o-Xylene	---
p-Dichlorobenzene	---
sec-Butylbenzene	---
Styrene	5
tert-Butylbenzene	---
Tertiary Butyl Alcohol	---
Tetrachloroethene	5
Toluene	5
trans-1,2-Dichloroethene	5
trans-l,3-Dichloropropene	0.4
Trichloroethene	5
Trichlorofluoromethane	5
Vinyl Acetate	---
Vinyl Chloride	2
Xylene (mixed)	5
Per- and Polyfluoroalkyl Substances (PFAS)	
PFOA	0.0067[3]
PFOS	0.0027[3]

Notes:

[1] - Division of Water Technical and Operational Guidance Values (TOGS) Ambient Water Quality Standards and Guidance Values (AWQS), ug/L

[2] - Guidance value for PFOA, PFOS, and 1,4-dioxane is from the NYSDEC final AWQGVs, dated March 2023.

ug/L - micro gram per liter

Table 1C
Soil Vapor Criteria Table
9 N. 15th Street Site
Brooklyn, New York
BCP Site No. TBD

Volatile Organics in Air	CAS No.	NYSDOH Soil Vapor Intrusion Guidance Criteria				Toxicity	Decision Matrix
		1	2	3	4		
1,1,1-Trichloroethane	71556	2.5	20.6	-	-	L	**B**
1,1,2,2-Tetrachloroethane	79345	0.4	-	-	-	M	TD
1,1,2-Trichloroethane	79005	0.4	<1.5	-	-	H	TD
1,1-Dichloroethane	75343	0.4	<0.7	-	-	L	TD
1,1-Dichloroethene	75354	0.4	<1.4	-	-	M	B
1,2,4-Trichlorobenzene	120821	0.5	<6.8	-	-	NA	TD
1,2,4-Trimethylbenzene	95636	9.8	9.5	-	-	NA	D
1,2-Dibromoethane	106934	0.4	<1.5	-	-	H	TD
1,2-Dichlorobenzene	95501	0.5	<1.2	-	-	M	TD
1,2-Dichloroethane	107062	0.4	<0.9	-	-	H	TD
1,2-Dichloropropane	78875	0.4	<1.6	-	-	M	TD
1,3,5-Trimethybenzene	108678	3.9	3.7	-	-	M	D
1,3-Butadiene	106990	-	<3.0	-	-	H	TD
1,3-Dichlorobenzene	541731	0.5	<2.4	-	-	M	TD
1,4-Dichlorobenzene	106467	1.2	5.5	344	-	M	TD
1,4-Dioxane	123911	-	-	-	-	M	TD
2,2,4-Trimethylpentane	540841	5	-	-	-	M	D
2-Butanone	78933	16	12	-	-	M	TD
2-Hexanone	591786	-	-	-	-	NA	TD
3-Chloropropene	107051	-	-	-	-	M	TD
4-Ethyltoluene	622968	-	3.6	-	-	NA	TD
4-Methyl-2-pentanone	108101	1.9	6	-	-	M	TD
Acetone	67641	115	98.9	45.8	-	L	TD
Benzene	71432	13	9.4	10	-	H	D
Benzyl chloride	100447	-	<6.8	-	-	H	TD
Bromodichloromethane	75274	-	-	-	-	M	TD
Bromoform	75252	-	-	-	-	M	TD
Bromomethane	74839	0.5	<1.7	-	-	M	TD
Carbon disulfide	75150	-	4.2	-	-	M	TD
Carbon tetrachloride	56235	1.3	<1.3	1.1	-	H	A
Chlorobenzene	108907	0.4	<0.9	-	-	M	TD
Chloroethane	75003	0.4	<1.1	-	-	L	TD
Chloroform	67663	1.2	1.1	6.34	-	H	TD
Chloromethane	74873	4.2	3.7	-	-	M	TD
cis-1,2-Dichloroethene	156592	0.4	<1.9	-	-	M	B
cis-1,3-Dichloropropene	10061015	0.4	<2.3	-	-	NA	TD
Cyclohexane	110827	6.3	-	-	-	L	D

Table 1C
Soil Vapor Criteria Table
9 N. 15th Street Site
Brooklyn, New York
BCP Site No. TBD

Volatile Organics in Air	**CAS No.**	NYSDOH Soil Vapor Intrusion Guidance Criteria				**Toxicity**	Decision Matrix
		1	**2**	**3**	**4**		
Dibromochloromethane	124481	-	-	-	-	NA	TD
Dichlorodifluoromethane	75718	10	16.5	-	-	NA	TD
Ethanol	64175	1300	210	-	-	L	TD
Ethyl Acetate	141786	-	5.4	-	-	M	TD
Ethylbenzene	100414	6.4	5.7	7.62	-	M	D
Freon-113	76131	2.5	3.5	-	-	L	TD
Freon-114	76142	0.4	<6.8	-	-	NA	TD
Heptane	142825	18	-	-	-	M	E
Hexachlorobutadiene	87683	0.5	<6.8	-	-	M	TD
Isopropanol	67630	-	-	-	-	M	TD
Methyl tert butyl ether	1634044	14	11.5	36	-	M	TD
Methylene chloride	75092	16	10	7.5	60	NA	TD
n-Hexane	110543	14	10.2	-	-	M	E
o-Xylene	95476	7.1	7.9	7.24	-	M	D
p/m-Xylene	179601231	11	22.2	22.2	-	M	E
Styrene	100-42-5	1.4	1.9	5.13	-	M	TD
Tertiary butyl Alcohol	75-65-0	-	-	-	-	NA	TD
Tetrachloroethene (PCE)	127184	2.5	15.9	6.01	30	H	B
Tetrahydrofuran	109999	0.8	-	-	-	M	TD
Toluene	108883	57	43	39.8	-	L	F
trans-1,2-Dichloroethene	156605	-	-	-	-	NA	TD
trans-1,3-Dichloropropene	10061026	NC	<1.3	-	-	NA	TD
Trichloroethene	79016	0.5	4.2	1.36	2	H	A
Trichlorofluoromethane	75694	12	18.1	-	-	L	TD
Vinyl bromide	593602	-	-	-	-	H	TD
Vinyl chloride	75014	0.4	<1.9	-	-	H	A

Notes
Decision Criteria used:
Martix A: Sub-Slab >5, Indoor Air >5 — ND - Non-detect
Martix B: Sub-Slab >100, Indoor Air >30 — NA - Not applicable
Toxicities from DAR-1 Appendix C/SCG/ACG — NFA - No further action
(H) HIGH Toxicity Contaminant. — TD - To be determined based on the NYSDOH VI Decision
(M) MODERATE Toxicity Contaminant.
(L) LOW Toxicity Contaminant. — easonable - Take reasonable/practical actions to identify source/reduce exposure

<u>NYSDOH Soil Vapor Intrusion Guidance Criteria</u>
1 - Table C-1 2003 Upper Fence Study of Volatile Organic Chemicals in air of Fuel Oil Heated Homes for Indoor Air
2 - Table C-2 2001 USEPA BASE 90th Percentile for Indoor Air
3 -Table C-5 2005 Health Effects Institute 95th Percentile for Indoor Air
4 -NYSDOH Air Guidance Value
NYSDOH Specific Compounds for Matrix Eval

Table 2

Typical Analytical Parameters, Methods, Preservation, Holding Time and Container Requirements

9 N. 15th Street Site

Brooklyn, New York

BCP Site No. TBD

Sample Matrix	Analytical Parameter	Numer of Samples[1]	EPA Analytical Method	Sample Preservation	Holding Time[2]	Sample Container[3]
Soil	VOCs + TICs (TCL)	33	SW-846 Method 8260C/5035	Cool to 4^0 C no headspace	14 days to analysis	(3) Encore
Soil	PCBs	22	SW-846 Method 8082A	Cool to 4^0 C	365 days to analysis	(1) 250 mL amber glass jar
Soil	Pesticides (TCL)	22	SW-846 Method 8081A	Cool to 4^0 C	14 days to extraction	(1) 250 mL amber glass jar
Soil	SVOCs + TICs (TCL)	22	SW-846 Method 8270D	Cool to 4° C	14 days to extraction	(1) 250 mL amber glass jar
Soil	1,4-Dioxane	22	SW-846 Method 8270D	Cool to 4° C	7 days to extraction	(2) 250 mL amber glass jars
Soil	Metals	22	SW-846 Method 6010DSeries	Cool to 4^0 C	180 days to analysis	(1) 60 mL glass jar
Soil	Mercury	22	SW-846 Method 7470 A	Cool to 4^0 C	28 days to analysis	(1) 60 mL glass jar
Soil	Hexavalent chromium	22	EPA 3060A/7196A	Cool to 4^0 C	14 days to analysis	(1) 250 mL amber glass jar
Soil	Cyanide	22	SW-846 Method 9010C/9012B	Cool to 4^0 C	14 days to analysis	(1) 250 mL amber glass jar
Soil	Herbicides	22	SW-846 Method 8151A	Cool to 4^0 C	14 days to extraction	(1) 250 mL amber glass jar
Soil	PFAS	22	EPA Method 1633	Cool to 4^0 C	14 Days	(1) 250 mL plastic container
Groundwater	VOCs (TCL)	11	SW-846 Method 8260C	HCl; Cool to 4^0 C; no headspace	14 days to analysis	(3) Vial
Groundwater	VOCs with TICs, including 1,4-Dioxane (TCL)	11	SW-846 Method 8260C	HCl; Cool to 4^0 C; no headspace	14 days to analysis	(3) Vial
Groundwater	1,4-Dioxane	6	SW-846 Method 8270D	Cool to 4^0 C	7 days to analysis	(2) 250 mL amber glass jar
Groundwater	SVOCs (TCL)	6	SW-846 Method 8270D	Cool to 4^0 C	7 days to extraction	(2) 250 mL amber glass jar
Groundwater	SVOCs with TICs (TCL)	6	SW-846 Method 8270D	Cool to 4^0 C	7 days to extraction	(2) 250 mL amber glass jar
Groundwater	Metals- total (TAL)	6	SW-846 Method 6020B/7470A Series	HNO_3; Cool to 4° C	28 days to analysis for Hg; 180 days to analysis for other	(1) 500 mL plastic container
Groundwater	Metals-dissolved (TAL)	6	SW-846 Method 6020B/7470A Series	HNO3; Cool to 4° C	28 days to analysis for Hg; 180 days to analysis for other metals	(1) 500 mL plastic container
Groundwater	Pesticides (TCL)	6	SW-846 Method 8081B	Cool to 4^0 C	7 days to extraction	(2) 120 mL amber glass jar
Groundwater	Herbicides (TCL)	6	SW-846 Method 8151A	Cool to 4^0 C	7 days to extraction	(2) 1000 mL amber glass jar
Groundwater	PCBs	6	SW-846 Method 8082A	Cool to 4^0 C	365 days to analysis	(1) 250 mL amber glass jar
Groundwater	Cyanide	6	SW-846 Method 9012A	Cool to 4^0 C	14 days to analysis	(1) 250 mL amber glass jar
Groundwater	Hexavalent chromium	6	EPA 3060A/7196A	Cool to 4^0 C	14 days to analysis	(1) 250 mL amber glass jar
Groundwater	Mercury	6	SW-846 Method 7470 A	HNO3; Cool to 4° C	28 days to analysis	(1) 250 mL plastic container
Groundwater	PFAS	6	EPA Method 1633	Cool to 4^0 C	14 Days	(1) 250 mL plastic container
Soil Gas & Ambient Air	VOCs	7	EPA Method TO-15	None	14 days to analysis	(1) Evacuated 6-Liter SUMMA® canister

Notes:

[1] Actual number of samples may vary depending on field conditions, sample material availability, and field observations. See RIWP for estimates.

[2] Holding times listed are method holding time calculated from time of collection and not NYSDEC ASP holding times.

[3] MS/MSDs require duplicate volume for all parameters for solid matrices; MS/MSDs require triplicate volume for organic parameters for aqueous matrices and duplicate volume for inorganic parameters for aqueous matrices

Table 3
Typical Laboratory Data Quality Objectives
Soil Samples
9 N. 15th Street., Brooklyn, NY
BCP Site No. TBD

Parameter	Method	Matrix	Accuracy Control Limits	Accuracy Frequency Requirements	Precision (RPD) Control Limits	Precision Frequency Requirements
VOCs (TCL)	SW-846 Methods 8260B/5035	Soil	Surrogates % Rec. 1,2-Dichloroethane-d4 70-130 4-Bromofluorobenzene 70-130 Dibromofluoromethane 70-130 Toluene-d8 70-130 2-Chloroethoxyethane 70-130 Matrix Spikes 30-151% recovery	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 30 per matrix type	Field Duplicates RPD <30 MS/MSDs (RPD) RPD <30	Field Duplicates: One per 20 per soils MS/MSDs: One per 30 per matrix type
VOCs with Tentatively Identified Compounds (TICs)	SW-846 Method 8260C	Soil	Surrogates % Rec. 1,2-Dichloroethane-d4 70-130 4-Bromofluorobenzene 70-130 Dibromofluoromethane 70-130 Toluene-d8 70-130 Matrix Spikes 36-162 % recovery	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 20	Field Duplicates RPD <30 MS/MSDs RPD RPD<30	Field Duplicates: One per 20 MS/MSDs: One per 20
PCBs	SW-846 Method 8082A	Soil	Surrogates % Rec. 2,4,5,6-Tetrachloro-m-xylene 30-150 Decachlorobiphenyl 30-150 Matrix Spikes 40-140% recovery	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 20 per matrix type	Field Duplicates RPD <50 MS/MSDs (RPD) RPD<50	Field Duplicates: One per 20 per soils MS/MSDs: One per 20 per matrix type
SVOCs	SW-846 Method 8270D	Soil	Surrogates % Rec. Phenol-d6 10-120 2-Fluorophenol 25-120 2,4,6-Tribromophenol 10-136 Nitrobenzene-d5 23-120 2-Fluorobiphenyl 30-120 4-Terphenyl-d14 18-120 Matrix Spikes 14-144% recovery	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 50 per matrix type	Field Duplicates RPD <50 MS/MSDs (RPD)	Field Duplicates: One per 20 per soils MS/MSDs: One per 20 per matrix type
SVOCs with TICs	SW-846 Method 8270D	Soil	Surrogates % Rec. Phenol-d5 10-120 2-Fluorophenol 21-120 2,4,6-Tribromophenol 10-120 Nitrobenzene-d5 23-120 2-Fluorobiphenyl 15-120 4-Terphenyl-d14 41-149 Matrix Spikes 14-144%	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 20	<u>Field Duplicates</u> RPD <50 MS/MSDs RPD RPD<50	<u>Field Duplicates:</u> One per 20 MS/MSDs: One per 20
1,4-Dioxane	SW-846 Method 8270D	Soil	Surrogates % Rec. 1,4-Dioxane-d8 15-110 Matrix Spikes 40-140% recovery	Surrogates: All samples, standards, QC samples	Field Duplicates RPD <30 MS/MSDs (RPD) RPD<30	Field Duplicates: One per 20 per soils MS/MSDs: One per 20
Pesticides (TCL)	SW-846 Method 8081A	Soil	Surrogates % Rec. Decachlorobiphenyl 30-150 Tetrachloro-m-xylene 30-150 Matrix Spikes 30-150% Recovery	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 20 per matrix type	Field Duplicates RPD <50 MS/MSDs (RPD) RPD<50	Field Duplicates: One per 20 per soils MS/MSDs: One per 20 per matrix type
Total Petroleum Hydrocarbons	SW-846 Method 8015B	Soil	Surrogates % Rec. o-Terphenyl 27-153 Tetracosane-d50 28-148 5α-androstane 27-148 TPH-DRO 10-149	Surrogates: All samples, standards, QC samples One per 20 per matrix type	Field Duplicates RPD <50 TPH-DRO 44	Field Duplicates: One per 20 per soils One per 20 per matrix type
Herbicides	SW-846 Method 8151A	Soil	Surrogates % Rec. 2,4-DCAA 30-150 Matrix Spikes 30-150% Recovery	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 20 per matrix type	Field Duplicates RPD <50 MS/MSDs (RPD) RPD<50	Field Duplicates: One per 20 per soils MS/MSDs: One per 20 per matrix type
Metals (TAL)	SW-846 Method 6010D	Soil	Surrogates % Rec. Matrix Spikes 75-125% recovery	Surrogates: Matrix Spikes: One per 20 per matrix type	Field Duplicates RPD <20 MS/MSDs (RPD) RPD <20	Field Duplicates: One per 20 per soils MS/MSDs: One per 20 per matrix type

Table 3
Typical Laboratory Data Quality Objectives
Soil Samples
9 N. 15th Street., Brooklyn, NY
BCP Site No. TBD

Parameter	Method	Matrix	Accuracy Control Limits	Accuracy Frequency Requirements	Precision (RPD) Control Limits	Precision Frequency Requirements
PFAs	LCMSMS- Isotope Dilution	Soil	Surrogates % Rec. Perfluoro[13C4]Butanoic Acid (MPFBA) 61-135 Perfluoro[13C4]Butanoic Acid (MPFBA) 58-132 Perfluoro[13C5]Pentanoic Acid (M5PFPEA) 62-163 Perfluoro[13C5]Pentanoic Acid (M5PFPEA) 58-150 Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS) 70-131 Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS) 74-139 Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA) 57-129 Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA) 66-128 Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA) 60-129 Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA) 71-129 Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS) 71-134 Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS) 78-139 Perfluoro[13C8]Octanoic Acid (M8PFOA) 62-129 Perfluoro[13C8]Octanoic Acid (M8PFOA) 75-130 1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS) 14-147 1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS) 20-154 Perfluoro[13C9]Nonanoic Acid (M9PFNA) 59-139 Perfluoro[13C9]Nonanoic Acid (M9PFNA) 72-140 Perfluoro[13C8]Octanesulfonic Acid (M8PFOS) 79-136 Perfluoro[13C8]Octanesulfonic Acid (M8PFOS) 69-131 Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA) 75-130 Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA) 62-124 1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS) 19-175 1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS) 10-162 N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA) 24-116 N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA) 31-134 Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA) 61-155 Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA) 55-137 Perfluoro[13C8]Octanesulfonamide (M8FOSA) 10-112 Perfluoro[13C8]Octanesulfonamide (M8FOSA) 10-117 N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA) 34-137 N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA) 27-126 Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA) 48-131 Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA) 54-150 Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA) 22-136 Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA) 24-159 Matrix Spikes 46-182% recovery	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 20 per matrix type	Field Duplicates RPD <30 MS/MSDs (RPD) RPD <30	Field Duplicates: One per 20 per soils MS/MSDs: One per 20 per matrix type
Mercury	SW-846 Method 7471B	Soil	Surrogates % Rec. Matrix Spikes 80-125% recovery	Surrogates: Matrix Spikes: One per 20 per matrix type	Field Duplicates RPD <20 MS/MSDs (RPD) RPD <20	Field Duplicates: One per 20 per soils MS/MSDs: One per 20 per matrix type
Cyanide	SW-846 Method 9012A	Soil	Surrogates % Rec. Matrix Spikes 75-125% Recovery	Surrogates: Matrix Spikes: One per 35 per matrix type	Field Duplicates RPD <35 MS/MSDs (RPD) RPD <35	Field Duplicates: One per 20 per soils MS/MSDs: One per 20 per matrix type

Recovery criteria for laboratory control samples must be at least as stringent as MS/MSD criteria.
Laboratory control limits are periodically updated. The latest control limits will be utilized at the time of sample analysis.

Table 4
Typical Laboratory Data Quality Objectives
Groundwater Samples
9 N. 15th Street., Brooklyn, NY
BCP Site No. TBD

Parameter	Method	Matrix	Accuracy Control Limits	Accuracy Frequency Requirements	Precision (RPD) Control Limits	Precision Frequency Requirements
VOCs (TCL)	SW-846 Method 8260C	Groundwater	Surrogates % Rec. 1,2-Dichloroethane-d4 70-130 4-Bromofluorobenzene 70-130 Dibromofluoromethane 70-130 Toluene-d8 70-130 Matrix Spikes 36-162 % recovery	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 20	Field Duplicates RPD <20 MS/MSDs RPD RPD <20	Field Duplicates: One per 20 MS/MSDs: One per 20
VOCs with Tentatively Identified Compounds (TICs)	SW-846 Method 8260C	Groundwater	Surrogates % Rec. 1,2-Dichloroethane-d4 70-130 4-Bromofluorobenzene 70-130 Dibromofluoromethane 70-130 Toluene-d8 70-130 Matrix Spikes 36-162 % recovery	Surrogates: All samples, standards, QC Matrix Spikes: One per 20	Field Duplicates RPD <20 MS/MSDs RPD RPD <20	Field Duplicates: One per 20 MS/MSDs: One per 20
SVOCs TCL	SW-846 Method 8270D	Groundwater	Surrogates % Rec. Phenol-d5 10-120 2-Fluorophenol 21-120 2,4,6-Tribromophenol 10-120 Nitrobenzene-d5 23-120 2-Fluorobiphenyl 15-120 4-Terphenyl-d14 41-149 Matrix Spikes 14-144%	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 20	Field Duplicates RPD <50 MS/MSDs RPD RPD <50	Field Duplicates: One per 20 MS/MSDs: One per 20
SVOCs with TICs	SW-846 Method 8270D	Groundwater	Surrogates % Rec. Phenol-d5 10-120 2-Fluorophenol 21-120 2,4,6-Tribromophenol 10-120 Nitrobenzene-d5 23-120 2-Fluorobiphenyl 15-120 4-Terphenyl-d14 41-149 Matrix Spikes 14-144%	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 20	Field Duplicates: RPD <50 MS/MSDs RPD RPD <50	Field Duplicates: One per 20 MS/MSDs: One per 20
1,4-Dioxane	SW-846 Method 8270D	Groundwater	Surrogates % Rec. 1,4-Dioxane-d8 15-110 Matrix Spikes 40-140% recovery	Surrogates: All samples, standards, QC samples	Field Duplicates RPD <30 Matrix Duplicates RPD<30	Field Duplicates: One per 20 per soils MS/MSDs: One per 20
Metals (Total and Dissolved)	SW-846 Methods 6020B	Groundwater	Matrix Spikes 75-125% recovery	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 20	Field Duplicates RPD <20 Matrix Duplicates RPD <20	Field Duplicates: One per 20 MS/MSDs: One per 20
Mercury (Total and Dissolved)	SW-846 Methods 7470A	Groundwater	Matrix Spikes 75-125% recovery	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 20	Field Duplicates RPD <35 (dissolved) RPD<20 (Total) Matrix Duplicates RPD <35 (dissolved) RPD<20 (Total)	Field Duplicates: One per 20 MS/MSDs: One per 20
PCBs	SW-846 Method 8082A	Groundwater	Surrogates % Rec. 2,4,5,6-Tetrachloro-m-xylene 30-150 Decachlorobiphenyl 30-150 Matrix Spikes 40-140% recovery	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 20 per matrix type	Field Duplicates RPD <50 MS/MSDs (RPD) RPD<50	Field Duplicates: One per 20 MS/MSDs: One per 20 per matrix type
Herbicides	SW-846 Method 8151A	Groundwater	Surrogates % Rec. 2,4-DCAA 30-150 Matrix Spikes 30-150% Recovery	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 20 per matrix type	Field Duplicates: RPD <50 MS/MSDs (RPD) RPD<50	Field Duplicates: One per 20 MS/MSDs: One per 20 per matrix type

Table 4
Typical Laboratory Data Quality Objectives
Groundwater Samples
9 N. 15th Street., Brooklyn, NY
BCP Site No. TBD

Parameter	Method	Matrix	Accuracy Control Limits	Accuracy Frequency Requirements	Precision (RPD) Control Limits	Precision Frequency Requirements
Pesticides (TCL)	SW-846 Method 8081B	Groundwater	Surrogates % Rec. Decachlorobiphenyl 15-142 2,4,5,6-Tetrachloro-m-xylene 36-126 Matrix Spikes 30-150% recovery	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 20	Field Duplicates RPD <30 MS/MSDs RPD RPD <30	Field Duplicates: One per 20 MS/MSDs: One per 20
PFAs	EPA Method 1633	Grounwater	Surrogates Perfluoro[13C4]Butanoic Acid (MPFBA) Perfluoro[13C4]Butanoic Acid (MPFBA) Perfluoro[13C5]Pentanoic Acid (M5PFPEA) Perfluoro[13C5]Pentanoic Acid (M5PFPEA) Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS) Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS) Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA) Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA) Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA) Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA) Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS) Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS) Perfluoro[13C8]Octanoic Acid (M8PFOA) Perfluoro[13C8]Octanoic Acid (M8PFOA) 1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2- 1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2- Perfluoro[13C9]Nonanoic Acid (M9PFNA) Perfluoro[13C9]Nonanoic Acid (M9PFNA) Perfluoro[13C8]Octanesulfonic Acid (M8PFOS) Perfluoro[13C8]Octanesulfonic Acid (M8PFOS) Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA) Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA) 1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2- 1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2- N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA) Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA) Perfluoro[13C8]Octanesulfonamide (M8FOSA) Perfluoro[13C8]Octanesulfonamide (M8FOSA) N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA) Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA) Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA) Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA) Matrix Spikes 46-182% recovery	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 20 per matrix type	Field Duplicates RPD <30 MS/MSDs (RPD) RPD <30	Field Duplicates: One per 20 MS/MSDs: One per 20 per matrix
Cyanide	EPA Method 9012B	Groundwater	Matrix Spikes 75-125% recovery	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 35	Field Duplicates RPD <35 Matrix Duplicates RPD <35	Field Duplicates: One per 20 Matrix Duplicates: One per 20

Recovery criteria for laboratory control samples must be at least as stringent as MS/MSD criteria.

Laboratory control limits are periodically updated. The latest control limits will be utilized at the time of sample analysis.

Table 5
Typical Laboratory Data Quality Objectives
Soil Gas Samples
9 N. 15th Street., Brooklyn, NY
BCP Site No. TBD

Parameter	Method	Matrix	Accuracy Control Limits	Accuracy Frequency Requirements	Precision (RPD) Control Limits	Precision Frequency Requirements
VOCs	EPA Method TO-15	Soil Gas	Surrogates % Rec. 4-Bromofluorobenzene 78-124	Surrogates: All samples, standards, QC samples	Matrix Duplicates RPD < 30	Matrix Duplicates One per 20

Table 6
QC Sample Preservation and Container Requirements
9 N. 15th Street., Brooklyn, NY
BCP Site No. TBD

Sample Matrix	Analytical Parameter	No. of Samples	EPA Analytical Method	Sample Preservation	Holding Time[1]	Sample Container
Soil	VOCs (TCL)	2	SW-846 Method 8260C/5035	Cool to 4^0 C no headspace	14 days to analysis	(3) Encore
Soil	PCBs	2	SW-846 Method 8082A	Cool to 4^0 C	365 days to analysis	(1) 250 mL amber glass jar
Soil	SVOCs (TCL)	2	SW-846 Method 8270D	Cool to 4° C	14 days to extraction	(1) 250 mL amber glass jar
Soil	1,4-Dioxane	2	SW-846 Method 8270D	Cool to 4° C	7 days to extraction	(2) 250 mL amber glass jars
Soil	Metals (TAL)	2	SW-846 Method 6010DSeries	Cool to 4^0 C	180 days to analysis	(1) 60 mL glass jar
Soil	Mercury	2	SW-846 Method 7471B	Cool to 4^0 C	28 days to analysis	(1) 60 mL glass jar
Soil	Hexavalent chromium	2	EPA 3060A/7196A	Cool to 4^0 C	14 days to analysis	(1) 250 mL amber glass jar
Soil	Cyanide	2	SW-846 Method 9010C/9012B	Cool to 4^0 C	14 days to analysis	(1) 250 mL amber glass jar
Soil	Herbicides	2	SW-846 Method 8151A	Cool to 4^0 C	14 days to extraction	(1) 250 mL amber glass jar
Soil	Pesticides	2	SW-846 Method 8141A[6]	Cool to 4^0 C	14 days to extraction	(1) 300 mL amber glass jar
Soil	PFAS	2	EPA Method 1633	Cool to 4^0 C	14 Days	(1) 250 mL plastic container

Table 6
QC Sample Preservation and Container Requirements
9 N. 15th Street., Brooklyn, NY
BCP Site No. TBD

Groundwater	VOCs (TCL)	1	SW-846 Method 8260C	HCl; Cool to 4^0 C; no headspace	14 days to analysis	(3) Vial
Groundwater	1,4-Dioxane	1	SW-846 Method 8270D	Cool to 4^0 C	7 days to analysis	(2) 250 mL amber glass jar
Groundwater	SVOCs (TCL)	1	SW-846 Method 8270D	Cool to 4^0 C	7 days to extraction	(2) 250 mL amber glass jar
Groundwater	Metals- total (TAL)	1	SW-846 Method 6020B/7470A Series	HNO_3; Cool to 4° C	28 days to analysis for Hg; 180 days to analysis for other metals	(1) 500 mL plastic container
Groundwater	Metals-dissolved (TAL)	1	SW-846 Method 6020B/7470A Series	HNO3; Cool to 4° C	28 days to analysis for Hg; 180 days to analysis for other metals	(1) 500 mL plastic container
Groundwater	Pesticides (TCL)	1	SW-846 Method 8081B	Cool to 4^0 C	7 days to extraction	(2) 120 mL amber glass jar
Groundwater	Herbicides (TCL)	1	SW-846 Method 8151A	Cool to 4^0 C	7 days to extraction	(2) 1000 mL amber glass jar
Groundwater	PCBs	1	SW-846 Method 8082A	Cool to 4^0 C	365 days to analysis	(1) 250 mL amber glass jar
Groundwater	Hexavalent Chromium	1	EPA 3060A/7196A	Cool to 4^0 C	14 days to analysis	(1) 250 mL amber glass jar
Groundwater	Cyanide	1	SW-846 Method 9012A	Cool to 4^0 C	14 days to analysis	(1) 250 mL amber glass jar
Groundwater	Mercury	1	SW-846 Method 7470 A	HNO3; Cool to 4° C	28 days to analysis	(1) 250 mL plastic container
Groundwater	PFAS	1	EPA Method 1633	Cool to 4^0 C	14 Days	(1) 250 mL plastic container
Soil Gas	VOCs	1	EPA Method TO-15	None	14 days to analysis	(1) Evacuated 6-Liter SUMMA® canister

Notes:
1 Holding times listed are method holding time calculated from time of collection and not NYSDEC ASP holding times.

ATTACHMENTS

RESUME

Chunhua Liu, PhD

Senior Technical Specialist

Education

B.E., 1992, Environmental Engineering, Tsinghua University, Beijing, China
M.E., 1995, Environmental Engineering, Tsinghua University, Beijing, China
M.S., 1998, Environmental Health, Harvard School of Public Health
D.S., 2000, Environmental Chemistry, Harvard School of Public Health

Areas of Specialization

- Human Health Risk Assessment
- Ecological Risk Assessment
- Data Usability Evaluation
- Project Quality Control and Assurance
- Fate and Transport Modeling

Summary of Experience

Dr. Liu is a senior chemist with more than 10 years of experience in analytical chemistry, data validation and management, and quality control and quality assurance for remedial investigations and remedial actions. Her experience includes laboratory chemical analysis, EPA Region I and Region II data validation and data usability evaluation, data usability evaluation for Massachusetts Contingency Plan (MCP), sampling and analysis plan development in accordance with the NYSDEC Analytical Service Protocol and Massachusetts Compendium of Quality Assurance and Quality Control Requirements (QA/QC) and Performance Standards for Selected Analytical Methods, and quality control and quality assurance for Superfund and MCP projects.

Dr. Liu majored in environmental chemistry and during her doctoral study at Harvard School of Public Health, she researched analytical methods for sediment and evaluated metal fate and transport in sediment. Dr. Liu worked at Parsons for over seven years and at Gradient for one year before joining GZA. At Parsons, Dr. Liu led the quality control and assurance and data management efforts from developing Quality Assurance Project Plan (QAPP) to assuring implementation of QA/QC requirements and from field sampling preparation and arrangement to chemical data management. Dr. Liu was responsible for the QA/QC and data validation and data usability evaluation for a 10,000-acre BRAC and Superfund NPL site in New York and assisted in the successful transfer of over 8,000 acres of land. Dr. Liu performed data usability evaluation for various Massachusetts Contingency Plan sites at Gradient and GZA.

Relevant Project Experience

Senior Technical Specialist. Leads GZA human health risk assessment efforts for federal and state level superfund and MCP projects. Dr. Liu is also responsible for data usability evaluation for various projects.

Technical Director. Directed preparation and submittal of the Site-Wide Sampling and Analysis Plan (SAP) and the Site-Wide Quality Assurance Project Plan (QAPP) for a 10,000-acre Superfund site in New York in accordance with the Department of Defense (DOD), NYSDEC ASP, EPA Region II and EPA guidance. Directed project field sampling and data management. Supervised data validation in accordance with EPA Region II SOPs and NYSDEC ASP based on the NYSDEC ASP Category B deliverables. Identified laboratories qualified for project chemical analyses and interfaced with various analytical laboratories to address analytical deficiencies. Submitted data summary report to EPA Region II on a quarterly basis.

Lead Chemist and Risk Assessor. Led data usability evaluation and supported the successful closure of a 125-acre Hingham Annex Guaranteed Fixed Price Remediation Project. Dr. Liu also led the risk assessment effort and the effort of evaluating pesticide fate and transport at the site and successfully demonstrated that the pesticide conditions at the site were related to the past normal use of pesticides and therefore were not associated with the release at the Site.

Technical Director. Directed preparation and submittal of the SAP and the QAPP for various Formerly Used Defense (FUD) Sites. Supervised field sampling and data

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validation in accordance with guidance from various EPA regions. Reviewed data validation and data usability report.

Technical Director. Directed data validation for various Superfund sites in EPA Region I and Region II in accordance with the EPA regional and state SOPs and the EPA Functional Guidelines. Led data validation for numerous MCP sites for various analytical analyses including metal, VOC, SVOC, pesticide, PCB, EPH, VPH, and TPH analyses.

Project Chemist. Evaluated different analytical methods for hexavalent chromium analysis. Compared analytical methods developed by NJDEP and EPA and identified the appropriate method for a CERCLA site in New Jersey.

Project Chemist. Evaluated quantitatively potential impacts to metal data usability by interference caused by common metals in environmental samples for a CERCLA site in New York.

Project Chemist. Performed data validation for indoor air samples for various CERCLA and MCP Sites to assist evaluation of potential vapor intrusion pathway.

Project Chemist. Performed Level IV data validation for a Superfund site in New York for various analytical analyses including metal, VOC, SVOC, pesticide, and PCB analyses. Reviewed TIC identification and quantitation and assessed chromatograms and mass spectrums for VOCs and SVOCs.

Project Chemist. Provided technical support, prepared QAPPs, established proper data quality objectives (DQOs) for various projects, maintained project quality control, trained junior scientists, coordinated project field sampling and laboratory analyses, addressed non-conformance issues associated with the data produced by the laboratory, conducted statistical analysis, and prepared data validation reports on numerous RCRA/CERCLA and MCP projects.

ENVIRONMENTAL ASSESSMENT AND REMEDIATION PROJECTS

(Former Malden MGP) Senior Scientist - Lead Risk Assessor, Chemist, Site Assessment, Malden, Massachusetts. Leading ongoing risk assessment work at large, complex former MGP that encompasses more than 16 acres of land and more than 10 different properties. Work has included vapor intrusion pathway evaluation, imminent hazard evaluation, substantial hazard evaluation, data usability evaluation, and risk characterizations for evaluation of effectiveness of sub-slab depressurization systems and remediation, direction of Site remediation and investigations, and verification of the need for AULs. GZA was able to demonstrate that indoor air impacts in a residential area were not related to MGP residuals, allowing for closure of that portion of the Site. Risk characterizations also demonstrated that Site conditions did not pose substantial hazards, confirming the effectiveness of the Temporary Solution.

(Commercial Point LNG Facility) Senior Scientist - Lead Risk Assessor, Site Assessment and Closure, Dorchester Massachusetts. Directed risk characterization to support MCP closure of former MGP facility that was currently being used as a Liquefied Natural Gas (LNG) storage and distribution facility. Performed risk characterization to support supplemental Phase II – IV MCP investigations and Permanent Solution status while allowing for beneficial reuse of the facility for LNG operations and a solar power generating facility. Also performed focused risk characterizations in support of an AUL filing and potential reuse options for portions of the Site.

(Former Haverhill Holder Site) Senior Scientist - Lead Risk Assessor, Site Closure, Haverhill Massachusetts. Directed risk characterization to support MCP closure of former MGP gas holder facility where wastes had been disposed. Conducted risk characterization to facilitate development of cost-effective cleanup plan involving focused soil excavation and use restrictions that allowed for achievement of a Permanent Solution. Performed a Method 3 risk characterization to support the complex supplemental Phase II investigation. This complex site encompassed properties owned by seven different parties, including residential land and portions of a river/tributary system.

(Gloucester Former MGP) Senior Scientist - Lead Risk Assessor, Human Health Risk Assessment, North Shore, Massachusetts. Performed Method 3 Risk Characterization for multiple parcels to support the Supplemental Phase II Comprehensive Site Assessment initiated by other consultants under the Massachusetts Contingency Plan. This Site included MGP impacts to

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approximately 45 acres of Gloucester Harbor sediment. GZA evaluated potential human health risks via exposure to soil, groundwater, sediment, surface water, homegrown produce, and consumption of fish. In addition, Risk Characterization was used in the early stages of the project to assist identification of data gaps and Site investigation.

(Salem Power Plant) Project Manager, Cost Recovery Negotiations, Salem, Massachusetts. Working through counsel, provided advice to a prior owner with respect to remedial obligations under the Massachusetts Contingency Plan (MCP) associated with impacts to soil at this power generating facility. Work included review of hot spot evaluation, risk characterization, and remediation performed at the Site. Given the Site use, we concluded that most of the claimed costs that had been incurred by the current owner were not necessary under the MCP and thus should not be subject to recovery from our client.

(Sawyer Passway) Senior Scientist - Lead Risk Assessor, Chemist, MGP Site Closure, Fitchburg, Massachusetts. Performed a Substantial Hazard Evaluation and a Method 3 Risk Characterization to support fast-track Massachusetts Contingency Plan (MCP) Phase II/III study of large, complex former MGP facility on the banks of a major New England river. The work had to be completed within two months to meet a key regulatory deadline. Work included a risk evaluation to support a streamlined supplemental field exploration program, a risk evaluation to direct the focused soil excavation, and a substantial hazard evaluation for the cost-effective temporary solution within the required regulatory deadlines. GZA's continuing work on this project has included technical support for an insurance cost-recovery claim, periodic evaluations of the temporary solution, completion of soil stabilization/solidification pilot studies, implementation of focused remedial programs during site building demolition work and development of remedial, plans directed at achieving a Permanent Solution (PS). Based on updated evaluations, a cost-effective approach to a PS was developed in 2014 and a Method 3 Risk Characterization was performed to support a PSS in 2015.

(Former Army Depot Activity Site), Technical Director, Syracuse, New York. Directed preparation and submittal of the Site-Wide Sampling and Analysis Plan (SAP) and the Site-Wide QAPP for a 10,000-acre Superfund site in New York in accordance with the Department of Defense (DOD), NYSDEC ASP, USEPA Region II and USEPA guidance. Directed project field sampling and data management. Supervised data validation in accordance with USEPA Region II SOPs and NYSDEC ASP based on the NYSDEC ASP Category B deliverables. Identified laboratories qualified for project chemical analyses and interfaced with various analytical laboratories to address analytical deficiencies. Submitted data summary report to USEPA Region II on a quarterly basis.

(Waverley Oaks Road), Senior Scientist - Lead Risk Assessor, Human Health Risk Assessment, Waltham, Massachusetts. This property has been impacted by improper storage of large quantities of waste oil that was to be used to heat on-site green houses, or to be processed and resold. This Site is regulated under the Massachusetts Contingency Plan; Massachusetts Department of Environmental Protection reviewed and approved all work plans and reports for the site investigation and risk assessment; it was downgraded from a Tier 1A to a Tier 1B Site following completion of the Phase II investigations.

Waste oil releases have impacted nearly 10-acres of an on-Site pond, stream and wetland, including 3 acres that have visible oil presented within surficial wetland soil and sediment. GZA conducted a Method 3 Risk Characterization to support the permanent solution of the Site. For the Vapor Intrusion pathway, GZA identified constituents not related to Site release and verified the conclusion based on the evaluation of Site-specific attenuation factors.

Publications and Presentations

Liu, C., J. Jay, T. Ford. Evaluation of Environmental Effects on Metal Transport from Capped Contaminated Sediment under Conditions of Submarine Groundwater Discharge. Env. Sci. Tech. 2001 35: 4549-4555.

Liu, C., J. Jay, R. Ika, S. James, and T. Ford. Capping efficiency for metal-contaminated marine sediment under conditions of groundwater inflow. Env. Sci. Tech. 2001 35: 2334-2340.

Blanchet, R., Liu, C., Bowers, T. Summary of Available Freshwater and Marine Sediment Quality Guidelines and Their Use in North America. Abstract accepted at SEATEC Conference, November, 2001

Blanchet, R., Liu, C., Bowers, T. Estimation of Average Exposure Point Concentrations for Pesticides Assuming Accumulation and Degradation in the Environment. Abstract accepted at SEATEC Conference, November, 2001

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Seeley, M.R., Schettler, S., Liu, C., Blanchet, R.J., Bowers, T.S. Assessing Cancer Risks Due to Use of Insecticides to Control the Mosquito-borne West Nile Virus: Use of the Margin of Exposure Approach. Abstract accepted at Society of Toxicology, 41st Annual Meeting, March 17-21, 2002.

Chunhua Liu, Jennifer Jay, Ravi Ika, Shine James, Timothy Ford. Capping Efficiency for Metal-Contaminated Marine Sediment under Conditions of Submarine Groundwater Discharge. Poster presentation at Conference on Dredged Material Management: Options and Environmental Considerations. December 3-6, 2000

Chunhua Liu, Jennifer Jay, Timothy Ford. Evaluation of Environmental Effects on Metal Transport from Capped Contaminated Sediment Under Conditions of Submarine Groundwater Discharge. Poster presentation at Conference on Dredged Material Management: Options and Environmental Considerations. December 3-6, 2000

Chunhua Liu, Jennifer Jay, Timothy Ford. Core analysis: Is it a good indicator of metal release and capping efficiency? Poster presentation at Conference on Dredged Material Management: Options and Environmental Considerations. December 3-6, 2000

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Chunhua Liu, Ravi Ika, Tim Ford. 1998. Metal flux in near shore capping sites under conditions of submarine groundwater discharge. In: Fourth Marine & Estuarine Shallow Water Science & Management Conference. March 15-19, 1998

Wei Lin, Guowei Fu, Chunhua Liu. 1996. Study on allocating permissible pollutants discharge based on axioms system. Chin. J. Environ. Sci. 1996 17(3):35-37

Wei Lin, Chunhua Liu, Guowei Fu. 1995. Environmental conflict analysis and its application in environmental planning and management: siting of public facilities. Chin. J. Environ. Sci. 1995 16(6): 36-39

Chunhua Liu, Yongfeng Nie, Wei Lin. 1995. Application prospects of landfill gas utilization technique in China. Pollution Control Technology 1995 8(3): 143-145

Chunhua Liu. 1995. Evaluation of gas production from sanitary landfill. Master's thesis. Tsinghua University, Beijing, P.R.China

Wei Lin, Chunhua Liu. 1994. Rudimentary study on countermeasure to comprehensively control air pollution caused by motor vehicles in China. Pollution Control Technology 1994 7(4): 1-3

Xiurong Zhang, Chunhua Liu, Yanru Yang, Qingzhong Bai. 1993. Environmental impact report of wastewater treatment plant project in Xuanhua City, China.

Chunhua Liu, Yongfeng Nie. 1993. Water balance evaluation in Hongmei hazardous waste landfill. In: Environmental Impact Assessment of Hongmei Hazardous Waste Landfill: 25-33

Chunhua Liu. 1992. Modeling landfill leachate production and migration. Bachelor Thesis. Tsinghua University, Beijing, P.R.China

Chunhua Liu. 1991. A discussion with the author of "clean water extraction from ocean water". Technology of Water Purification 1991(1): 39-41

Affiliations/Memberships

- Member, LSP Association
- Member, Society for Risk Analysis
- Certified EIT in Massachusetts

APPENDIX B – HEALTH AND SAFETY PLAN (HASP)

GZA SITE-SPECIFIC HEALTH, SAFETY & ACCIDENT PREVENTION STANDARD-PLAN

1. CLIENT/SITE/PROJECT INFORMATION		
Client: 9N15Inlet LLC		
Site Address: 9 North 15th Street, Brooklyn, NY		
Site Description (be sure to list pertinent site features, chemicals used at the facility, and other potential hazard sources): The property contains an inactive one-story industrial warehouse building.		
Work Environment (active manufacturing, office, vacant site, undeveloped property, etc.): Vacant site.		
Job/Project #: 41.0163352.10	Field Start Date: TBD	Field Finish Date: TBD
Site is Covered by the Following Regulations:	OSHA HAZWOPER Standard ☒	Mine Safety and Health Administration ☐
	OSHA Construction Regulations ☒	

2. EMERGENCY INFORMATION		
Hospital Name: NYC Health + Hospitals/Woodhull		Hospital Phone: 718-963-8000
Hospital Address: 760 Broadway, Brooklyn, NY 11206		Directions and Street Map Attached: ☒ Yes
Local Fire #: 911	Local Ambulance #: 911	Local Police #: 911
WorkCare Incident Intervention Services:	**For non-emergencies, if an employee becomes hurt or sick call 888-449-7787**	
Other Emergency Contact(s): Reinbill Maniquez	Phone #'s: 347-443-1059	
Site-Specific Emergency Preparedness/Response Procedures/Concerns:		

owning ZERO
accidents – injuries - illnesses

- All EHS Events must be reported immediately to the Project Manager and to the GZA People-Based Safety mobile app.
- In the event of a chemical release greater than 5 gallons, site personnel will evacuate the affected area and relocate to an upwind location. The GZA Field Safety Officer and client site representative shall be contacted immediately.
- Site work shall not be conducted during severe weather, including high winds and lightning. In the event of severe weather, stop work, lower any equipment (drill rigs), and evacuate the affected area.

3. SCOPE OF WORK	
General project description, and phase(s) or work to which this H&S Plan applies.	Remedial Investigation, Monitoring Well Installation, Drilling, Field Sampling (soil, groundwater, and air).
Specific Tasks Performed by GZA:	Drilling observation, soil sampling, groundwater sampling, soil vapor sampling, soil handling, and field logging.
Concurrent Tasks to be Performed by GZA-hired Subcontractors (List Subcontractors by Name):	Drilling Subcontractor (TBD) - Drilling, groundwater monitoring well installation, soil vapor point installation, and soil handling
Concurrent Tasks to be Performed by Others:	None. The site is unoccupied.

Any OSHA PERMIT-REQUIRED CONFINED SPACE entry? ☐ YES ☒ NO IF YES, ADD CONFINED SPACE ENTRY PERMIT FOR THAT PORTION OF THE WORK	Any INDOOR fieldwork? ☒ YES ☐ NO IF YES, EXPLAIN: All remedial investigation work will be conducted inside of an existing industrial building.

4. SUB-SURFACE WORK, UNDERGROUND UTILITY LOCATION	
Will subsurface explorations be conducted as part of this work (drilling or excavation)?	☒ Yes ☐ No
Have GZA project-related files been searched for existing private utility drawings?	☐ Yes ☒ No ☐ N/A
Has GZA requested utility drawings from our Client, property owner, and others?	☒ Yes ☐ No ☐ N/A
Have existing drawings been reviewed for possible conflicts with planned work?	☒ Yes ☐ No ☐ N/A
Will GZA personnel be required to use a hand-auger as part of this work?	☐ Yes ☒ No
Site property ownership where underground explorations will be conducted on: Haplin Realty Corp.	Public Access Property ☐ Yes ☒ No Private Property ☒ Yes ☐ No
Have Necessary Underground Utility Notifications for Subsurface Work Been Made?	☐ Yes ☒ Yet to be conducted
Specify Clearance Date & Time, Dig Safe Clearance I.D. #, And Other Relevant Information: GZA will review utility clearance with driller prior to field work.	
IMPORTANT! For subsurface work, prior to the initiation of ground penetrating activities, GZA personnel to assess whether the underground utility clearance (UUC) process has been completed in an manner that appears acceptable, based on participation/ confirmation by other responsible parties (utility companies, subcontractor, client, owner, etc.), for the following:	

Electric:	☐ Yes	☐ No	☐ NA	☒ Other GPR will be utilized
Fuel (gas, petroleum, steam):	☐ Yes	☐ No	☐ NA	☒ Other GPR will be utilized
Communication:	☐ Yes	☐ No	☐ NA	☒ Other GPR will be utilized
Water:	☐ Yes	☐ No	☐ NA	☒ Other GPR will be utilized
Sewer:	☐ Yes	☐ No	☐ NA	☒ Other GPR will be utilized
Other:________	☐ Yes	☐ No	☐ NA	☐ Other________

Comments: GZA to confirm mark outs prior to commencing work. Contractor to determine exact location of test boring.

GZA SITE-SPECIFIC HEALTH, SAFETY & ACCIDENT PREVENTION STANDARD-PLAN

5. HAZARD ASSESSMENT (CHECK ALL THAT APPLY AND ADDRESS EACH HAZARD IN SECTION 6)

A. GENERAL FIELDWORK HAZARDS

☐ Confined Space Entry (Add Confined Space Entry Permit)	☒ Overhead Hazards (i.e. falling objects, overhead power lines)
☒ Abandoned or vacant building/Enclosed Spaces	☒ Portable Hand Tools or Power Tools
☒ Significant Slip/Trip/Fall Hazards	☒ Significant Lifting or Ergonomic Hazards
☐ Unsanitary/Infectious Hazards	☐ Electrical Hazards (i.e. Equipment 120 Volts or Greater, Work Inside Electrical Panels, or Maintenance of Electrical Equipment)
☐ Poisonous Plants	☒ Other Stored energy Hazards (i.e. Equipment with High Pressure or Stored Chemicals)
☐ Biting/Stinging Insects	☐ Fire and/or Explosion Hazard
☐ Feral Animal Hazards	☒ Elevated Noise Levels
☐ Water/Wetlands Hazards	☒ Excavations/Test Pits
☐ Remote Locations/Navigation/Orientation hazards	☐ Explosives or Unexploded Ordinance/MEC
☐ Heavy Traffic or Work Alongside a Roadway	☐ Long Distance or Overnight Travel
☒ Weather-Related Hazards	☐ Personal Security or High Crime Area Hazards
☐ Motor vehicle operation Hazards	☐ Working Alone
☒ Heavy Equipment Hazards	☐ Ionizing Radiation or Non-Ionizing Radiation
☐ Structural Hazards (i.e. unsafe floors/stairways/roof)	☒ Chemical/Exposure Hazards (See Part B for Details)
☐ Demolition/Renovation	☒ Other: Underground Utilities, Soil Handling
☐ Presence of Pedestrians or the General Public	

B. CHEMICAL/EXPOSURE HAZARDS (CONTAINMENTS ARE CONTAINED IN X SOIL, WATER, X GROUNDWATER)

☐ No chemical hazards anticipated	☐ Methane
☐ Hydrogen Sulfide (H2S)	☐ Chemicals Subject to OSHA Hazard Communication (attach Safety Data Sheet for each chemical GZA brings to the site)
☐ Cyanides, Hydrogen Cyanide (HCN)	☐ Containerized Waste, Chemicals in Piping & Process Equipment
☒ Carbon Monoxide	☒ Emissions from Gasoline-, Diesel-, Propane-fired Engine, Heater, Similar Equipment
☐ Herbicides, Pesticide, Fungicide, Animal Poisons	☒ General Work Site Airborne Dust Hazards
☒ Metals, Metal Compounds:	☒ Volatile Organic Compounds (VOCs), BTEX
☐ Corrosives, Acids, Caustics, Strong Irritants	☒ Chlorinated Organic Compounds
☐ Polychlorinated Biphenyls (PCBs)	☒ Fuel Oil, Gasoline, Petroleum Products, Waste Oil
☒ Polycyclic Aromatic Hydrocarbons (PAHs)	☐ Asbestos
☐ Compressed Gases	☐ Oxygen Deficiency, Asphyxiation Hazards
☐ Flammable/Combustible Liquids	☐ Other:
☐ Radiation Hazards (i.e. radioactive sealed/open source, x-rays, ultra violet, infrared, radio-frequency, etc.)	

6. SITE-SPECIFIC OVERVIEW OF H&S HAZARDS/MITIGATIONS (NOTE: Based on Hazard Assessment, Section 5)	
Describe the major hazards expected to be present at the jobsite, and describe the safety measures to be implemented for worker protection (refer to items checked in Section 5 above). Use brief abstract statements or more detailed narrative as may be appropriate.	
ON-SITE HAZARDS:	**HAZARD MITIGATIONS:**
Task Hazard Analyses	Task 21.01 – General Outdoor Field Work Task 4.1 – Drilling Observations Task 4.5 – Soil-Gas Sampling Task 20.11 – Field Sampling See additional Task Hazard Analyses in **Attachment D**.
Owning Zero	Ensure all GZA personnel on-site have downloaded the People Based Safety app to their mobile phones and are familiar with using it to report safety events. Prior to work each day, review Owning Zero rules with all onsite personnel during morning safety meeting.
Weather-Related Hazards	Weather conditions will be assessed prior to on-site work and forecast examined for anticipated period of work. If weather permits fieldwork, then workers will dress appropriately. Should inclement weather be encountered, the project scope may be reduced or rescheduled. Breaks will be taken to reduce exposure to the elements. If conditions change and lightning or thunder is observed, work will be suspended immediately, and workers will seek shelter. Work may resume if thunder and/or lightning cease for 30 minutes. In the case of cold weather, proper warm gear should be worn to minimize cold exposure. Hand warmers (e.g. "Hot Hands") should be used when appropriate to keep extremities warm and multiple breaks within a warm area (vehicle with heat) should be taken. Review the signs of heat stress, hypothermia, and dehydration before the start of fieldwork. Water, sunscreen, hardhat, tinted safety sunglasses, rain gear (if necessary) and periodic breaks should all be planned for. Be sure to consume plenty of liquids on hot summer days and stay out of direct sunlight for extended periods of time to the extent possible. Use protective ointments such as sunscreen and chap stick, and consult the OSHA Heat Safety App daily to determine risk of heat related illnesses for the day. Maintain extra clothing, blankets, etc. in the work vehicle for a change of clothing if necessary.
Abandoned or vacant building/Enclosed Spaces	Ask the client to validate that the building is structurally safe to enter. Constantly scan surroundings for integrity of floors and stairs and stay alert to debris on the ground or unsafe objects. Do not walk under ceilings or structures showing signs of distress and wear hard hats at all times within structures. Be alert for other people and / or animals in the building. Bring flashlights in case of poor lighting and a charged cell phone for communication. Inform your PM to let her/him know your anticipated hours of work on the site, and call them when you leave the site for the day. Leave the site if it is unsafe for any reason.
Groundwater Sampling	"Potential for chemical exposure of contaminants from sampling groundwater. Do not stand over groundwater monitoring well, maintain a safe working distance. Wear appropriate PPE, nitrile gloves, and safety glasses. Sample bottles may contain preservatives that can be corrosive to skin. Wash hands and face before eating or applying cosmetics (i.e. sunscreen or chapstick). Do not eat within the work zone. Sample containers may contain corrosive chemicals as preservatives. Keep upright during transport. Sample containers may have broken during transport. Handle containers only while wearing nitrile gloves and use leather work gloves in addition to nitrile gloves to remove any broken or cracked containers. Pack containers in an upright orientation and use packaging (such as bubble wrap) between each glass container to prevent breakage. Also Reference attached JHA 04.02 – Groundwater Sampling Also Reference attached JHA 20.11 – Field Sampling"
Soil Handling	Be aware that soil jars may have been broken during transport and properly cushion sample jars to prevent breakage. Don leather work gloves in addition to nitrile gloves to remove any broken or cracked containers. Do not eat, smoke or apply cosmetics (e.g. Chapstick, sunscreen) in the work area. Wear nitrile gloves during sampling to avoid common hazards associated with soil

	handling. Do not have skin contact with/ingest soils. Wash hands and face before eating or drinking.
Volatile Organic Compounds (VOCs), BTEX	"VOC contaminated groundwater can produce odors, fumes, and present ingestion, inhalation, and skin contact hazards. Compounds associated with gasoline and waste oils include benzene, xylene, toluene, gasoline, and various oils (hydrocarbons). These materials can cause eye, skin and respiratory tract irritation, liver and kidney damage, headaches, blurred vision, nausea, and dizziness. 1,4-dioxane. 1,4-Dioxane is readily adsorbed through the lungs and gastrointestinal tract. Some 1,4-dioxane may also pass through the skin, but studies indicate that much of it will evaporate before it is absorbed. Distribution is rapid and uniform in the lung, liver, kidney, spleen, colon and skeletal muscle tissue. Short-term exposure to high levels of 1,4-dioxane may result in nausea, drowsiness, headache, and irritation of the eyes, nose and throat. Exposure to the vapors of benzene, ethyl benzene, toluene and xylenes above their respective permissible exposure limits (PELs), as defined by the Occupational Safety and Health Administration (OSHA), may produce irritation of the mucous membranes of the upper respiratory tract, nose and mouth. Overexposure may also result in the depression of the central nervous system. Symptoms of such exposure include drowsiness, headache, fatigue and drunken-like behavior. Benzene has been determined to be carcinogenic, targeting blood-forming organs and bone marrow. The primary route of exposure to VOCs is through inhalation and therefore air monitoring and respiratory protection is the primary control against exposure to VOCs. Air monitoring will be completed as specified below to minimize airborne exposures. Exposure through direct contact is possible and will be minimized through the use of PPE as prescribed herein. Stop work and evacuate area if readings persist above OSHA permissible exposure limits in the breathing zone. Some common VOCs and their OSHA PELs are as follows: Benzene (1.0 ppm - 8 hr TWA), Toluene (200 ppm 8 hr -TWA), Ethylbenzene (100 ppm - 8hr TWA), Xylene (100 ppm - 8 hr TWA), Naphthalene (10 ppm - 8 hr TWA). Diesel (100 ppm 8-hr TWA _ ACGIH TLV as total hydrocarbons), Gasoline (300 ppm - 8 hr TWA_ACGIH TLV), Hydrogen Cyanide (10 ppm – OSHA 8 hr TWA). Exposure to the vapors of benzene, ethyl benzene, toluene and xylenes above their respective permissible exposure limits (PELs), as defined by the Occupational Safety and Health Administration (OSHA), may produce irritation of the mucous membranes of the upper respiratory tract, nose and mouth. Overexposure may also result in the depression of the central nervous system. Symptoms of such exposure include drowsiness, headache, fatigue and drunken-like behavior. Benzene has been determined to be carcinogenic, targeting blood-forming organs and bone marrow. The primary route of exposure to VOCs is through inhalation and therefore air monitoring and respiratory protection is the primary control against exposure to VOCs. Air monitoring will be completed as specified below to minimize airborne exposures. Exposure through direct contact is possible and will be minimized through the use of PPE as prescribed herein. BTEX Compounds. Exposure to the vapors of benzene, ethyl benzene, toluene and xylenes above their respective permissible exposure limits (PELs), as defined by the Occupational Safety and Health Administration (OSHA), may produce irritation of the mucous membranes of the upper respiratory tract, nose and mouth. Overexposure may also result in the depression of the central nervous system. Symptoms of such exposure include drowsiness, headache, fatigue and drunken-like behavior. Benzene has been determined to be carcinogenic, targeting blood-forming organs and bone marrow. The odor threshold for benzene is higher than the PEL and employees may be overexposed to benzene without sensing its presence, therefore, detector tubes must be utilized to evaluate airborne concentrations.
Fuel Oil, Gasoline, Petroleum Products, Waste Oil	Oils/gasoline contaminated soils can produce odors, fumes, and present ingestion, inhalation, and skin contact hazards. Compounds associated with gasoline and waste oils include benzene, xylene, toluene, gasoline, and various oils (hydrocarbons). These materials can cause eye, skin

	and respiratory tract irritation, liver and kidney damage, headaches, blurred vision, nausea, and dizziness. Wear proper PPE and perform air monitoring to detect presence of oil and gas related compounds. Stop work and evacuate area if readings persist above OSHA permissible exposure limits in the breathing zone. Benzene (1.0 ppm - 8 hr TWA), Toluene (200 ppm 8 hr -TWA), Ethylbenzene (100 ppm - 8hr TWA), Xylene (100 ppm - 8 hr TWA), Naphthalene (10 ppm - 8 hr TWA). Diesel (100 ppm 8-hr TWA _ ACGIH TLV as total hydrocarbons), Gasoline (300 ppm - 8 hr TWA_ACGIH TLV). Ventilate area and retest before resuming work. Wash hands and follow good personal hygiene after sampling or being exposed to potentially contaminated soils.
Metals, Metal Compounds:	Metal Compounds. Overexposure to metal compounds has been associated with a variety of local and systemic health hazards, both acute and chronic in nature, with chronic effects being most significant. Direct contact with the dusts of some metal compounds can result in contact or allergic dermatitis. Repeated contact with arsenic compounds may result in hyper-pigmentation. Cases of skin cancer due to the trivalent inorganic arsenic compounds have been documented. The moist mucous membranes, particularly the conjunctivae, are most sensitive to the irritating effects of arsenic. The early symptoms of lead poisoning are usually nonspecific. Symptoms include sleep disturbances, decreased physical fitness, headache, decreased appetite and abdominal pains. Chronic overexposure may result in severe colic and severe abdominal cramping. The central nervous system (CNS) may also be adversely effected when lead is either inhaled or ingested in large quantities for extended periods of time. The peripheral nerve is usually affected. "Wrist drop" is peculiar to such CNS damage. Lead has also been characterized as a male and female reproductive toxin as well as a fetotoxin. Exposure to lead (Pb) is regulated by a comprehensive OSHA standard (29 CFR 1910.1025). On sites where high concentrations of these compounds are present, a potential inhalation hazard to the field team during subsurface investigations can result. However, if the site is open and the anticipated quantities of contamination are small (i.e., part per million concentrations in the soil or groundwater), overexposure potential will also be small. Using wet methods, the potential for inhalation exposure above the OSHA Construction Lead Standards Action Level is unlikely.
Chlorinated Organic Compounds	Chlorinated Organic Compounds. Exposure to the vapors of many chlorinated organic compounds such as chlorobenzene, dichlorobenzenes, and benzene above their respective permissible exposure limits (PELs) will result in similar symptoms. The actual PELs as set by the Occupational Safety and Health Administration (OSHA) vary depending on the specific compound. Overexposure to the vapor of these compounds can cause irritation of the eyes, nose and throat. The liquid if splashed in the eyes, may cause burning irritation and damage. Repeated or prolonged skin contact with the liquid may cause dermatitis. Acute overexposure to chlorinated hydrocarbons depresses the central nervous system exhibiting such symptoms as drowsiness, dizzi¬ness, headache, blurred vision, loss of coordination, mental confusion, flushed skin, tremors, nausea, vomiting, fatigue and cardiac arrhythmia. Alcohol may make symptoms of overexposure worse. If alcohol has been consumed, the overexposed worker may become flushed. Some of these compounds are considered to be potential human carcinogens. Exposure to vinyl chloride is regulated by a comprehensive OSHA standard (29 CFR 1910.1017).
Slip, Trips, and Falls	Inspect work area prior to starting work. Mark out or remove any potential hazards. Be aware and inspect area for uneven surface. Wear sturdy shoes with ankle support and good tread. Look for potential natural depressions/holes/or other obstructions in the area of work and travel. Personnel will be wearing appropriate boots with good tread to prevent slips and falls. Maintain one free hand to break falls. Provide adequate space for each employee to work safely with sound footing. Watch for equipment on ground and slippery surfaces. Keep work area clean, no running, be mindful of changing weather conditions that may change footing conditions. Store any hand

	tools used for sampling in their proper storage location when not in use. Do not perform work if adequate lighting is not available. Maintain an exit pathway away from the rig at all times.
Underground Utilities	Confirm that underground utility clearance procedures have been completed in accordance with GZA Policy # 04-0301 Responsibility for Utility Clearance of Exploration Locations for clearing utility locations prior to breaking ground. Hand clear as necessary prior to commencement of drilling activities.
Heavy Equipment - Drilling	Prior to mobilization to the project site, all underground utilities will be located and properly marked. All personnel working in proximity to heavy equipment will be familiarized with the location and operation of emergency kill switches prior to equipment start-up. No loose clothing, jewelry or unsecured long hair is permitted near the equipment. Keep hands and feet AWAY from all moving parts while work is in progress. Persons shall not pass under or over a moving stem or auger, or other elevated loads or equipment. Watch for moving vehicles and equipment. Stay out of equipment radius while work is in progress. Maintain visibility and eye contact with operators. Wear reflective vest to enhance visibility. Stay clear of equipment (minimum 6 feet) while operating, and do not approach unless equipment has been stopped and eye contact/coordination is made with equipment operator for personnel to approach equipment to make observations or collect samples. GZA personnel shall not climb onto rig or approach rig while operating or while drill rods or other equipment are being attached or removed. GZA staff should verify that the onsite equipment has been routinely inspected. GZA staff should also maintain a safe working distance from the equipment while it is maneuvering around the Site. A fire extinguisher (with up to date inspection sticker indicating at a minimum an annual certification and monthly inspections) should be available on the machine or support truck on site. GZA staff are not authorized to operate the equipment. Keep drilling equipment at least 25 feet from all overhead power lines; use spotters to assist operator in to positioning equipment when overhead power lines or other obstructions are near. Personnel are not allowed on a mast while the auger is in operation. When equipment is moved from one location to another, tools and other equipment shall be secured and the mast placed in a safe position. All borings will be adequately covered and/or barricaded if left unattended for any period of time to prevent injury. While working around heavy equipment / excavators maintain awareness for pinch points, rotating equipment, and winch-operated equipment. Maintain safe working distance and never walk underneath overhead projection of the equipment. Follow GZA safe drilling and field work procedures. Be aware of rotating, falling, and mechanical hazards around equipment. Stay aware of surroundings and wear proper PPE such as safety glasses, hard hats, high visibility vests, and steel toe boots. Stay alert for potential overhead hazards (utilities lines, tree limbs) and other overhead objects that may pose hazards or may dislodge and fall during operations or while equipmentis obtaining access to the next location. Take care maneuvering the equipment over vegetated areas, especially after heavy rains or wet snows. Planking may be needed to prevent the equipment from sinking into softened grounds. See attached Job Hazard Analysis – Task 4.01 Drilling observations
Struck by, caught by, run over by equipment	Do not stand near or where equipment operators cannot see you. Always be in line of sight. Do not make sudden moves and always let the operator know of your intentions. Wear high-visibility safety vest, hard hat, eye protection, steel toe boots and use common sense and good housekeeping practices to avoid injury. Stay within sight of rig/excavator operator but at least 6-10 feet away from rig and excavator swing area. Maintain clear lines of communication (verbal and/or visual) with the operator. Stand clear of exhaust from operating equipment and stay out of the swing radius of heavy equipment. Be aware of overhead equipment and potential for falling objects (i.e. tree branches). Avoid any "pinch points" where one could become trapped between the equipment and other objects. Maintain awareness of general rig movement/operation and communication with drill crew. Do not conduct soil classification/sampling directly adjacent to the drill rig. Hearing protection shall be worn when working near operating equipment. Equipment should be situated so that at full extension of bucket arm, the equipment is at least 10 feet away from overhead lines.
Overhead Hazards	Observe proposed exploration locations for possible overhead utility lines/tree branches and avoid these if applicable. Maintain awarenes of mechanical raising and falling of equipment. Maintain safe working distance from equipment and work being performed and maintain eye contact and communication with operator.

	Wear steel toed boots, hardhat and safety glasses/goggles, hearing protection. If stacked materials appear unstable inform the site representative. Never stand under elevated loads or equipment. Keep equipment at least 25 feet from overhead utilities.
Significant Lifting or Ergonomic Hazards	Proper lifting techniques (lifting with the legs, carrying the load at a reasonable height to allow for proper posture during the carry, and avoiding twisting while carrying loads) should be followed at all times. Caution should be used when lifting equipment. Be aware of hand position during all stages of the lift, transport and placement of equipment. Review equipment to be moved prior to lifting to prevent moving parts from crushing fingers or otherwise pinching skin. Do not stack items prior to carrying, but rather transport one item at a time to prevent shifting during carrying. Follow GZA Safe Lifting SOP.
Elevated Noise Levels	Always use ear protection when drill rig is in operation. In accordance with 29 CFR 1910.95(b)(1) When employees are subjected to sound exceeding those listed in Table G-16, feasible administrative or engineering controls shall be utilized. If such controls fail to reduce sound levels within the levels of Table G-16, personal protective equipment shall be provided and used to reduce sound levels within the levels of the table. TABLE G-16 - PERMISSIBLE NOISE EXPOSURES (1) Duration per day (hours) | Sound level dBA slow response 8..................................... | 90 6......................................| 92 4......................................| 95 3......................................| 97 2......................................| 100 1 1/2 ....| 102 1.......................................| 105 1/2 ....| 110 1/4 or less........................| 115 Hearing protection in the form of disposable ear plugs will be worn during field work with sound levels anticpated above those listed in Table G-16. Use sound meter app on phone to assess required PPE. Be aware that hearing protection can diminish warning sounds - do not stand with back to operating equipment and be alert for changing conditions.
Portable Hand Tools or Power Tools	Lift and transport hand tools using proper lifting techniques and keep a clean and orderly workspace. Be familiar with tool's operating instructions and specific hazards before beginning work; wear leather gloves when appropriate. Use grounded or double insulated power hand tools. Use GFCI plugs. Check extension cords and power cords keep all cords organized to avoid tripping hazards. Check cords for sign of fraying, or damage. Do not use portable tools that shows signs of damage. Observe proper electrical safety practices. Wear proper PPE. Store and carry tools correctly. Use the correct tool for the job. Know first aid response procedures to address potential injuries. 1. Wear safety glasses and other appropriate PPE. 2. Keep vents clear to maintain adequate ventilation. 3. Use sharp drill bits, blades or other cutting surfaces. 4. Use GFCI plugs and keep all cords clear of the cutting area during use. 5. Inspect for frays or damage before each use. 6. Disconnect power supply before changing or adjusting the equipment.
Utility Clearance	Confirm that underground utility clearance procedures have been completed in accordance with GZA Policy # 04-0301 Responsibility for Utility Clearance of Exploration Locations for clearing utility locations prior to breaking ground. Hand clear as necessary prior to commencement of drilling activities.
Carbon Monoxide	If work is to be conducted indoors with no ventilation, carbon monoxide monitoring will be conducted. The warehouse contains two large garage doors that may be opened to promote ventilation through the building. During carbon monoxide monitoring, if greater than 35 ppm, exit area, provide adequate ventilation, proceed to Level B, or discontinue activities.
General worksite airborne dust hazards	Dust monitoring will be conducted during intrusive site activities. Water suppression and ventilation of the indoor work space will be utilized as dust control measures, if required. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 ug/m3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind

	PM-10 particulate concentration to within 150 ug/m3 of the upwind level and in preventing visible dust migration.

7. AIR MONITORING ACTION LEVELS – Make sure air monitoring instruments are in working order, calibrated before use, and 'bump-checked' periodically throughout the day and/or over multiple days of use

Is air monitoring to be performed for this project? Yes ☒ No ☐

ACTION LEVELS FOR OXYGEN DEFICIENCY AND EXPLOSIVE ATMOSPHERIC HAZARDS **(Action levels apply to occupied work space in general work area)**

☐ Applicable, See Below. ☒ Not Applicable

Parameter	Response Actions for Elevated Airborne Hazards
Oxygen	At 19.5% or below – Exit area, provide adequate ventilation, or proceed to Level B, or discontinue activities Verify presence of adequate oxygen (approx. 12% or more) before taking readings with LEL meter. Note: If oxygen levels are below 12%, LEL meter readings are not valid.
LEL	Less than 10% LEL – Continue working, continue to monitor LEL levels Greater than or Equal to 10% LEL – Discontinue work operations and immediately withdraw from area. Resume work activities ONLY after LEL readings have been reduced to less than 10% through passive dissipation, or through active vapor control measures.

ACTION LEVELS FOR INHALATION OF TOXIC/HAZARDOUS SUBSTANCES **(Action levels are for sustained breathing zone concentrations)**

☒ Applicable, See Below. ☐ Not Applicable

Air Quality Parameters (Check all that apply)	**Remain in Level D or Modified D**	**Response Actions for Elevated Airborne Hazards**
☒ VOCs	0 to 5 ppm	From 5 ppm to 10 ppm: Proceed to Level C, or Ventilate, or Discontinue Activities If greater than 5 ppm: Discontinue Activities and consult EHS Team
☒ Carbon Monoxide	0 to 35 ppm	At greater than 35 ppm, exit area, provide adequate ventilation, proceed to Level B, or discontinue activities.
☐ Hydrogen Sulfide	0 to 10 ppm	At greater than 10 ppm, exit area, provide adequate ventilation, proceed to Level B, or discontinue activities
☒ Dust	0 to 150 ug/m^3	If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 ug/m3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 ug/m3 of the upwind level and in preventing visible dust migration

SPECIAL INSTRUCTIONS/COMMENTS REGARDING AIR MONITORING (IF APPLICABLE)

8. HEALTH AND SAFETY EQUIPMENT AND CONTROLS

AIR MONITORING INSTRUMENTS

- ☒ PID Type: Lamp Energy: 11.7 eV
- ☐ FID Type:
- ☒ Carbon Monoxide Meter (if no ventilation)
- ☐ Hydrogen Sulfide Meter
- ☐ O_2/LEL Meter
- ☒ Particulate (Dust) Meter
- ☒ Calibration Gas Type - Isobutylene

PERSONAL PROTECTIVE EQUIPMENT

- ☐ Respirator – Type
- ☐ Respirator - Cartridge Type:
- ☒ Hardhat
- ☒ Outer Gloves Type: Nitrile
- ☐ Inner Gloves Type:
- ☒ Steel-toed boots/shoes
- ☐ Coveralls –

8. HEALTH AND SAFETY EQUIPMENT AND CONTROLS

☐ Others:

OTHER H&S EQUIPMENT & GEAR

☐ Fire Extinguisher
☐ Caution Tape
☐ Traffic Cones or Stanchions
☐ Warning Signs or Placards
☐ Decon Buckets, Brushes, etc.
☐ Portable Ground Fault Interrupter (GFI)
☐ Lockout/Tagout Equipment
☐ Ventilation Equipment
☒ Others: First Aid Kit, Cell Phone, Water, Soap

☐ Outer Boots – Type
☒ Eye Protection with side shields
☐ Face Shield
☒ Traffic Vest
☐ Personal Flotation Device (PFD)
☐ Fire Retardant Clothing
☐ EH (Electrical Hazard) Rated Boots, Gloves, etc.
☒ Noise/Hearing Protection
☐ Others:

9. H&S TRAINING/QUALIFICATIONS FOR FIELD PERSONNEL

☒ Project-Specific H&S Orientation (Required for All Projects/Staff)
☒ OSHA 40-Hour HAZWOPER/8 Hour Refreshers
☐ Hazard Communication (for project-specific chemical products)
☒ First Aid/CPR (required for HAZWOPER for at least one individual on site)
☒ Current Medical Clearance Letter (required for HAZWOPER)
☒ OSHA 10-hour Construction Safety Training
☐ Fall Protection Training
☐ Trenching & Excavation

☐ Lockout/Tagout Training
☐ Electrical Safety Training
☐ Bloodborne Pathogen Training
☒ Safe Drilling SOP
☐
☐
☐
☐

Discuss/Clarify, as needed: dry decon

10. PERSONNEL AND EQUIPMENT DECONTAMINATION (SECTION ONLY REQUIRED FOR HAZWOPER SITES)

Describe personnel decontamination procedures for the project site, including "dry decon" (simple removal of PPE)	Dry Decon, wash hands and other exposed skin before taking breaks or leaving site. Change PPE before leaving site.

11. PROJECT PERSONNEL - ROLES AND RESPONSIBILITIES

GZA ON-SITE PERSONNEL:

Name(s)	Project Title/Assigned Role	Telephone Numbers
Jackson Bogach	Site Supervisor	Work: 212-594-8140 Cell: 332-215-6349
Jackson Bogach	Field Safety Officer	Work: 212-594-8140 Cell: 332-215-6349
Jackson Bogach	First Aid Personnel	Work: 212-594-8140 Cell: 332-215-6349
Mark Frey	GZA Project Team Members	Work: 631-847-1605 Cell: 347-213-8324

Site Supervisors and Project Managers (SS/PM): Responsibility for compliance with GZA Health and Safety programs, policies, procedures and applicable laws and regulations is shared by all GZA management and supervisory personnel. This includes the need for effective oversight and supervision of project staff necessary to control the Health and Safety aspects of GZA on-site activities.

Field Safety Officer (FSO): The FSO is responsible for implementation of the Site Specific Health and Safety Plan.

First Aid Personnel: At least one individual designated by GZA who has current training and certification in basic first aid and cardiopulmonary resuscitation (CPR) must be present during on-site activities involving multiple GZA personnel at HAZWOPER sites.

GZA Project Team: Follow instructions relayed by the HASP and GZA manager on-site.

OTHER PROJECT PERSONNEL:

Name	Project Title/Assigned Role	Telephone Numbers
Victoria D. Whelan	Principal-in-Charge	Work: (212) 594-8140 Cell: (631) 793-8821
Jackson Bogach	Project Manager	Work: (212) 594-8140 Cell: (332) 215-6349
Reinbill Maniquez	Office Safety Coordinator	Work: (212) 594-8140 Cell: (347) 443-1059
Richard Ecord	GZA EHS Director	Work: 781-278-3809 Cell: 404-234-2834

Principal-in-Charge: Responsible of overall project oversight, including responsibility for Health and Safety.

Project Manager: Responsible for day-to-day project management, including Health and Safety.

Health and Safety Coordinator: General Health and Safety guidance and assistance.

GZA EHS Director: H &S technical and regulatory guidance, assistance regarding GZA H&S policies and procedures.

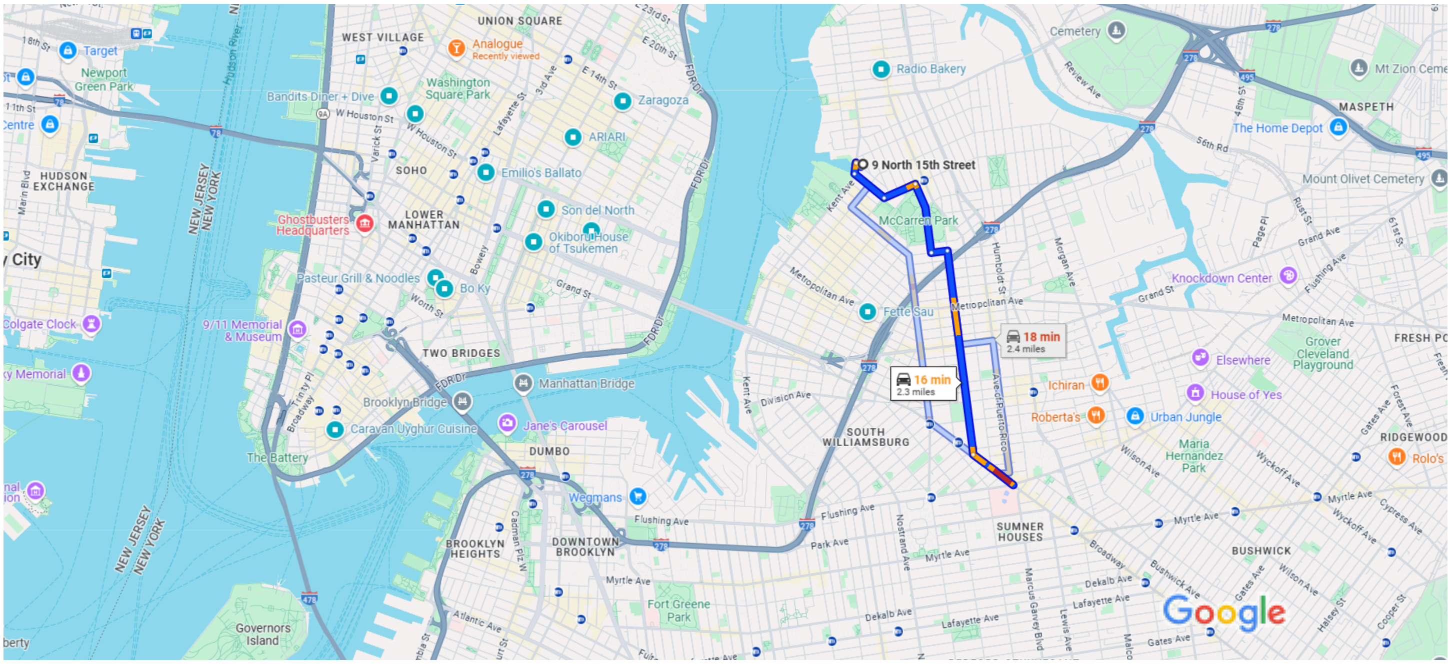
12. PLAN ACKNOWLEDGEMENT AND APPROVALS		
GZA Project Site Worker Plan Acknowledgement		
I have read, understood, and agree to abide by the information set forth in this Safety and Accident Prevention Plan. I will follow guidance in this plan and in the GZA Health and Safety Program Manual. I understand the training and medical monitoring requirements covered by the work outlined in this plan and have met those requirements.		
GZA Employee Name	GZA Employee Signature	Date
Jackson Bogach	Jackson Bogach	**10/29/2024**
Subcontractor Site Worker Plan Acknowledgement		
GZA has prepared this plan solely for the purpose of protecting the health and safety of GZA employees. Subcontractors, visitors, and others at the site must refer to their organization's health and safety program or site-specific HASP for their protection. Subcontractor employees may use this plan for general informational purposes only. Subcontractor firms are obligated to comply with safety regulations applicable to their work, and understand this plan covers GZA activities only.		
Subcontractor Employee Name	Subcontractor Employee Signatures	Date
GZA HASP Approval Signatures		
The following individuals indicate their acknowledgement and/or approval of the contents of this Site Specific H&S Plan based on their understanding of project work activities, associated hazards and the appropriateness of health and safety measures to be implemented. A signed copy of this document must be present at the project site at all times work is being performed.		
GZA Author/Reviewer Role	Signature	Date
Yunmee Han **HASP Preparer**	[signature]	**10/29/2024**
Mel Kenerson **EHS Reviewer**	[signature]	**10/31/2024**
Victoria Whelan **Principal in Charge**	[signature]	**11/8/2024**

Attachment A – Route to Hospital

Google Maps

9 N 15th St, Brooklyn, NY 11222 to NYC Health + Hospitals/Woodhull

Drive 2.3 miles, 16 min



Map data ©2024 Google 2000 ft

9 N 15th St
Brooklyn, NY 11222

1. Head northwest on N 15th St toward Franklin St

22 sec (171 ft)

2. Turn left onto Franklin St

36 sec (302 ft)

Take Leonard St to Broadway

12 min (1.9 mi)

3. Franklin St turns left and becomes N 14th St

0.2 mi

4. N 14th St turns left and becomes Nassau Ave
⚠ Parts of this road may be closed at certain times or days

0.2 mi

5. Turn right onto Lorimer St
⚠ Parts of this road may be closed at certain times or days

0.4 mi

6. Turn left onto Richardson St

453 ft

7. Turn right at the 1st cross street onto Leonard St

1.1 mi

8. Turn left onto Broadway

Pass by McDonald's (on the right)

2 min (0.3 mi)

NYC Health + Hospitals/Woodhull

760 Broadway, Brooklyn, NY 11206

Attachment B – Tailgate Safety Meeting Form

TAILGATE SAFETY MEETING

CHECK ONE: ______ **Initial H&S Orientation** _______**Periodic "Toolbox" Safety Meeting**

Project Site/Location____

Date________________________ **Time**_______________________________ **Job No.**__________________

PM____ **PIC**____

The undersigned have attended a Health and Safety briefing, consisting of a review of the provisions of the Site Specific H&S Plan, and/or appropriate prior H&S events or concerns, and/or review of anticipated H&S concerns and safety measures for the project.

SUMMARY OF HEALTH AND SAFETY TOPICS COVERED (required topics are listed below to be covered in addition to regular site-specific topics)
1. Pausing and Stopping Work
2. Review Site-Specific Safety Guidelines
3. Uneven and/or Unstable Terrain in Work Area(s)
4. How GZA People-Based Safety will be implemented on the site

NAME (printed)	**SIGNATURE**	**COMPANY**

Conducted by: ____ Date:________________________

Attachment C – Incident Form

SUPERVISOR'S ACCIDENT INVESTIGATION REPORT

Injured Employee ________________________________ Job Title ______________________________

Home Office ____________________________ Division/Department ___________________________________

Date/Time of Accident ____

Location of Accident ____

Witnesses to the Accident ____

Injury Incurred? __________ Nature of Injury ____

____

Engaged in What Task When Injured? ____

____

Will Lost Time Occur? ____ How Long? ____________ Date Lost Time Began ___________________________

Were Other Persons Involved/Injured? ____

____

How Did the Accident Occur? ____

____

____

____

____

What Could Be Done to Prevent Recurrence of the Accident? ______________________________________

____

____

What Actions Have You Taken Thus Far to Prevent Recurrence? ____________________________________

____

____

Supervisor's Signature ____________________________ Title __________________________ Date __________

Reviewer's Signature _____________________________ Title __________________________ Date __________

Note: If the space provided on this form is insufficient, provide additional information on a separate page and attach. The completed accident investigation report must be submitted to the Health and Safety Manager within two days of the occurrence of the accident.

Attachment D – Job Hazard Analyses

GZA GEOENVIRONMENTAL, INC.
JOB HAZARD ANALYSIS WORKSHEET

Job: Drilling Observations, Monitoring Well Installation Observation and Soil Sampling		
Analysis By: Andrew Whitsitt	**Reviewed By: Guy Dalton**	**Approved By: Jayanti Chatterjee , CIH**
Date: October 2, 2011 Revised: June 14, 2012	**Date: June 14, 2012**	**Date: June 26, 2012**

Task 4.1
DRILLING OBSERVATIONS, MONITORING WELL INSTALLATION OBSERVATIONS, SOIL SAMPLING

HAZARD CONTROLS

GZA Job Tasks	Potential Hazards	Controls
Review Related THA's – 21.1 – General Outdoor Field Work		
Observation of Deploying of Traffic Protection Equipment by Drilling Contractor (e.g., cones, signs, etc.)	Personal injury due to vehicle traffic, Collisions, injuries	Wear high visibility vest at all times when out of vehicle.
		Park in designated parking locations or select off-road areas that are firm and free of hazards. Directly inspect parking location on foot if necessary.
		Use emergency flashers or other appropriate vehicle warning system as appropriate to local conditions when parking personal or GZA vehicle and/or equipment.
		If parking outside of a designated parking area, demarcate vehicle with traffic cones or equivalent.
		Use emergency flashers or other appropriate vehicle warning system when placing equipment.
		Observe if police detail or other required traffic control system (if necessary) is in place.
		Stay within the confines of the work area and do not venture outside of the demarcated work area into traffic.
		If you observe that contractor may back into structures, vehicles, fences, etc., notify contractor immediately with pre-determined signals. Do not cross the path of the heavy equipment.
		Stand clear of moving Drill Rig.
Observation of Mobilizing Drill Rig To Job Site and positioning at borehole by Drilling Contractor	Struck by drill rig	Before drilling begins, confirm that drill rig has been parked properly and securely by the drilling contractor.
		Wear high visibility vests. Make sure that the driver can see you and is aware of your location at all times.
		Inform the driller if it is observed that the rig is being moved with the mast raised and/or tools and other equipment on the rig are not secured and can fall over and potentially hurt personnel.

Job: Drilling Observations, Monitoring Well Installation Observation and Soil Sampling		
Analysis By: Andrew Whitsitt	**Reviewed By: Guy Dalton**	**Approved By: Jayanti Chatterjee , CIH**
Date: October 2, 2011 **Revised: June 14, 2012**	**Date: June 14, 2012**	**Date: June 26, 2012**

Task 4.1
DRILLING OBSERVATIONS, MONITORING WELL INSTALLATION OBSERVATIONS, SOIL SAMPLING

HAZARD CONTROLS

GZA Job Tasks	Potential Hazards	Controls
	Overhead utility	Look overhead to assess if any utilities are present and confirm with driller that they are aware of the overhead utility location and to take appropriate actions to prevent contact with the overhead utilities and to minimize any arc flash hazards. Review GZA's Electrical Safe Work Practices Program 03-3003.
Observation of drilling operations and monitoring well installations	Underground utilities	Confirm that underground utility clearance procedures have been completed in accordance with GZA Policy # 04-0301 *Responsibility for Utility Clearance of Exploration Locations* for clearing utility locations prior
	Moving machinery, rotating parts, cables, ropes, etc.	Do not wear loose fitting clothing.
		All GZA personnel working in proximity to a drill rig will be familiarized with the location and operation of emergency kill switches prior to equipment start-up. Maintain safe distance from rotating auger, drill casing, rods and cathead at all times. Observe operations from a safe distance. Persons shall not pass under or over a moving stem or auger Check that "kill" switches are present and working. Confirm with driller that daily inspection of rig has been performed prior to commencing work and no conditions were noted with the rig that would affect its proper operation.
		Do not touch or operate or assist with any rig operations and maintenance work.
		Make eye contact with operator before approaching equipment.
		Be alert and take proper precautions regarding slippery ground surfaces and similar hazards near rotating auger.
		Do not engage the driller or helper when drill is in operation. Work out prearranged signals to get their attention before approaching them.
		Confirm prior to drilling operations that driller and helper communicate and coordinate their actions and movements.
		GZA personnel are not allowed to be on the drill rig or operate a rig.

Job: Drilling Observations, Monitoring Well Installation Observation and Soil Sampling		
Analysis By: Andrew Whitsitt	**Reviewed By: Guy Dalton**	**Approved By: Jayanti Chatterjee , CIH**
Date: October 2, 2011 Revised: June 14, 2012	**Date: June 14, 2012**	**Date: June 26, 2012**

Task 4.1
DRILLING OBSERVATIONS, MONITORING WELL INSTALLATION OBSERVATIONS, SOIL SAMPLING

HAZARD CONTROLS

GZA Job Tasks	Potential Hazards	Controls
		Wear steel toed boots, hardhat and side-shielding safety glasses/goggles.
	Falling objects, debris	Stand clear of stacked drill rods. If stack appears unstable inform driller.
	Noise	Wear appropriate hearing protection.
	Roadway/traffic hazards	Be alert at all times; never step outside traffic cones.
		Wear high visibility vests at all times.
		Be familiar with escape routes at each location.
		Follow project Traffic Control Plan. Be alert at all times and never step outside the traffic cones. Use a Police detail when necessary.
	Slips, trips and falls	Maintain clean and sanitary work area free of tripping/slipping hazards.
		All borings, excavations, or partially completed groundwater monitoring wells will be adequately covered and/or barricaded if left unattended for any period of time to prevent injury.
		Store any hand tools used for sampling in their proper storage location when not in use.
		Provide adequate space for each employee to work safely with sound footing.
		Do not perform work if adequate lighting is not available.
		Maintain an exit pathway away from the rig at all times.
	Cuts, bruises, shocks, lacerations, sprains and strains during tool use	When working with a driller, do not assist the drilling crew with their work.
		Use properly maintained tools; do not use damaged tools.
		Wear the proper Personal Protective Equipment based on the task being performed.
		Store and carry tools correctly.
		Use the correct tool for the job.
		Do not use electrical tools with damaged cords or other electrical components.
		Observe proper electrical safety practices. Do not use electrical tools in wet areas.

Job: Drilling Observations, Monitoring Well Installation Observation and Soil Sampling		
Analysis By: Andrew Whitsitt	**Reviewed By: Guy Dalton**	**Approved By: Jayanti Chatterjee , CIH**
Date: October 2, 2011 **Revised: June 14, 2012**	**Date: June 14, 2012**	**Date: June 26, 2012**

Task 4.1
DRILLING OBSERVATIONS, MONITORING WELL INSTALLATION OBSERVATIONS, SOIL SAMPLING

HAZARD CONTROLS

GZA Job Tasks	Potential Hazards	Controls
		Coordinate activities with driller. Allow driller to open sampling equipment (i.e., split spoons, Geoprobe sleeves, etc.)
	Fire hazards	Be familiar with emergency procedures and where fire extinguishers are present on site.
		Inform GZA subcontractor if you observe improper storage of used rags and unsafe storage of flammable/combustible liquids brought on site.
		GZA and its subcontractors, suppliers and vendors shall not smoke in the work area in GZA project sites. Smoking can only be in designated smoking areas away from work areas and potential fire hazard locations.
		Confirm with driller that a fire extinguisher present with rig and will be available at all times and that inspection tag is not expired.
		If driller is welding or cutting on site confirm there are no flammables or combustible materials near the vicinity of welding machines or torches (such as debris, fuels, grass/weeds, etc.). Review Site requirements for obtaining “Hot Work Permit”.
		Stand well clear of welding/cutting/burning areas.
		When drilling activities encounter the presence of gas or electric, the drill crew shall immediately curtail drilling activity, shut down the drill rig and contact the Project Manager.
	Exposure to Hazardous Substances/Chemicals	Become familiar with hazards associated with hazardous commercial products used in drilling (fuels, silica sand, grout, cement, bentonite, etc.). Review Safety Data Sheets (SDSs) for such products and participate in daily safety tailgate meetings.
		Do not handle drilling chemicals.
		Wear appropriate personal protective equipment.
		Review hazards of chemicals that may have been used or currently are being used on site.
		Refer to the site specific HASP for chemical hazards and the necessary precautions required for sampling.

GZA GEOENVIRONMENTAL, INC. JOB HAZARD ANALYSIS WORKSHEET		
Job: Drilling Observations, Monitoring Well Installation Observation and Soil Sampling		
Analysis By: Andrew Whitsitt	**Reviewed By: Guy Dalton**	**Approved By: Jayanti Chatterjee , CIH**
Date: October 2, 2011 **Revised: June 14, 2012**	**Date: June 14, 2012**	**Date: June 26, 2012**

Task 4.1
DRILLING OBSERVATIONS, MONITORING WELL INSTALLATION OBSERVATIONS, SOIL SAMPLING

HAZARD CONTROLS

GZA Job Tasks	Potential Hazards	Controls
		Be alert for hazardous site contaminants (as indicated by odor, visual characteristics, location, and site history). Assess whether procedures and contingencies are in place for characterizing hazards and protecting workers by use of appropriate air monitoring, personal protective clothing and respiratory protection, as needed. If contamination is identified at the Site only personnel trained and medically qualified to work on hazardous sites will be permitted to proceed with the work.
Sampling Soil	Exposure to chemicals	Refer to the site specific HASP for chemical hazards and the necessary precautions required for sampling.
		Understand potential hazards associated with handling sample collection preservatives.
		Review and have SDS available for chemicals being brought on site, including that of sample preservatives.
		Wear appropriate PPE identified in the HASP
		Wash hands before eating and drinking. Eating and drinking are prohibited in areas of soil contamination/work area.

GZA GEOENVIRONMENTAL, INC.
JOB HAZARD ANALYSIS WORKSHEET

Job: Soil-Gas Sampling		
Analysis By: Joseph DiAntonio	**Reviewed By: Guy Dalton**	**Approved By: Jayanti Chatterjee , CIH**
Date: September 30, 2011 **Revised: June 22, 2012**	**Date: June 22, 2012**	**Date: June 26, 2012**

Task 4.5
Soil-Gas Sampling

HAZARD CONTROLS

GZA Job Tasks	Potential Hazards	Controls
<u>Review Related THA's</u> – 21.1 – General Outdoor Field Work		
Collection of Soil-Gas for Sampling	Exposure to Hazardous Substances	Become familiar with hazards through review of Task Hazard Analysis and participate in daily safety tailgate meetings.
		Communicate Task Hazard Analysis and Lessons Learned information to GZA field crew prior to initiating work and throughout the project as needed.
		Be alert for hazardous site contaminants (as indicated by odor, visual characteristics, location, and site history).
		Wear appropriate safety equipment as required by the Site Specific Health and Safety Plan (HASP) work area (hard hat, steel toe boots, work clothes, high visibility vest, eye and hearing protection, etc.). Implement work practices identified in the HASP.
		Be familiar with hazards associated with products used where samples will be collected and potential compounds of concern during the remedial investigation.
		Review and have Safety Data Sheets (SDSs) available on site for chemicals being used on site.
	Slips, Trips, and Falls	Become familiar with physical site specifics to reduce or eliminate slips, trips and falls due to uneven surfaces, onsite equipment, discarded materials, or working at height.
	Underground Utilities	Proper utility locations/clearance must be performed and the area checked for evidence of underground features prior to breaking ground. Review and comply with GZA Policy 04-0301 *Responsibility for Utility Clearance of Exploration Locations* .
	Electrical Conductor Hazards	Identify location of electrical conductors and maintain minimum approach distance of 25 feet.
	Poor visibility	Provide additional portable lighting if natural lighting is not adequate for performing the work safely.
	Manual Lifting, Equipment Handling	Use proper lifting techniques when lifting/moving objects or equipment to gain access into survey areas. Seek assistance with heavy loads.

GZA GEOENVIRONMENTAL, INC.
JOB HAZARD ANALYSIS WORKSHEET

Job: Soil-Gas Sampling		
Analysis By: Joseph DiAntonio	**Reviewed By: Guy Dalton**	**Approved By: Jayanti Chatterjee , CIH**
Date: September 30, 2011 **Revised: June 22, 2012**	**Date: June 22, 2012**	**Date: June 26, 2012**

Task 4.5
Soil-Gas Sampling

HAZARD CONTROLS		
GZA Job Tasks	**Potential Hazards**	**Controls**
		Use work gloves where appropriate to prevent hand injuries.
		Wear steel-toed work shoes.
	Personnel Decontamination	All personnel, clothing, and equipment leaving the contaminated area of the site must be decontaminated to remove any harmful chemicals or properly disposed.
Sampling Near or In Roadways:	Personal Injury Due to Vehicular Traffic	Wear high visibility safety vest when out of vehicle and in areas with vehicular traffic.
		Park vehicle in designated parking locations, or select off-road area that is firm, and without hazards. Directly inspect parking location on foot if necessary.
		If parking outside of a designated parking area, demarcate vehicle with traffic cones or equivalent.
		Use emergency flashers or other appropriate vehicle warning system as appropriate to local conditions when parking vehicle.
		Use police detail (if necessary) to direct traffic while
Manual Installation of Sample Points	Cuts, Bruises, Shocks, Lacerations, Sprains and Strains	Observe proper electrical safety practices. Do not use electrical tools with damaged cords or other electrical components.
		Tools must be properly maintained; do not use damaged tools.
		Wear proper Personal Protective Equipment.
		Store and carry tools correctly.
		Use the correct tool for the job.
		Unplug tools or remove batteries when servicing or changing bit, blades, abrasive wheels or other components.
		Protect your “off hand” from gouges, hammer blows, cutting tools, etc. Position your “off hand” to prevent injury in case of slip of the tool.
Generator Use	Fire / Burn Hazards from Generator Used to Power Drill,	All flammable/combustible liquids must be stored in proper containers.
		A fire extinguisher (10 # class B/C, minimum) must be present on site.
		Generator must be placed on level, stable ground. Keep exhaust port/pipe away from potential flammable materials (i.e., dry brush, oily rags, etc).

Job: Soil-Gas Sampling		
Analysis By: Joseph DiAntonio	**Reviewed By: Guy Dalton**	**Approved By: Jayanti Chatterjee , CIH**
Date: September 30, 2011 **Revised: June 22, 2012**	**Date: June 22, 2012**	**Date: June 26, 2012**

Task 4.5
Soil-Gas Sampling

HAZARD CONTROLS		
GZA Job Tasks	**Potential Hazards**	**Controls**
		Use care when working around hot exhaust port/pipe.
		If a fuel powered generator is being used take precautions to prevent carbon monoxide and other exhaust fume build up on the work area and other potential areas occupied by personnel.
		Vent outside of the work area away from other personnel/occupants. Where necessary have CO detector available to warn of hazardous concentrations.

GZA GEOENVIRONMENTAL, INC.
JOB HAZARD ANALYSIS WORKSHEET

Job: Field Sampling

Analysis By: Christie Wagner	**Reviewed By: Jayanti Chatterjee, CIH**	**Approved By: Jayanti Chatterjee, CIH**
Date: November 4, 2011 **Revised: July 12, 2012**	**Date: July 12, 2012**	**Date: July 12, 2012**

Task 20.11
Field Sampling

HAZARD CONTROLS

GZA Job Tasks	Potential Hazards	Controls
Review Related THA's – 21.1 General Outdoor Field Work		
Pre work task for site visit	Adverse Weather Conditions	Assess weather conditions prior to on-site work and examine forecast for anticipated period of work.
		Dress appropriately for weather conditions (e.g., precipitation, temperature ranges over anticipated duration of field work).
		Use protective ointments such as sunscreen and chap stick, as appropriate to the field conditions.
		Be aware of the anticipated weather conditions prior to mobilization to the site. Unacceptable field work conditions are not precise, but may include site specific conditions, general location, extreme weather conditions (e.g., icing, lightening, excessive cold or wind), travel conditions, and other factors. Professional judgment is required, and personal assessment of safety must always be individually assessed.
Conduct visual inspection of site	Dangerous Terrain	Be aware of the site terrain, watch for holes and rocks that can be tripping hazards
		Learn to identify and watch for plants such as thorn bushes and poision ivy that can either scratch you or give you a rash.
Collecting sample	Muscle strain from lifting heavy objects	Use proper lifting techniques. Use appropriate mechanical assistance and tools when possible. Wear work gloves and steel toed boots.
	Exposure to unknown sample	Be sure to treat effluent samples as unknowns and wear the proper PPE.
		If there are any unusual odors/fumes coming from a sample, especially those that cause reactions in the eyes or nose, leave the area and inform a supervisor immediately.

GZA GEOENVIRONMENTAL, INC.
JOB HAZARD ANALYSIS WORKSHEET

Job: General Outdoor Field Work		
Analysis By: Anthony Zemba, CHMM	**Reviewed By: Richard Ecord**	**Approved By: Jayanti Chatterjee , CIH**
Date: June 25, 2012	**Date: March 23, 2023**	**Date: July 12, 2012**

Task 21.1
General Outdoor Field Work

HAZARD CONTROLS

GZA Job Tasks	**Potential Hazards**	**Controls**
Pre-work preparation	Overlooking of potential hazards	Become familiar with project area and job site by reviewing available on-line mapping (USGS Topographic, NWI Wetland, NRCS Soil, etc.; and aerial photographs before visiting site. Understand related hazards through review of this and other Task Hazard Analyses and participate in daily safety tailgate meetings (where applicable).
		Communicate Task Hazard Analysis and Lessons Learned information to operator(s) prior to initiating work and throughout the project as needed.
Driving to site	Vehicle accidents/collisions/injuries	Perform pre-operation check of vehicle, verifying service brakes, parking brake, steering, lights, tires, horn, wipers mirrors and glass are in good condition. verify that the rig is roadworthy.
		Wear seat belts always when driving even on site.
		Secure loose materials in cab or bed of vehicle.
		Keep windshields, windows and lights cleans.
		Abide by safe driving procedures.
	Backing collisions	If possible avoid backing by using a route that allows you to pull through.
		If backing up from a parked area do a quality 360 walker.
Working within transportation corridors or active construction sites	Collisions injuries	Wear high visibility safety vest on site when out of personal or GZA vehicle.
		Park vehicle in designated parking locations, or select off-road area that is firm, and without hazards. Directly inspect parking location on foot if necessary.
		Use emergency flashers or other appropriate vehicle warning system as appropriate to local conditions when parking vehicle.
		Use emergency flashers or other appropriate vehicle warning system when parking outside of standard parking spaces, or to stop in right-of-
		Be alert at all times; never step outside traffic cones.

GZA GEOENVIRONMENTAL, INC.
JOB HAZARD ANALYSIS WORKSHEET

Job: General Outdoor Field Work		
Analysis By: Anthony Zemba, CHMM	**Reviewed By: Richard Ecord**	**Approved By: Jayanti Chatterjee , CIH**
Date: June 25, 2012	**Date: March 23, 2023**	**Date: July 12, 2012**

Task 21.1
General Outdoor Field Work

HAZARD CONTROLS

GZA Job Tasks	Potential Hazards	Controls
		Stand clear of moving heavy equipment and away from any overhead utility lines until equipment is safely in position and parked properly and securely by the contractor.
		Do not wear headphones or earbuds, or listen to music or talk on the phone, which may distract from work hazards.
	Crossing Automobile traffic lanes	Wear high visibility safety vests at all times when out of vehicle and working within or adjacent to the roadway.
	Crossing Airport Movement Areas (e.g., Runways, taxiways, approaches)	Learn, know, and conform to project site Airport's, Airfield's, or Airbase's protocol for crossing movement areas (whether on foot or in vehicle).
		Work within airport movement areas or safety zones must be coordinated with the Air Traffic Control Tower.
		Vehicles to have blinking or flashing lights or beacons; pedestrians to wear high visibility safety vests.
		Using protocol, maintain communication with airport security and air traffic controllers.
	Crossing Railways	Work within active railroad ROWs requires railroad safety training. No work can be done within the railroad traffic envelope without the permission of a railroad flagman.
		No equipment or vehicles can cross without the permission of a railroad flagman.
		Expect any train on any track coming from either direction at any time.
Working in Natural or Remote Areas	Slips, trips, fall	Be aware of loose ground materials such as talus, unconsolidated rock, soil, sediment, ice and other media that could cause slips, trips or falls.
		Be careful when walking in heavily vegetated areas. Mind tangles of vines, thorny branches, and slippery logs and rock surfaces. Dense vegetation and especially entangled vines present trip hazards, or can mask voids, sharp objects, or other hazards beneath.

GZA GEOENVIRONMENTAL, INC.
JOB HAZARD ANALYSIS WORKSHEET

Job: General Outdoor Field Work		
Analysis By: Anthony Zemba, CHMM	**Reviewed By: Richard Ecord**	**Approved By: Jayanti Chatterjee , CIH**
Date: June 25, 2012	**Date: March 23, 2023**	**Date: July 12, 2012**

Task 21.1
General Outdoor Field Work

HAZARD CONTROLS		
GZA Job Tasks	**Potential Hazards**	**Controls**
		Be vigilant for signs of cracking, shifting, fracturing, and evidence of past movement.
		Use wood mats or other stabilizing materials for equipment if soft ground conditions are present.
		Use walking stick, auger, or ski poles to steady yourself when traversing loose material or slopes.

Job: General Outdoor Field Work		
Analysis By: Anthony Zemba, CHMM	**Reviewed By: Richard Ecord**	**Approved By: Jayanti Chatterjee , CIH**
Date: June 25, 2012	**Date: March 23, 2023**	**Date: July 12, 2012**

Task 21.1
General Outdoor Field Work

HAZARD CONTROLS

GZA Job Tasks	Potential Hazards	Controls
		Wear proper footwear for conditions.
		Store tools in their proper storage location when not in use.
		Provide adequate lighting when necessary.
	Falls into excavations/ voids	Stand away from edges of excavations and voids. Do not attempt access without proper equipment / training. Remember that some excavations or voids may constitute a confined space and may present structural stability issues.
	Cave-ins and engulfment	DO NOT enter caves, sinkholes, excavations, and other voids or concavities that are not sloped or shored properly and have not been evaluated by a competent person to be safe.
		Stand away from edges of excavations, cliffs, dug wells, and other voids.
		Watch for cracks/fissures in the ground surface in the immediate vicinity of a pit or void, which indicate imminent sidewall failure/cave-in.
		Assess if confined space entry procedures need to be implemented.
		Before entering void (if required to do so and with proper training) be aware of any hazards at the surface (boulders, equipment) which may fall into the void.
Working among hazardous biota	Plant toxins Incidental contact	Know the appearance of poison ivy and poison sumac in all seasons, and if sensitive to these toxins, carry and use special cleaning soaps/solutions when thought to be exposed. Stock first aid kit with poison ivy/sumac cleaning soaps/solutions.
	Ticks	Ticks carry risk of Lyme’s and other Diseases. Tick season is basically any field day above 40 degrees F.
		Tuck pants into long socks.
		The application of DEET (or permethrin pre-treatment) to clothing in season to control exposure to ticks is recommended.
		Check clothing for ticks frequently.

GZA GEOENVIRONMENTAL, INC. JOB HAZARD ANALYSIS WORKSHEET		
Job: General Outdoor Field Work		
Analysis By: Anthony Zemba, CHMM	**Reviewed By: Richard Ecord**	**Approved By: Jayanti Chatterjee , CIH**
Date: June 25, 2012	**Date: March 23, 2023**	**Date: July 12, 2012**

Task 21.1
General Outdoor Field Work

HAZARD CONTROLS		
GZA Job Tasks	**Potential Hazards**	**Controls**
		Check whole body immediately upon returning from field and shower.
	Mosquitoes	Be aware of intermittent seasonal reports of mosquito borne diseases, such as West Nile disease and Eastern Equine Encephalitis (EEE), and their locations relative to your field site. Use of DEET or other mosquito repellant is recommended.
	Stinging bees and wasps	Be aware of potential cavity, suspended or ground nesting bee/wasp/hornet nests. Avoid undue disturbance or approach with appropriate safety clothing, protection and netting.
		Take appropriate precautions if allergic to bees. Carry at least two epi-pens in first aid kit as well as anti-histamines (oral and inhalers).
		Avoid areas of heavy bee activity if allergic. Avoid perfumed soaps, shampoos, deodorants, colognes, etc. that may attract bees.
	Poisonous Snakes	Be aware of terrain likelihood of harboring poisonous snakes in your work zone. Avoid reaching or stepping into hidden areas (such as into wood pile, rock pile, debris pile, stone wall, etc.) without pre-inspection.
		Coordinate with local hospitals to verify they have proper anti-venom in stock.
		Learn first aid procedures in case of poisonous snake bite.
		Devise an action plan and include in the site-specific HASP.
	Wild Animals	Do NOT handle wildlife unless properly trained to do so.
		Beware of any wild animal that shows no sign of wariness of humans.
		Do NOT attempt to feed wild animals or to help apparently injured wild animals.
		Be aware of domestic animals that may also pose a threat such as dogs off leash, bulls out to pasture, etc.

GZA GEOENVIRONMENTAL, INC.
JOB HAZARD ANALYSIS WORKSHEET

Job: General Outdoor Field Work		
Analysis By: Anthony Zemba, CHMM	**Reviewed By: Richard Ecord**	**Approved By: Jayanti Chatterjee , CIH**
Date: June 25, 2012	**Date: March 23, 2023**	**Date: July 12, 2012**

Task 21.1
General Outdoor Field Work

HAZARD CONTROLS

GZA Job Tasks	Potential Hazards	Controls
Working in Adverse Weather Conditions	Heat / cold stress and other weather related hazards	Assess weather conditions prior to on-site work and examine forecast for anticipated period of work.
		Dress appropriately for weather conditions (e.g., precipitation, temperature ranges over anticipated duration of field work). Include clothing and the presence / absence of shade when calculating a heat index.
		Schedule work day to avoid working during hottest or coldest parts of the day, to the extent practicable.
		Keep exposed skin covered in extremely cold weather.
		Recognize signs of frostbite; use warming packs and layer clothing to maintain warmth.
		Use a wicking layer of clothing against your body to keep moisture away from skin.
		Wool clothing will continue to keep you warm after it becomes wet; cotton will not.
		Use protective ointments such as sunscreen and chap stick, as appropriate to the field conditions.
		Stay hydrated in hot weather; drink fluids regularly throughout the day, even if not thirsty.
		Recognize signs of heat stress; take frequent breaks in shade when working in direct sunlight for prolonged periods.
		Be familiar with Heat index chart - add 20 degrees to chart if fully clothed and if working in direct sunlight.
		NOTE: Unacceptable field work conditions are not precise, but may include site specific conditions, general location, extreme weather conditions (e.g., icing, lightning, excessive cold or wind), travel conditions, and other factors. Professional judgment is required, and personal assessment of safety must always be individually assessed.
	Working on Ice	Assess relative load bearing capacity of ice on lakes, ponds and other waterways. If unsure do not venture onto the ice.

GZA GEOENVIRONMENTAL, INC.
JOB HAZARD ANALYSIS WORKSHEET

Job: General Outdoor Field Work		
Analysis By: Anthony Zemba, CHMM	**Reviewed By: Richard Ecord**	**Approved By: Jayanti Chatterjee , CIH**
Date: June 25, 2012	**Date: March 23, 2023**	**Date: July 12, 2012**

Task 21.1
General Outdoor Field Work

HAZARD CONTROLS

GZA Job Tasks	Potential Hazards	Controls
		Wear proper footwear modified for traction on ice.
	Electrical storms	If lightning is observed during drilling activities, work shall be suspended immediately and employees shall find suitable shelter (building or vehicle at minimum). Work will commence no sooner than 30 minutes after the last indications of lightning have been observed
		Seek shelter inside a walled building or your vehicle.
		Open picnic pavilions and under trees are not adequate shelters.
		Assess vulnerability to lightning strikes as soon as thunder is heard on the horizon. Open areas and higher elevations are more susceptible to strikes.
		Tall objects such as metal towers and flag poles may attract lightning.
		Consult internet weather radar tracking devices to learn of impending storm patterns proximal to your work area.
	High Winds	Avoid working at high elevations, elevated platforms, and other exposed areas during high wind conditions.
		Assess work area for equipment that may be blown down, over, or carried aloft by high winds.
Working in areas without sanitary facilities	Hygiene related hazards	Provide hand washing kits (e.g., baby wipes, hand sanitizers, paper towels, bottled water, etc.) to be used prior to eating and drinking.
		Have garbage bags handy to collect trash.
Working in remote areas	Emergency Conditions	Be familiar with onsite emergency procedures and route to nearest hospital.
		Have a first aid kit available; know its contents and how to use them.
		Carry a cell phone during all field work for emergency purposes, and confirm the nearest location of cell phone signal on site prior to start of worksite.
	Disorientation	Plan your route and anticipated progress prior to field work.

Job: General Outdoor Field Work		
Analysis By: Anthony Zemba, CHMM	Reviewed By: Richard Ecord	Approved By: Jayanti Chatterjee , CIH
Date: June 25, 2012	Date: March 23, 2023	Date: July 12, 2012

Task 21.1
General Outdoor Field Work

HAZARD CONTROLS

GZA Job Tasks	Potential Hazards	Controls
		Have multiple navigation aids (e.g., USGS Map, compass, GPS, etc.) and know how to use them before entering field. Remember to have charged batteries and battery back-ups for electronic devices.
		Share your progress plan with office staff prior to entering the field.
		Check in with office personnel periodically to update progress.
		Review and comply with GZA's Working Alone Policy 03-1009 in advance of working alone on a project site.
	Hunting	Be familiar with the various game hunting seasons. Follow rules and guidelines for remaining visible to hunters.
		Try to plan work around active hunting seasons or daily peak hunting hours as warranted.

APPENDIX C – COMMUNITY AIR MONITORING PLAN (CAMP)

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Appendix C
New York State Department of Health
Generic Community Air Monitoring Plan
Overview

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical- specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for VOCs and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate NYSDEC/NYSDOH staff.

Continuous monitoring will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. A periodic monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well bailing/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions, particularly if wind direction changes. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

1. If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

2. If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the

source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

4. All 15-minute readings must be recorded and be available for State (NYSDEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m3 above the upwind level and provided that no visible dust is migrating from the work area.

2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m3 of the upwind level and in preventing visible dust migration.

3. All readings must be recorded and be available for State (NYSDEC and NYSDOH) and County Health personnel to review.

Special Requirements for Work Within 20 Feet of Potentially Exposed Individuals or Structures

When work areas are within 20 feet of potentially exposed populations or occupied structures, the continuous monitoring locations for VOCs and particulates must reflect the nearest potentially exposed individuals and the location of ventilation system intakes for nearby structures. The use of engineering controls such as vapor/dust barriers, temporary negative-pressure enclosures, or special ventilation devices should be considered to prevent exposures related to the work activities and to control dust and odors. Consideration should be given to implementing the planned activities when potentially exposed populations are at a minimum, such as during weekends or evening hours in non-residential settings.

1. If total VOC concentrations opposite the walls of occupied structures or next to intake vents exceed 1 ppm, monitoring should occur within the occupied structure(s). Background readings in the occupied spaces must be taken prior to commencement of the planned work. Any unusual background readings should be discussed with NYSDOH prior to commencement of the work.

2. If total particulate concentrations opposite the walls of occupied structures or next to intake vents exceed 150 mcg/m3, work activities should be suspended until controls are implemented and are successful in reducing the total particulate concentration to 150 mcg/m3 or less at the monitoring point.

3. Depending upon the nature of contamination and remedial activities, other parameters (e.g., explosivity, oxygen, hydrogen sulfide, carbon monoxide) may also need to be monitored. Response levels and actions should be pre-determined, as necessary, for each site.

Special Requirements for Indoor Work with Co-Located Residences or Facilities

Unless a self-contained, negative-pressure enclosure with proper emission controls will encompass the work area, all individuals not directly involved with the planned work must be absent from the room in which the work will occur. Monitoring requirements shall be as stated above under “Special Requirements for Work Within 20 Feet of Potentially Exposed Individuals or Structures” except that in this instance “nearby/occupied structures” would be adjacent occupied rooms. Additionally, the location of all exhaust vents in the room and their discharge points, as well as potential vapor pathways (openings conduits, etc.) relative to adjoining rooms, should be understood and the monitoring locations established accordingly. In these situations, it is strongly recommended that exhaust fans or other engineering controls be used to create negative air pressure within the work area during remedial activities. Additionally, it is strongly recommended that the planned work be implemented during hours (e.g. weekends or evenings) when building occupancy is at a minimum.

APPENDIX D – HISTORICAL DATA TABLES (FEBRUARY AND MAY 2022)

February 2022 Limited Phase II Subsurface Investigation

Table I: NYSDOH Regulated Compounds Detected in SVI Investigation

Sample ID Sampling Date Client Matrix	SS-1 2/9/2022 Soil Vapor		IA-1 2/9/2022 Indoor Ambient Air		SS-2 2/9/2022 Soil Vapor		IA-2 2/9/2022 Indoor Ambient Air		OA-1 2/9/2022 Outdoor Ambient Air	
Compound	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
VOCs, TO-15	µg/m³		µg/m³		µg/m³		µg/m³		µg/m³	
Dilution Factor	8.5		0.9		802		1.0		0.9	
1,1,1-Trichloroethane	590	D	0.5	U	320	D	0.6	U	0.5	U
1,1-Dichloroethane	6.8	D	0.4	U	51	D	0.4	U	0.4	U
Carbon tetrachloride	27	D	0.3	D	11	D	0.3	D	0.3	D
cis-1,2-Dichloroethylene	17	D	0.1	U	1,500	D	0.1	U	0.1	U
Methylene chloride	5.9	J	2.4	D	11	J	0.7	D	1.4	D
Tetrachloroethylene	51	D	0.8	D	32,000	D	2.9	D	4.9	D
Trichloroethylene	2,000	D	3.2	D	190,000	BD	4.2	D	13	D
Vinyl Chloride	1.1	U	0.1	U	9.0	D	0.1	U	0.1	U
NYSDOH Matrix A Decision	Mitigate				Mitigate				Not Applicable	
NYSDOH Matrix B Decision	No Further Action				Mitigate					
NYSDOH Matrix C Decision	No Further Action				Monitor					

Note:

µg/m³=micrograms per cubic meter

Q is the qualifier column, where: B=analyte detected in the batch blank, D=result is from an analysis that required a dilution, J=analyte detected at or above the method detection limit but below the reporting limit, U=analyte not detected at or above the level indicated.

Table II: Subsurface Soil Analytical Results

Sample ID / Sampling Date / Client Matrix	NYSDEC Unrestricted Use SCOs	SB-1 @4' 2/9/2022 Soil		SB-2 @5' 2/9/2022 Soil		SB-3 @3-4' 2/9/2022 Soil	
Compound		Result	Q	Result	Q	Result	Q
VOCs, 8260	mg/Kg	mg/Kg		mg/Kg		mg/Kg	
Dilution Factor		1		1000		1	
1,2,4-Trimethylbenzene	3.6	0.0	U	0.5	JD	0.0	U
Acetone	0.05	0.0		**0.7**	U	0.0	U
cis-1,2-Dichloroethylene	0.25	0.0	U	**1.5**	D	0.0	U
Ethyl Benzene	1	0.0	U	0.5	JD	0.0	U
Hexachlorobutadiene	~	0.0	U	1.0	D	0.0	U
Methylene chloride	0.05	0.04	B	**5.6**	BD	0.02	B
o-Xylene	~	0.0	U	0.7	D	0.0	U
p- & m- Xylenes	~	0.0	U	2.1	D	0.0	U
Tetrachloroethylene	1.3	0.0	U	**100**	DE	0.0	U
Toluene	0.7	0.0	U	0.7	JD	0.0	U
Trichloroethylene	0.47	0.0		**400**	DE	0.0	J
Xylenes, Total	0.26	0.0	U	**2.9**	D	0.0	U

Sample ID / Sampling Date / Client Matrix	NYSDEC Unrestricted Use SCOs	SB-1 @4' 2/9/2022 Soil		SB-2 @5' 2/9/2022 Soil		SB-3 @3-4' 2/9/2022 Soil	
Compound		Result	Q	Result	Q	Result	Q
Metals, RCRA	mg/Kg	mg/Kg		mg/Kg		mg/Kg	
Dilution Factor		1		1		1	
Arsenic	13	7.8		**43**		5.0	
Barium	350	44		49		38	
Cadmium	2.5	0.3	U	**2.6**		0.3	U
Chromium	~	6.3		141		16	
Lead	63	**118**		**89**		53	
Silver	2	0.6	U	0.7		0.6	U
Mercury	0.18	0.1		**0.7**		**0.9**	

Note:

mg/Kg=milligrams per kilogram

Q is the qualifier column, where: B=analyte detected in the batch blank, D=result is from an analysis that required a dilution, J=analyte detected at or above the method detection limit but below the reporting limit, U=analyte not detected at or above the level indicated.

Table III: Groundwater Analytical Results

Sample ID / Sampling Date / Client Matrix	NYSDEC TOGS Class GA	TMW-1 2/9/2022 Water		TMW-2 2/9/2022 Water		TMW-3 2/9/2022 Water	
Compound		Result	Q	Result	Q	Result	Q
VOCs, 8260	µg/L	µg/L		µg/L		µg/L	
Dilution Factor		10		10		1	
1,1-Dichloroethane	5	2.0	U	0.3	J	0.2	U
1,1-Dichloroethylene	5	2.0	U	0.7		0.2	U
1,2,4,5-Tetramethylbenzene	~	2.0	U	0.3	J	0.2	U
1,2,4-Trimethylbenzene	5	2.1	JD	0.4	J	0.2	U
cis-1,2-Dichloroethylene	5	2.0	U	**60**		0.5	
Ethyl Benzene	5	2.0	U	0.6		0.2	U
Methyl tert-butyl ether (MTBE)	10	2.0	U	0.3	J	0.5	J
Methylene chloride	5	**40**	D	4.2		2.8	
Naphthalene	10	**14**	JD	1.0	U	1.0	U
o-Xylene	5	2.0	U	0.9		0.2	U
p- & m- Xylenes	~	5.0	U	2.1		0.5	U
sec-Butylbenzene	5	2.0	U	0.3	J	0.2	U
tert-Butylbenzene	5	2.0	U	0.2	J	0.2	U
Tetrachloroethylene	5	**570**	D	**10**		0.2	U
Toluene	5	2.0	U	0.9		0.2	U
trans-1,2-Dichloroethylene	5	2.0	U	0.3	J	0.2	U
Trichloroethylene	5	2.0	U	**21**		0.2	J
Vinyl Chloride	2	2.0	U	**300**	D	0.4	J
Xylenes, Total	5	**6**	U	3.0		0.6	U
Metals, RCRA	µg/L	µg/L		µg/L		µg/L	
Dilution Factor		1.0		1.0		1.0	
Barium	1000	78		198		156	
Chromium	50	7.0	B	8.0	B	7.0	B
Lead	25	**28**		13		12	
Selenium	10	**59**		**68**		**45**	

Note:

µg/L=micrograms per liter

Q is the qualifier column, where: B=analyte detected in the batch blank, D=result is from an analysis that required a dilution, J=analyte detected at or above the method detection limit but below the reporting limit, U=analyte not detected at or above the level indicated.

Table IV: UST Investigation Analytical Results

Sample ID / Sampling Date / Client Matrix	NYSDEC Unrestricted Use SCOs	UST-1 @8-9' 2/9/2022 Soil		UST-2 @7-8' 2/9/2022 Soil		UST-3 @5-6' 2/9/2022 Soil	
Compound		Result	Q	Result	Q	Result	Q
SVOCs, CP-51 List	mg/Kg	mg/Kg		mg/Kg		mg/Kg	
Dilution Factor		2		2		100	
Acenaphthene	20	0.1	U	0.0	U	0.7	D
Acenaphthylene	100	0.1	U	0.0	U	0.5	D
Anthracene	100	0.1	U	0.2	D	1.6	D
Benzo(a)anthracene	1	0.3	D	0.1	D	**3.7**	JD
Benzo(a)pyrene	1	0.4	D	0.2	D	**4.1**	JD
Benzo(b)fluoranthene	1	0.3	D	0.1	D	**2.9**	JD
Benzo(g,h,i)perylene	100	0.3	D	0.1	D	2.3	D
Benzo(k)fluoranthene	0.8	0.3	D	0.1	D	**3.5**	JD
Chrysene	1	0.3	D	0.1	D	**4.2**	JD
Dibenzo(a,h)anthracene	0.33	0.1	JD	0.0	U	**0.9**	D
Fluoranthene	100	0.3	D	0.2	D	8.2	D
Fluorene	30	0.1	U	0.0	U	0.7	D
Indeno(1,2,3-cd)pyrene	0.5	0.3	D	0.1	D	**2.7**	D
Naphthalene	12	0.1	D	0.0	U	0.4	D
Phenanthrene	100	0.2	D	0.2	D	6.8	D
Pyrene	100	0.3	D	0.2	D	8.0	D

mg/Kg=milligrams per kilogram

Q is the qualifier column, where: B=analyte detected in the batch blank, D=result is from an analysis that required a dilution, J=analyte detected at or above the method detection limit but below the reporting limit, U=analyte not detected at or above the level indicated.

May 2022 Remedial Investigation Report

Table I: VOCs Detected in Groundwater Samples

Sample ID	NYSDEC TOGS - Class GA	MW-1		MW-2		MW-3		MW-4		MW-5		MW-6	
Compound		Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
VOCs, 8260 Full	µg/L	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
Dilution Factor		1		1		1		1		1		1	
1,1-Dichloroethane	5	0.2	U	0.2	U	0.7		0.5		0.2	U	0.2	U
Acetone	50	1.0	U	2.8		1.0	U	1.0	U	1.0	U	1.0	U
cis-1,2-Dichloroethylene	5	0.2	U	0.2	U	**27**		**6.1**		0.8		1.7	
Cyclohexane	~	0.7		0.4	J	0.8		0.4	J	0.2	U	0.2	U
Methyl tert-butyl ether (MTBE)	10	0.2	U	0.2	U	0.5		0.2	J	0.2	U	0.2	U
Methylcyclohexane	~	0.2	U	0.2	U	0.2	J	1.6		0.2	U	0.2	U
Methylene chloride	5	1.0	J	1.0	U	1.3	J	1.0	U	1.0	U	1.0	U
o-Xylene	5	0.2	U	0.2	U	0.2	U	0.3	J	0.2	U	0.2	U
sec-Butylbenzene	5	0.2	U	0.2	U	0.2	U	0.9		0.2	U	0.2	U
tert-Butylbenzene	5	0.2	U	0.2	U	0.2	U	0.5	J	0.2	J	0.2	U
Tetrachloroethylene	5	0.2	U	0.2	U	0.4	J	3.1		0.2	U	0.2	U
Trichloroethylene	5	0.2	U	1.0		1.4		**65**		0.2	J	0.3	J
Vinyl Chloride	2	0.2	U	0.2	U	**55**		**2.0**		1.2		1.2	

Note:
Yellow=exceeds NYSDEC TOGS Values for Class GA Groundwater
µg/L=micrograms per liter
Q is the qualifier column, where:
J=analyte detected at or above the method detection limit but below the reporting limit – data is estimated.
U=analyte not detected at or above the level indicated

Table II: PFCs Detected in Groundwater Samples

Sample ID	NYSDEC Part 375 PFAS Remedial Guidance Values	MW-2		MW-4		MW-6	
Compound		Result	Q	Result	Q	Result	Q
PFAS, NYSDEC Target List	ng/L	ng/L		ng/L		ng/L	
Dilution Factor		10		10		20	
Perfluoro-1-heptanesulfonic acid (PFHpS)	100	13		11		80	D
Perfluorobutanesulfonic acid (PFBS)	100	**383**	D	**170**	D	**2,000**	D
Perfluoroheptanoic acid (PFHpA)	100	5		7		10	
Perfluorohexanesulfonic acid (PFHxS)	100	11		12		90	D
Perfluorohexanoic acid (PFHxA)	100	8		10		15	
Perfluoro-n-butanoic acid (PFBA)	100	36		**351**		27	
Perfluorononanoic acid (PFNA)	100	2		2		2	
Perfluorooctanesulfonic acid (PFOS)	10	**498**	D	**267**	D	**605**	D
Perfluorooctanoic acid (PFOA)	10	**35**		**46**		**63**	
Perfluoropentanoic acid (PFPeA)	100	12		14		6	

Note:
Yellow=exceeds NYSDEC Part 375 PFAS Remedial Guidance Values
ng/L=nanograms per liter
Q is the qualifier column, where:
D=result is from an analysis that required a dilution

Table III: VOCs Detected in Soil Samples

Sample ID	NYSDEC Part 375 UU SCOs	DB-1 @ 5'		DB-2 @ 5'		DB-3 @ 5'		DB-4 @ 6'		DB-5 @ 8'		DB-6 @ 5'	
Compound		Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
VOCs, 8260 Full	mg/Kg	mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg	
Dilution Factor		1		1		1		1000		1		500	
1,1,1-Trichloroethane	0.68	0.00	U	0.01	U	0.01	U	0.01	J	0.00	U	0.01	
1,4-Dichlorobenzene	1.8	0.00	U	0.01	U	0.01	U	0.01	J	0.00	U	0.00	U
2-Butanone	0.12	0.00	U	0.01	U	0.01	U	0.00	U	0.00	U	0.00	J
Acetone	0.05	0.01	J	0.01	U	0.01	U	0.01		0.01	U	0.02	
Chloroform	0.37	0.00	U	0.01	U	0.01	U	0.01	J	0.00	U	0.00	J
cis-1,2-Dichloroethylene	0.25	0.00	U	0.02		0.01	U	0.02		0.01		0.02	
Methylene chloride	0.05	0.02	J	0.03		0.01	J	0.01	U	0.02		0.02	
Tetrachloroethylene	1.3	0.00	U	0.01	J	0.01		0.12		0.12		0.03	
Trichloroethylene	0.47	0.00	U	0.12		0.02		**100**	D	0.19		**66**	D

Sample ID	NYSDEC Part 375 UU SCOs	DB-7 @ 8'		DB-8 @ 8'		DB-9 @ 5'		DB-10 @ 8'		DB-11 @ 8'		DB-12 @ 8'	
Compound		Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
VOCs, 8260 Full	mg/Kg	mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg	
Dilution Factor		1		1		1		1		1		1	
1,1,1-Trichloroethane	0.68	0.00	U	0.00	U	0.00	U	0.00	U	0.00	U	0.00	U
1,4-Dichlorobenzene	1.8	0.00	U	0.00	U	0.00	U	0.00	U	0.00	U	0.00	U
2-Butanone	0.12	0.00	U	0.00	U	0.00	U	0.00	U	0.00	U	0.00	U
Acetone	0.05	0.01	J	0.01	U	0.01	U	**0.41**	E	0.01	U	0.01	J
Chloroform	0.37	0.00	U	0.00	U	0.00	U	0.00	U	0.00	U	0.00	U
cis-1,2-Dichloroethylene	0.25	0.02		0.03		0.00	U	0.02		0.03		0.03	
Methylene chloride	0.05	0.04		0.02		0.03		0.01	J	0.02		0.03	
Tetrachloroethylene	1.3	0.05		0.17		0.00	U	0.03		0.04		0.08	
Trichloroethylene	0.47	0.14		0.19		0.03		0.12		0.14		0.11	

Sample ID	NYSDEC Part 375 UU SCOs	DB-13 @ 7'		DB-14 @ 5'		DB-15 @ 8'		DB-16 @ 6'	
Compound		Result	Q	Result	Q	Result	Q	Result	Q
VOCs, 8260 Full	mg/Kg	mg/Kg		mg/Kg		mg/Kg		mg/Kg	
Dilution Factor		1		100		100		200	
1,1,1-Trichloroethane	0.68	0.00	U	0.01		0.00	U	0.00	U
1,4-Dichlorobenzene	1.8	0.00	U	0.00	U	0.00	U	0.00	U
2-Butanone	0.12	0.00	U	0.00	U	0.00	U	0.00	U
Acetone	0.05	0.05		0.01	J	0.01	J	1.30	U
Chloroform	0.37	0.00	U	0.00	J	0.00	U	0.00	U
cis-1,2-Dichloroethylene	0.25	0.03		0.01		0.07		0.06	
Methylene chloride	0.05	0.01	J	0.01	U	0.01	J	0.01	J
Tetrachloroethylene	1.3	0.02		0.01		0.15		0.06	
Trichloroethylene	0.47	0.04		**23**	D	**2.5**	D	**39**	D

Note:
Yellow=exceeds NYSDEC Part 375 Unrestricted Use SCOs
mg/Kg=milligrams per kilogram
Q is the qualifier column, where:
D=result is from an analysis that required a dilution
J=analyte detected at or above the method detection limit but below the reporting limit – data is estimated.
U=analyte not detected at or above the level indicated

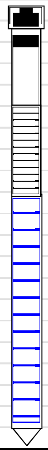
Table IV: PFCs Detected in Soil Samples

Sample ID	NYSDEC Part 375 PFAS Remedial Guidance Values	DB-7 PFAS @ 4-6'		DB-11 PFAS @ 4-5'	
Compound		Result	Q	Result	Q
PFAS, NYSDEC Target List	µg/kg	µg/kg		µg/kg	
Dilution Factor		1		1	
Perfluorooctanesulfonic acid (PFOS)	0.88	**4.7**		**9.6**	

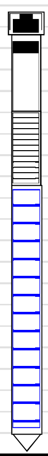
Note:
Yellow=exceeds NYSDEC Part 375 PFAS Remedial Guidance Values
µg/kg=micrograms per kilogram

APPENDIX E – EXISTING MONITORING WELL CONSTRUCTION LOGS

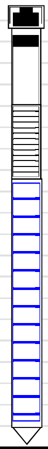
Client:	Seen Media Group			Well ID:	MW-1
Site Location:	9 North 15th Street, Brooklyn, NY			Well Location:	See Sketch
Job#:	21-435			Surface Elev. (ft):	
Geologist:	JB			DTW (ft) :	8.980
Driller:	Luke Reiss			Drill Rig:	Geoprobe 7822
Weather:	Cloudy			Drill Method:	Direct Push
Temp:	50°F			Sample Type:	Split_____
Date:	4/20/2022				Grab____
*All measurements taken from top of well casing					Core__X_

DEPTH (ft)	WELL	WELL MATERIAL	FILL MATERIAL	SOIL DESCRIPTION/REMARKS
0		Locking J-Plug	Bolt-Down MH	Urban Fill
1		2" Sch. 40 Riser	Concrete	Urban Fill
2		2" Sch. 40 Riser	Concrete	Urban Fill
3		2" Sch. 40 Riser	Bentonite Cement Slurry	Urban Fill
4		2" Sch. 40 Riser	Bentonite Cement Slurry	Urban Fill
5		2" Sch. 40 Riser	Sand	Urban Fill
6		2" .020" Slot Screen	Sand	Urban Fill
7		2" .020" Slot Screen	Sand	Urban Fill
8		2" .020" Slot Screen	Sand	Urban Fill
9		2" .020" Slot Screen	Sand	Urban Fill
10		2" .020" Slot Screen	Sand	No Recovery
11		2" .020" Slot Screen	Sand	No Recovery
12		2" .020" Slot Screen	Sand	No Recovery
13		2" .020" Slot Screen	Sand	No Recovery
14		2" .020" Slot Screen	Sand	No Recovery
15		2" .020" Slot Screen	Sand	No Recovery
16		2" .020" Slot Screen	Sand	No Recovery
17		2" .020" Slot Screen	Sand	No Recovery
18		2" .020" Slot Screen	Sand	No Recovery
19		2" .020" Slot Screen	Sand	No Recovery
20		Endcap	Sand	No Recovery

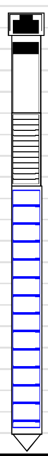
Client:	Seen Media Group			Well ID:	MW-2
Site Location:	9 North 15th Street, Brooklyn, NY			Well Location:	See Sketch
Job#:	21-435			Surface Elev. (ft):	
Geologist:	JB			DTW (ft) :	8.190
Driller:	Luke Reiss			Drill Rig:	Geoprobe 7822
Weather:	Cloudy			Drill Method:	Direct Push
Temp:	50°F			Sample Type:	Split_____
Date:	4/20/2022				Grab____
*All measurements taken from top of well casing					Core__X_

DEPTH (ft)	WELL	WELL MATERIAL	FILL MATERIAL	SOIL DESCRIPTION/REMARKS
0		Locking J-Plug	Bolt-Down MH	Urban Fill
1		2" Sch. 40 Riser	Concrete	Urban Fill
2		2" Sch. 40 Riser	Concrete	Urban Fill
3		2" Sch. 40 Riser	Bentonite Cement Slurry	Urban Fill
4		2" Sch. 40 Riser	Bentonite Cement Slurry	Urban Fill
5		2" Sch. 40 Riser	Sand	Urban Fill
6		2" .020" Slot Screen	Sand	Urban Fill
7		2" .020" Slot Screen	Sand	Urban Fill
8		2" .020" Slot Screen	Sand	Urban Fill
9		2" .020" Slot Screen	Sand	Urban Fill
10		2" .020" Slot Screen	Sand	No Recovery
11		2" .020" Slot Screen	Sand	No Recovery
12		2" .020" Slot Screen	Sand	No Recovery
13		2" .020" Slot Screen	Sand	No Recovery
14		2" .020" Slot Screen	Sand	No Recovery
15		2" .020" Slot Screen	Sand	No Recovery
16		2" .020" Slot Screen	Sand	No Recovery
17		2" .020" Slot Screen	Sand	No Recovery
18		2" .020" Slot Screen	Sand	No Recovery
19		2" .020" Slot Screen	Sand	No Recovery
20		Endcap	Sand	No Recovery

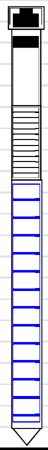
Client:	Seen Media Group	Well ID:	MW-3
Site Location:	9 North 15th Street, Brooklyn, NY	Well Location:	See Sketch
Job#:	21-435	Surface Elev. (ft):	
Geologist:	JB	DTW (ft) :	8.370
Driller:	Luke Reiss	Drill Rig:	Geoprobe 7822
Weather:	Cloudy	Drill Method:	Direct Push
Temp:	50°F	Sample Type:	Split____
Date:	4/20/2022		Grab____
*All measurements taken from top of well casing			Core_X_

DEPTH (ft)	WELL	WELL MATERIAL	FILL MATERIAL	SOIL DESCRIPTION/REMARKS
0		Locking J-Plug	Bolt-Down MH	Urban Fill
1		2" Sch. 40 Riser	Concrete	Urban Fill
2		2" Sch. 40 Riser	Concrete	Urban Fill
3		2" Sch. 40 Riser	Bentonite Cement Slurry	Urban Fill
4		2" Sch. 40 Riser	Bentonite Cement Slurry	Urban Fill
5		2" Sch. 40 Riser	Sand	Urban Fill
6		2" .020" Slot Screen	Sand	Urban Fill
7		2" .020" Slot Screen	Sand	Urban Fill
8		2" .020" Slot Screen	Sand	Urban Fill
9		2" .020" Slot Screen	Sand	Urban Fill
10		2" .020" Slot Screen	Sand	No Recovery
11		2" .020" Slot Screen	Sand	No Recovery
12		2" .020" Slot Screen	Sand	No Recovery
13		2" .020" Slot Screen	Sand	No Recovery
14		2" .020" Slot Screen	Sand	No Recovery
15		2" .020" Slot Screen	Sand	No Recovery
16		2" .020" Slot Screen	Sand	No Recovery
17		2" .020" Slot Screen	Sand	No Recovery
18		2" .020" Slot Screen	Sand	No Recovery
19		2" .020" Slot Screen	Sand	No Recovery
20		Endcap	Sand	No Recovery

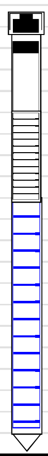
Client:	Seen Media Group	Well ID:	MW-4
Site Location:	9 North 15th Street, Brooklyn, NY	Well Location:	See Sketch
Job#:	21-435	Surface Elev. (ft):	
Geologist:	JB	DTW (ft) :	8.425
Driller:	Luke Reiss	Drill Rig:	Geoprobe 7822
Weather:	Cloudy	Drill Method:	Direct Push
Temp:	50°F	Sample Type:	Split____
Date:	4/20/2022		Grab____
*All measurements taken from top of well casing			Core_X_

DEPTH (ft)	WELL	WELL MATERIAL	FILL MATERIAL	SOIL DESCRIPTION/REMARKS
0		Locking J-Plug	Bolt-Down MH	Urban Fill
1		2" Sch. 40 Riser	Concrete	Urban Fill
2		2" Sch. 40 Riser	Concrete	Urban Fill
3		2" Sch. 40 Riser	Bentonite Cement Slurry	Urban Fill
4		2" Sch. 40 Riser	Bentonite Cement Slurry	Urban Fill
5		2" Sch. 40 Riser	Sand	Urban Fill
6		2" .020" Slot Screen	Sand	Urban Fill
7		2" .020" Slot Screen	Sand	Urban Fill
8		2" .020" Slot Screen	Sand	Urban Fill
9		2" .020" Slot Screen	Sand	Urban Fill
10		2" .020" Slot Screen	Sand	No Recovery
11		2" .020" Slot Screen	Sand	No Recovery
12		2" .020" Slot Screen	Sand	No Recovery
13		2" .020" Slot Screen	Sand	No Recovery
14		2" .020" Slot Screen	Sand	No Recovery
15		2" .020" Slot Screen	Sand	No Recovery
16		2" .020" Slot Screen	Sand	No Recovery
17		2" .020" Slot Screen	Sand	No Recovery
18		2" .020" Slot Screen	Sand	No Recovery
19		2" .020" Slot Screen	Sand	No Recovery
20		Endcap	Sand	No Recovery

Client:	Seen Media Group	Well ID:	MW-5
Site Location:	9 North 15th Street, Brooklyn, NY	Well Location:	See Sketch
Job#:	21-435	Surface Elev. (ft):	
Geologist:	JB	DTW (ft) :	8.630
Driller:	Luke Reiss	Drill Rig:	Geoprobe 7822
Weather:	Cloudy	Drill Method:	Direct Push
Temp:	50°F	Sample Type:	Split_____
Date:	4/20/2022		Grab____
*All measurements taken from top of well casing			Core_X_

DEPTH (ft)	WELL	WELL MATERIAL	FILL MATERIAL	SOIL DESCRIPTION/REMARKS
0		Locking J-Plug	Bolt-Down MH	Urban Fill
1		2" Sch. 40 Riser	Concrete	Urban Fill
2		2" Sch. 40 Riser	Concrete	Urban Fill
3		2" Sch. 40 Riser	Bentonite Cement Slurry	Urban Fill
4		2" Sch. 40 Riser	Bentonite Cement Slurry	Urban Fill
5		2" Sch. 40 Riser	Sand	Urban Fill
6		2" .020" Slot Screen	Sand	Urban Fill
7		2" .020" Slot Screen	Sand	Urban Fill
8		2" .020" Slot Screen	Sand	Urban Fill
9		2" .020" Slot Screen	Sand	Urban Fill
10		2" .020" Slot Screen	Sand	No Recovery
11		2" .020" Slot Screen	Sand	No Recovery
12		2" .020" Slot Screen	Sand	No Recovery
13		2" .020" Slot Screen	Sand	No Recovery
14		2" .020" Slot Screen	Sand	No Recovery
15		2" .020" Slot Screen	Sand	No Recovery
16		2" .020" Slot Screen	Sand	No Recovery
17		2" .020" Slot Screen	Sand	No Recovery
18		2" .020" Slot Screen	Sand	No Recovery
19		2" .020" Slot Screen	Sand	No Recovery
20		Endcap	Sand	No Recovery

Client:	Seen Media Group	Well ID:	MW-6
Site Location:	9 North 15th Street, Brooklyn, NY	Well Location:	See Sketch
Job#:	21-435	Surface Elev. (ft):	
Geologist:	JB	DTW (ft) :	9.120
Driller:	Luke Reiss	Drill Rig:	Geoprobe 7822
Weather:	Cloudy	Drill Method:	Direct Push
Temp:	50°F	Sample Type:	Split_____
Date:	4/20/2022		Grab____
*All measurements taken from top of well casing			Core_X_

DEPTH (ft)	WELL	WELL MATERIAL	FILL MATERIAL	SOIL DESCRIPTION/REMARKS
0		Locking J-Plug	Bolt-Down MH	Urban Fill
1		2" Sch. 40 Riser	Concrete	Urban Fill
2		2" Sch. 40 Riser	Concrete	Urban Fill
3		2" Sch. 40 Riser	Bentonite Cement Slurry	Urban Fill
4		2" Sch. 40 Riser	Bentonite Cement Slurry	Urban Fill
5		2" Sch. 40 Riser	Sand	Urban Fill
6		2" .020" Slot Screen	Sand	Urban Fill
7		2" .020" Slot Screen	Sand	Urban Fill
8		2" .020" Slot Screen	Sand	Urban Fill
9		2" .020" Slot Screen	Sand	Urban Fill
10		2" .020" Slot Screen	Sand	No Recovery
11		2" .020" Slot Screen	Sand	No Recovery
12		2" .020" Slot Screen	Sand	No Recovery
13		2" .020" Slot Screen	Sand	No Recovery
14		2" .020" Slot Screen	Sand	No Recovery
15		2" .020" Slot Screen	Sand	No Recovery
16		2" .020" Slot Screen	Sand	No Recovery
17		2" .020" Slot Screen	Sand	No Recovery
18		2" .020" Slot Screen	Sand	No Recovery
19		2" .020" Slot Screen	Sand	No Recovery
20		Endcap	Sand	No Recovery

APPENDIX F – FIELD SAMPLING FORMS

SOIL BORING LOG

GZA GeoEnvironmental of New York *Engineers and Scientists* **104 West 29th St., 10th Fl.** **New York, NY 10001**	**PROJECT**	**Boring No.** **Sheet:** **File No.:** **Reviewed By:**
Logged By: **Drilling Co. :** **Foreman**	**Geoprobe Location:** **Ground Surface Elevation (ft.):** **Final Geoprobe Depth (ft.):** **Date : Start Finish**	**Horizontal Datum:** **Vertical Datum:**
Type of Rig: **Rig Model:** **Drilling Method:**	**Sampler Type:** **Sampler O.D. (in.):** **Sampler Length (in.)** **Rock Core Size**	

Groundwater Depth (ft.)			
Date	Time	Water Depth	Stab. Time

DEPTH (FT)	SAMPLE					Sample Description Modified Burmister Classification	Remark	Depth (ft.)	Stratum Description	Elevation (ft.)
	Macro No.	Macro Depth (ft.)	Pen. (in.)	Rec. (in.)	PID (ppm)					
5										
10										
15										
20										

REMARKS:

Field Screening performed with a photoionization detector (PID) with a 10.5 eV lamp span calibrated to 100 ppm via isobutylene gas.
See Log key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil types.
Actual transition maybe gradual. Water level readings ahave been made at the times and under conditions stated. Fluctuations of groundwater
may occur due to other factors than those present at the times the measurements were made

Boring No.

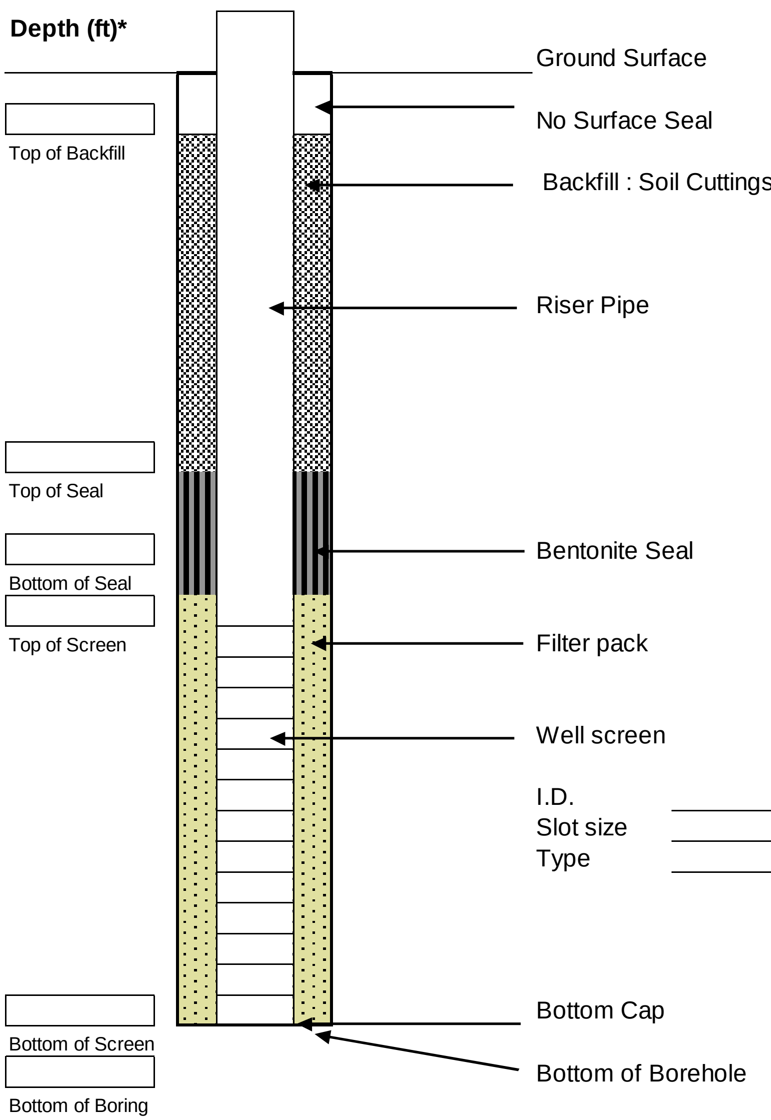
GZA GEOENVIRONMENTAL OF NEW YORK
Engineers and Scientists

Well No.

Project:		Page 1 of 1		
Project No.:	Contractor:	Water Levels		
Surface Elevation:	Driller:	Date	Time	Depth*
Top of PVC Casing Elevation:	GZA Rep:			
Datum:	Date of Completion:			

Temporary Well Installation

Borehole diameter (in.): ___________



I.D. _______________ inches
Slot size _______________ inches
Type _______________

* measurement is relative to the ground surface not the stickup.

WELL PURGE DATA SHEET

WELL ID: MW-

CLIENT:
SITE:
WEATHER:

PROJECT NO:
DATE:
SAMPLER(S):

COLUMN OF WATER IN WELL:
T = Depth to Bottom (ft) - Static Water Level (ft)
= ________ - ________
Water Column (T) = ________ (ft)

TOTAL VOLUME PURGED:
Design = ________ (gallons)
Actual = ________ [1] (gallons)

PURGE RATE: Variable (mL / min)
PURGE METHOD: Peristaltic Pump, Low Flow Sampling

GALLONS OF WATER PER WELL VOLUME:
Well Volume = Water Column (T) (ft) x Multiplier
= ________ x ________
Well Volume (V) = ________ (Gallons)

well diameter	multiplier
1	0.041
1.5	0.092
2	0.163
4	0.653
6	1.469

SCREENED INTERVAL: approximately to ft bgs

WATER QUALITY:

Time	Elapsed Time (Mins)	Purged Volume (gal)	Depth to Water (ft)	pH (SU)	Specific Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/l)	Temp (^{0}C)	ORP	Notes
										Start

UNITS:
gal. - gallons
ft. - feet
SU - standard units
ORP - Oxygen Reduction Potential

mS/cm - millisiemens per centimeter
NTU -nephelometric turbidity units
mg/l -milligrams per liter
^{0}C - degrees Celsius
bgs - below ground surface
NA - not applicable

NOTES AND OBSERVATIONS:

1. Purged volume was estimated.

SOIL VAPOR SAMPLE FIELD LOG

PROJECT NAME: ______________________ DATE : ______________________

LOCATION: ______________________ FILE NO.: ______________________

GZA Engineer: ________ Contractor/Lab: ________

Weather: ________ Analytical Method: ________ Depth to Water: ________

Operator: ________ Ground Elevation: ________

Barometric Pressure: ________ PID Calibration: ________ Water Elevation: ________

Sample ID	Canister No.	Regulator No.	Sample Depth (ft)	Vacuum Pressure (in.Hg)		Purge Time			Sample Date	Sample Time		PID Reading (ppm)	Container Type	Surface Cover	Driving Effort	Remark
				Start	End	Purge Start	Purge Stop	Elapsed Time		Start	End					

ABBREVIATIONS:

ft. - feet

in.Hg- Inches of mercury

l./min. - liters per minute

cu. Ft. - cubic feet

ppm - parts per million

NA - not applicable

CONTAINER TYPE	SURFACE COVER	PROBE DRIVING EFFORT	SOIL MOISTURE CONTENT
TB -Tedlar Bag	SO - Soil	E - Easy	D- Dry
SC- Suma Canister	GIL - Grass/Loam	M - Moderate	M- Moderate
ST- Sorbant Tube	Asph - Asphalt	D - Difficult	W - Wet
	Cncrt - Concrete	R - Rellisal	S - Saturated

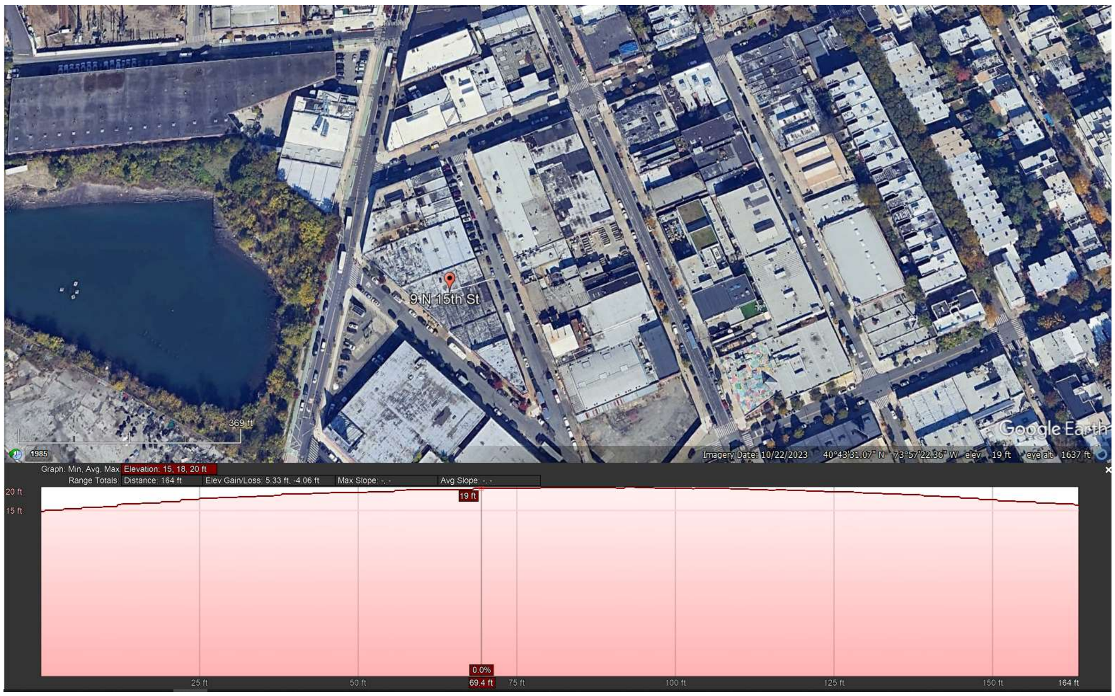
REMARKS:

APPENDIX G – GREEN AND SUSTAINABILITY REMEDIATION DOCUMENTATION

Climate Screening Checklist

Background

- Qualified Environmental Professional: Victoria Whelan, P.G.
- Project Manager: Jackson Bogach, P.E.
- Site Name: 9 N. 15th Street Site
- Site Number: TBD
- Site Location: 9 North 15th Street, Brooklyn, NY
- Site Elevation (average above sea level): Approximately 19 feet above sea level (from google earth).



- ClimAID region: Region 4—New York City and Long Island

- Remedial Stage/Site Classification: Class P for Registry of Inactive Hazardous Waste Disposal

- Contamination -- Media Impacted/Contaminants of Concern:

- Soil: chlorinated solvents, semi-volatile organic compounds, metals
- Groundwater: chlorinated solvents, metals, PFAS
- Soil Vapor: chlorinated solvents

- Proposed/Current Remedy: The proposed remedy is pending the results of the Remedial Investigation, as discussed in this report. The remedial investigation will include the sampling of soils, groundwater, and soil vapor at the site. The soil investigation will include 11 borings with 2 samples per boring for laboratory analysis for TCL VOCs, TCL SVOCs, TAL Metals including hexavalent chromium and cyanide, TCL pesticides and herbicides, PCBs, and PFAS and 1 sample for TCL VOCs only. The groundwater investigation will include the installation of 10 new monitoring wells with one sample collected from each shallow well for laboratory analysis for TCL VOCs, TCL SVOCs, total and dissolved TAL metals including cyanide and mercury, pesticides, herbicides, PCBs, and PFAS. One sample will be collected from each intermediate and deep screened well for TCL VOCs only. The soil vapor investigation will include the installation of 3 soil vapors points with one sample collected at each point, 3 co-located indoor air samples at each soil vapor sampling location, and one outdoor ambient air sample for VOCs.

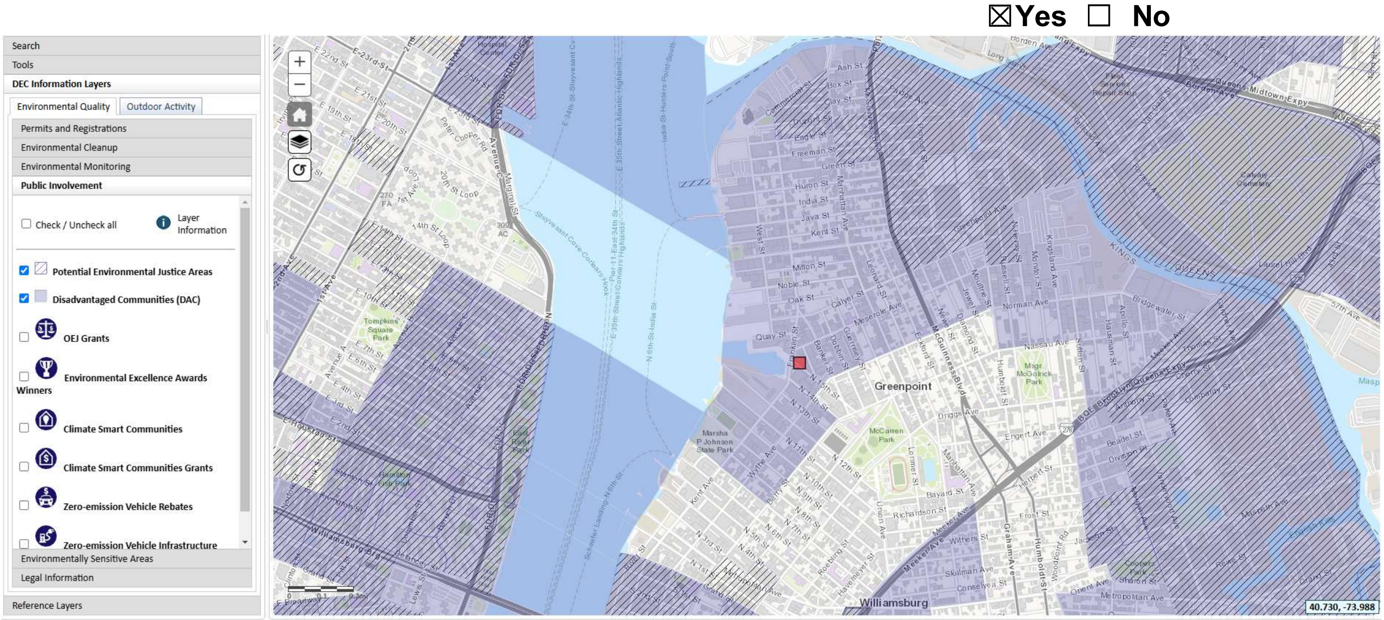
- What is the predicted timeframe of the remedy? Will components of the remedy still be in place in 10+ years? Permanent monitoring wells are being installed as part of this remedial investigation and are anticipated to last for longer than 10 years. All other components of the remedial investigation will be temporary disturbances to the site that will only last during the field operations of the investigation.

Is the site in a disadvantaged community (DAC) or potential environmental justice area (PEJA) (Use DECinfolocator: DECinfo Locator (ny.gov))? Site is in a DAC.

☒**Yes** ☐ No

If the site is in a DAC or PEJA, will climate impacts be magnified? If yes, list how and why.

☒**Yes** ☐ **No**



The site’s proximity to the East River and location within a FEMA flood zone makes climate impacts due to flooding magnified during future remediation. However, climate impact should not impact this phase as work as there is no long-term remedial implementation during the Remedial Investigation besides installation of permanent monitoring wells. The only potential impact during the remedial investigation is common weather conditions, such as rain, snow, or lightning that may postpone but not cancel work.

Should thresholds of concern be lowered to account for magnification of impacts? If yes, indicate how lower thresholds will be used in the screening.

☒**Yes** ☒ **No**

Climate Screening Table*

Potential Climate Hazards	Relevant to the Site Location (Y/N/NA) [1]	Projected Change (Put the reference document/model used here) [3]	Potential to Impact Remedy (Y/N)	Is remedy/site already resilient? (Y/N) [4]
Precipitation	Y	Based upon FEMA's Resiliency Analysis Planning Tool the annual rain fall is projected to increase between 6.97 and 11.20 inches by 2054.	N	Y – RI is not susceptible to precipitation impacts. All work will be conducted indoors.
Temperature (Extreme Heat or Cold Weather Impacts) [2]	Y	Based upon FEMA's Resiliency Analysis Planning Tool, by the middle of the century there will be an estimated increase of 525.15 cooling degree days.	N	Y – RI is not susceptible to extreme temperatures.
Sea Level Rise	Y	Based upon the NOAA's Sea Level Rise Viewer the site is impacted at 10 feet of SLR.	N	Y – RI is not susceptible to long term sea level rise.
Flooding[5]	Y	Based upon FEMA's Resiliency Analysis Planning Tool, the site falls within both the 0.2% and 1% flood hazard zone.	N	Y – RI is not susceptible to flooding hazards.
Storm Surge	Y	Y – NOAA's Storm	N	Y – The RI is not

		Surge Risk Maps tool indicates that the site could be impacted by greater than 3 ft of water during category 1 hurricanes, greater than 6 ft of water during category 2 hurricanes, and over 9 ft of water for category 3 and higher hurricanes		impacted by storm surge impacts.
Wildfire	N	N/A	N/A	N/A
Drought	N	N/A	N/A	N/A
Storm Severity (could include high winds, lightning, etc.)	N	N - Based upon FEMA's Resiliency Analysis Planning Tool, there is no increase in storm severity outlook.	N	N/A
Landslides	N	N/A	N/A	N/A
Other Hazards:	Seismic Activity – N/A	N/A	N/A	N/A

*Links to potential data sources can be found on the following page

[1] If the first column is N --> The rest of the columns will be N/A, the hazard is not applicable to the site.

[2] Extreme Heat: periods of three or more days above 90°F- Extreme Cold: Individual days with minimum temperatures at or below 30 degrees F (NYSERDA ClimAID report), Note: this is important for sites with active remedial systems/sites where the remedy relies on the electrical grid

[3] List the projected change in specific terms or units e.g. inches of rain fall, feet of sea level rise, etc.

[4] If final column is Y, provide reasoning, if the final column is N --> Climate Vulnerability Assessment (CVA) required.

[5] For system sites- components (e.g. electrical wiring and panels) should be evaluated to determine if they would need to be raised to avoid flooding.

Required Next Steps (If no further action, provide justification):

No further action is required for the evaluation of the remedial investigation resiliency. Climate related impacts would only impact the scheduling of the field work for the investigation. Monitoring wells will be the only lasting portions of the remedial investigation at the site and are not impacted by the climate impacts evaluated.

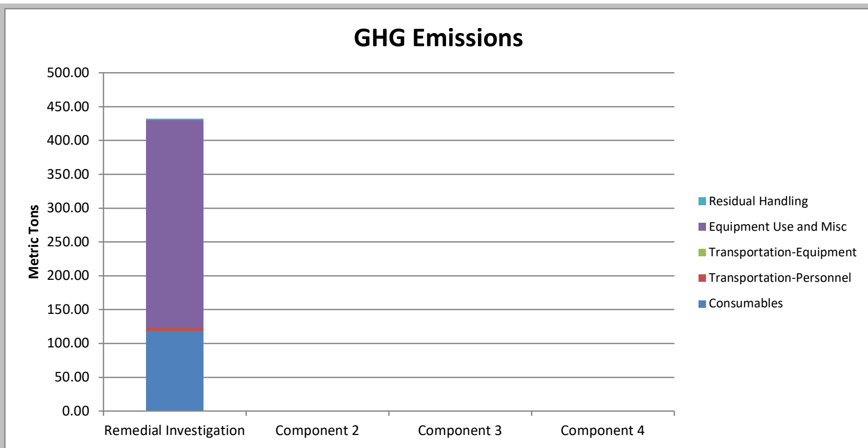
Attachment 1

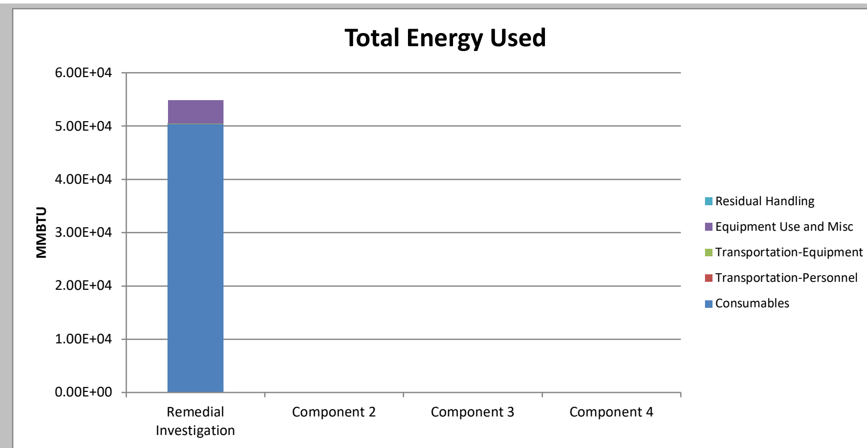
Overall Project Summary

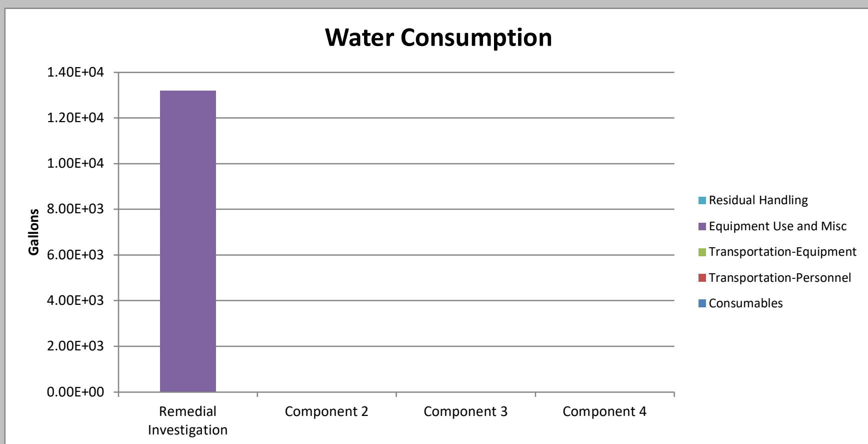
Sustainable Remediation - Environmental Footprint Summary
9N15 RIWP GSR

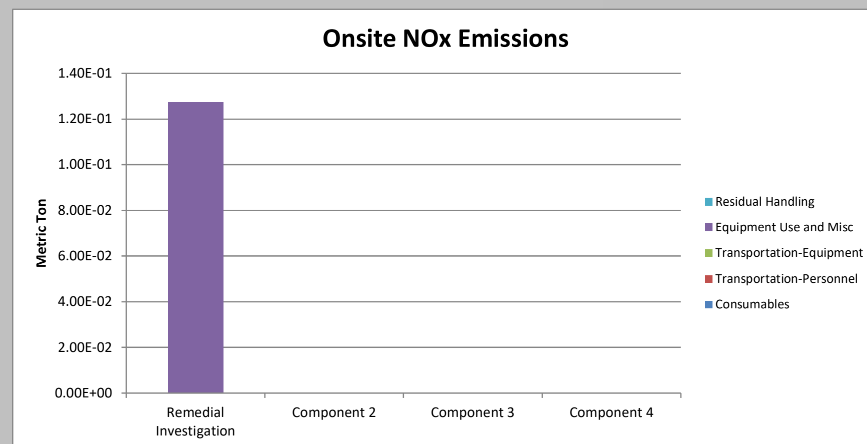
Phase	Activities	GHG Emissions	Total Energy Used	Water Consumption	Electricity Usage	Onsite NOx Emissions	Onsite SOx Emissions	Onsite PM10 Emissions	Total NOx Emissions	Total SOx Emissions	Total PM10 Emissions	Accident Risk Fatality	Accident Risk Injury
		metric ton	MMBTU	gallons	MWH	metric ton	metric ton	metric ton	metric ton	metric ton	metric ton		
Remedial Investigation	Consumables	120.96	5.0E+04	NA	NA	NA	NA	NA	1.7E-01	2.6E-01	4.3E-02	NA	NA
	Transportation-Personnel	4.21	5.3E+01	NA	NA	NA	NA	NA	1.4E-03	5.9E-04	2.9E-04	1.3E-04	1.1E-02
	Transportation-Equipment	0.33	4.6E+00	NA	NA	NA	NA	NA	1.1E-04	4.4E-06	8.7E-06	1.9E-06	1.5E-04
	Equipment Use and Misc	305.47	4.3E+03	1.3E+04	0.0E+00	1.3E-01	1.3E-02	1.2E-02	1.5E+00	1.1E+00	1.3E-01	2.0E-04	6.2E-02
	Residual Handling	1.29	1.7E+01	NA	NA	0.0E+00	0.0E+00	0.0E+00	4.0E-04	7.2E-06	3.6E-05	5.6E-06	4.5E-04
	Sub-Total	432.27	5.49E+04	1.32E+04	0.00E+00	1.27E-01	1.30E-02	1.24E-02	1.71E+00	1.33E+00	1.74E-01	3.40E-04	7.31E-02
Component 2	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	NA	NA
	Transportation-Personnel	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Transportation-Equipment	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Residual Handling	0.00	0.0E+00	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Sub-Total	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Component 3	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	NA	NA
	Transportation-Personnel	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Transportation-Equipment	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Residual Handling	0.00	0.0E+00	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Sub-Total	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Component 4	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	NA	NA
	Transportation-Personnel	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Transportation-Equipment	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Residual Handling	0.00	0.0E+00	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Sub-Total	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total		**4.3E+02**	**5.5E+04**	**1.3E+04**	**0.0E+00**	**1.3E-01**	**1.3E-02**	**1.2E-02**	**1.7E+00**	**1.3E+00**	**1.7E-01**	**3.4E-04**	**7.3E-02**

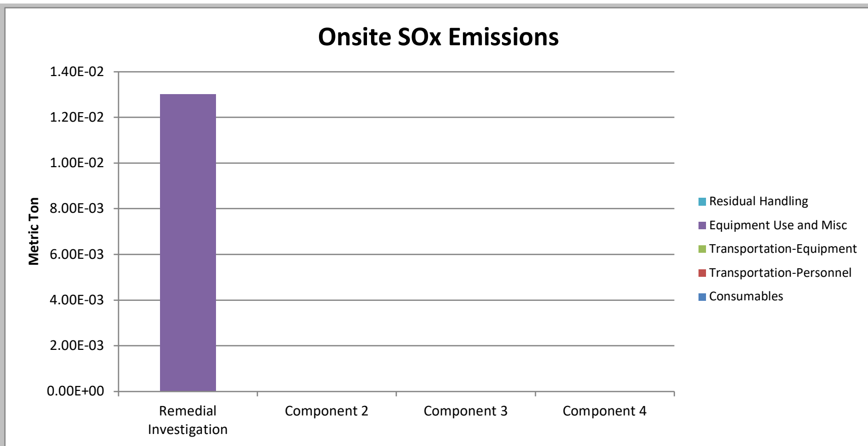
Remedial Alternative Phase	Non-Hazardous Waste Landfill Space	Hazardous Waste Landfill Space	Topsoil Consumption	Costing	Lost Hours - Injury	Percent electricity from renewable sources	Total Cost with Footprint Reduction
	tons	tons	cubic yards	$		%	
Remedial Investigation	0.0E+00	0.0E+00	0.0E+00	0	5.8E-01	0.0%	$0
Component 2	0.0E+00	0.0E+00	0.0E+00	0	0.0E+00	0.0%	
Component 3	0.0E+00	0.0E+00	0.0E+00	0	0.0E+00	0.0%	
Component 4	0.0E+00	0.0E+00	0.0E+00	0	0.0E+00	0.0%	
Total	**0.0E+00**	**0.0E+00**	**0.0E+00**	**$0**	**5.8E-01**	**0.0%**	

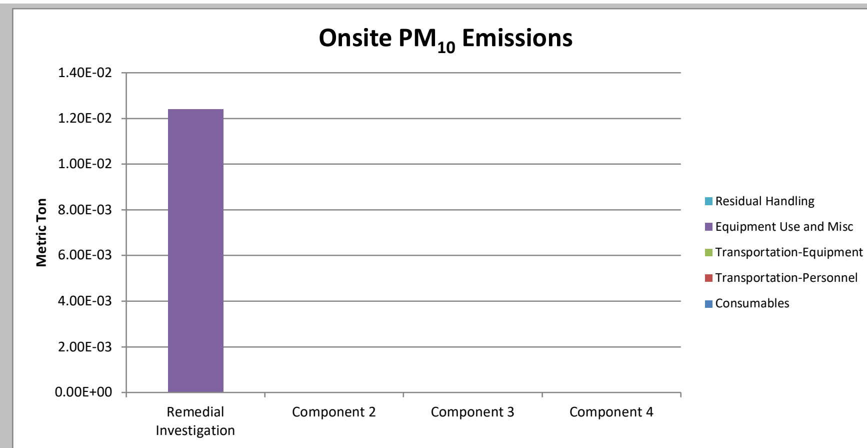

GHG Emissions
Metric Tons
500.00
450.00
400.00
350.00
300.00
250.00
200.00
150.00
100.00
50.00
0.00
Remedial Investigation
Component 2
Component 3
Component 4
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

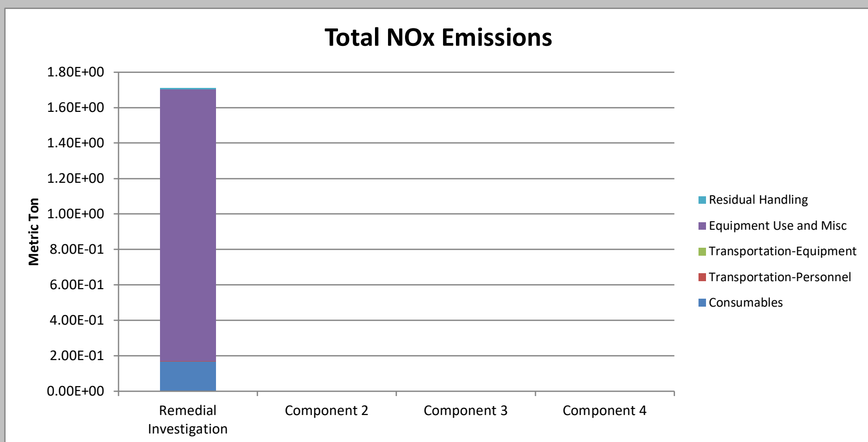

Total Energy Used
MMBTU
6.00E+04
5.00E+04
4.00E+04
3.00E+04
2.00E+04
1.00E+04
0.00E+00
Remedial Investigation
Component 2
Component 3
Component 4
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

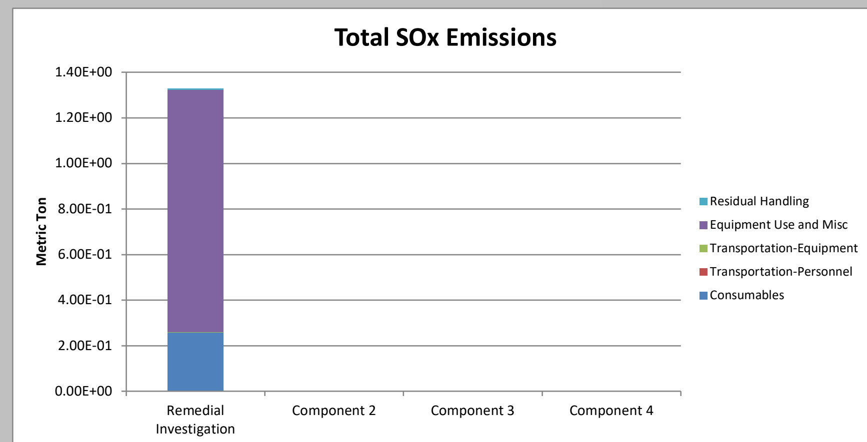

Water Consumption
Gallons
1.40E+04
1.20E+04
1.00E+04
8.00E+03
6.00E+03
4.00E+03
2.00E+03
0.00E+00
Remedial Investigation
Component 2
Component 3
Component 4
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

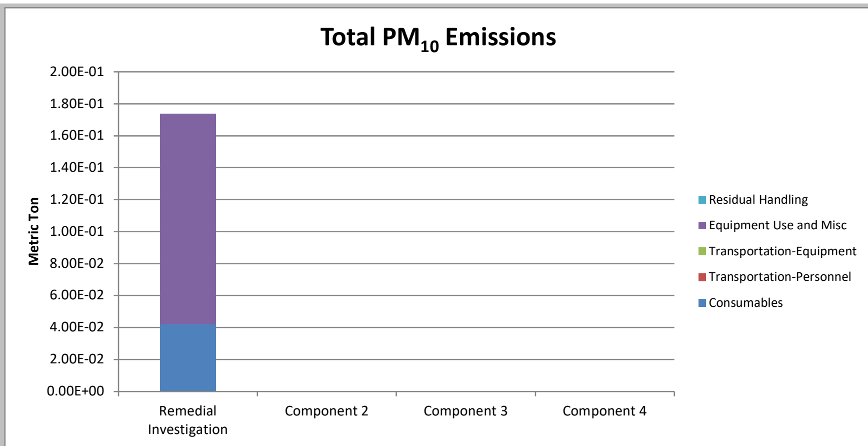

Onsite NOx Emissions
Metric Ton
1.40E-01
1.20E-01
1.00E-01
8.00E-02
6.00E-02
4.00E-02
2.00E-02
0.00E+00
Remedial Investigation
Component 2
Component 3
Component 4
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

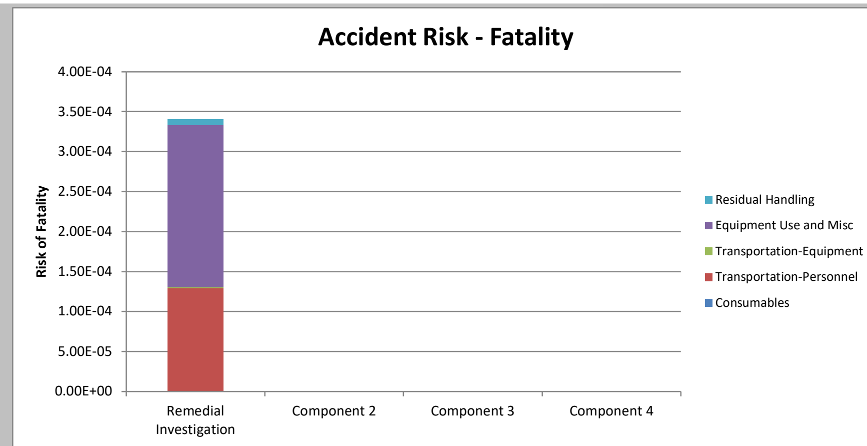

Onsite SOx Emissions
Metric Ton
1.40E-02
1.20E-02
1.00E-02
8.00E-03
6.00E-03
4.00E-03
2.00E-03
0.00E+00
Remedial Investigation
Component 2
Component 3
Component 4
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

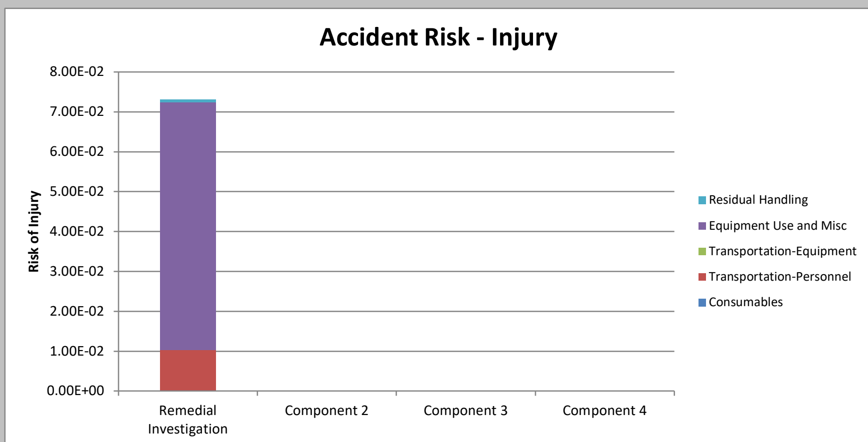

Onsite PM_{10} Emissions
Metric Ton
1.40E-02
1.20E-02
1.00E-02
8.00E-03
6.00E-03
4.00E-03
2.00E-03
0.00E+00
Remedial Investigation
Component 2
Component 3
Component 4
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

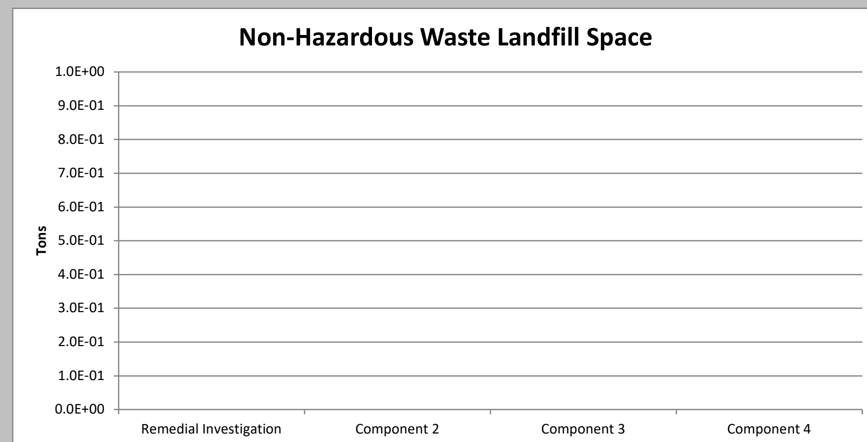

Total NOx Emissions
Metric Ton
1.80E+00
1.60E+00
1.40E+00
1.20E+00
1.00E+00
8.00E-01
6.00E-01
4.00E-01
2.00E-01
0.00E+00
Remedial Investigation
Component 2
Component 3
Component 4
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

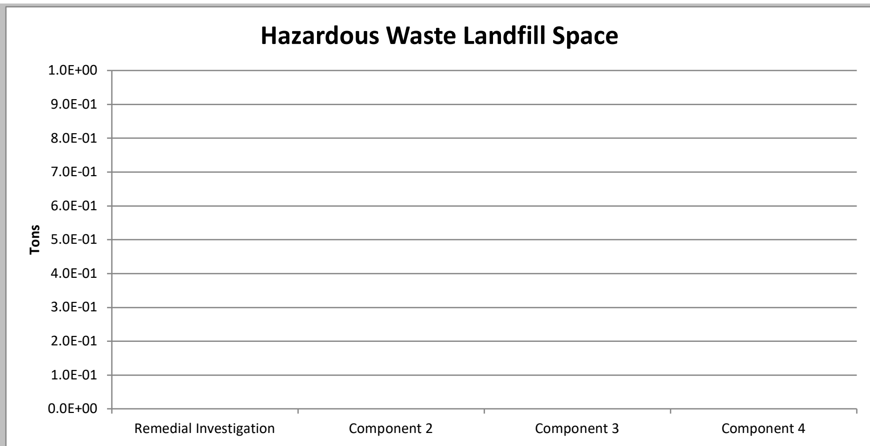

Total SOx Emissions
Metric Ton
1.40E+00
1.20E+00
1.00E+00
8.00E-01
6.00E-01
4.00E-01
2.00E-01
0.00E+00
Remedial Investigation
Component 2
Component 3
Component 4
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

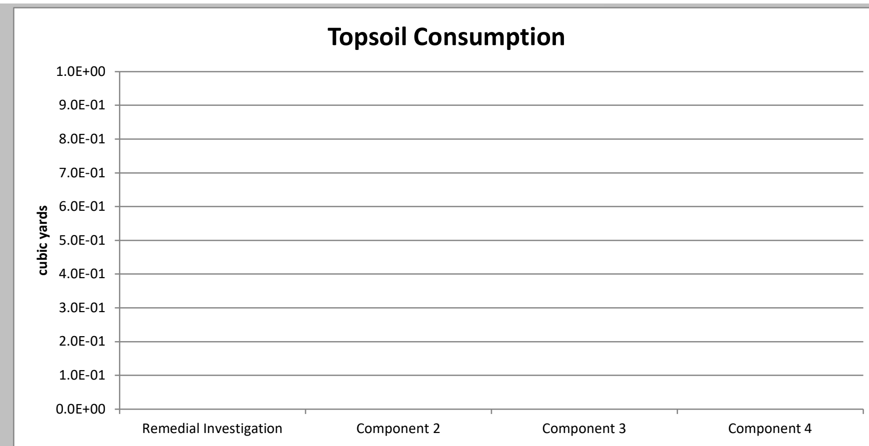

Total PM$_{10}$ Emissions
Metric Ton
2.00E-01
1.80E-01
1.60E-01
1.40E-01
1.20E-01
1.00E-01
8.00E-02
6.00E-02
4.00E-02
2.00E-02
0.00E+00
Remedial Investigation
Component 2
Component 3
Component 4
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

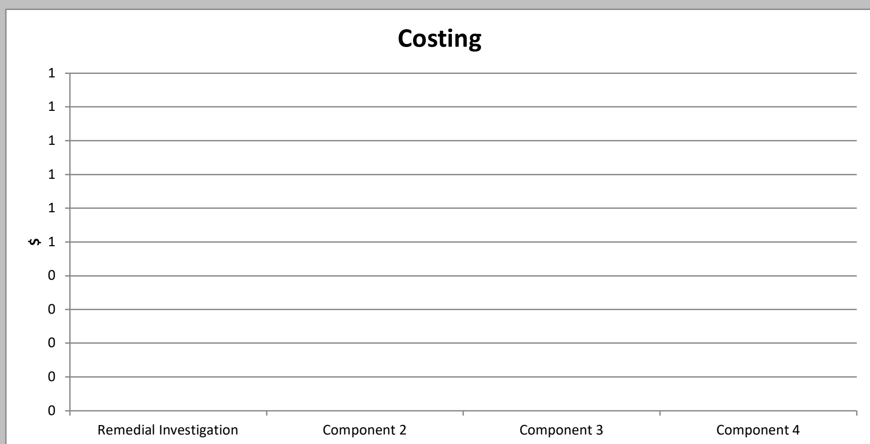

Accident Risk - Fatality
Risk of Fatality
4.00E-04
3.50E-04
3.00E-04
2.50E-04
2.00E-04
1.50E-04
1.00E-04
5.00E-05
0.00E+00
Remedial Investigation
Component 2
Component 3
Component 4
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

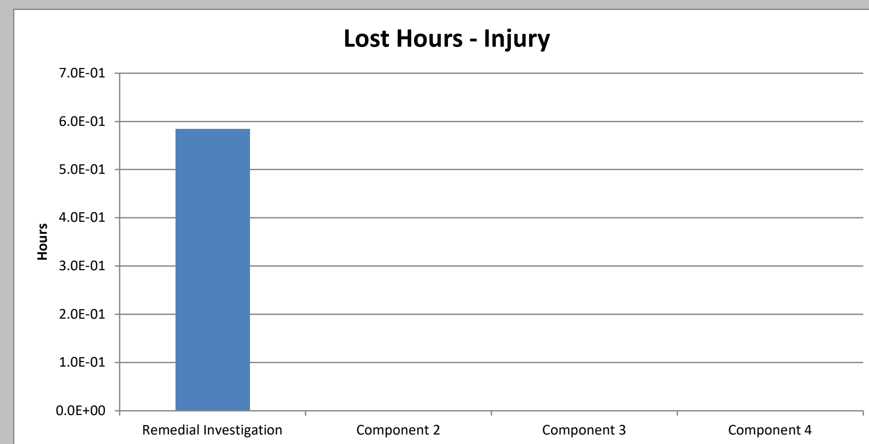

Accident Risk - Injury
Risk of Injury
8.00E-02
7.00E-02
6.00E-02
5.00E-02
4.00E-02
3.00E-02
2.00E-02
1.00E-02
0.00E+00
Remedial Investigation
Component 2
Component 3
Component 4
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables


Non-Hazardous Waste Landfill Space
Tons
1.0E+00
9.0E-01
8.0E-01
7.0E-01
6.0E-01
5.0E-01
4.0E-01
3.0E-01
2.0E-01
1.0E-01
0.0E+00
Remedial Investigation
Component 2
Component 3
Component 4


Hazardous Waste Landfill Space
Tons
1.0E+00
9.0E-01
8.0E-01
7.0E-01
6.0E-01
5.0E-01
4.0E-01
3.0E-01
2.0E-01
1.0E-01
0.0E+00
Remedial Investigation
Component 2
Component 3
Component 4


Topsoil Consumption
cubic yards
1.0E+00
9.0E-01
8.0E-01
7.0E-01
6.0E-01
5.0E-01
4.0E-01
3.0E-01
2.0E-01
1.0E-01
0.0E+00
Remedial Investigation
Component 2
Component 3
Component 4


Costing
$
1
1
1
1
1
1
0
0
0
0
0
Remedial Investigation
Component 2
Component 3
Component 4


Lost Hours - Injury
Hours
7.0E-01
6.0E-01
5.0E-01
4.0E-01
3.0E-01
2.0E-01
1.0E-01
0.0E+00
Remedial Investigation
Component 2
Component 3
Component 4

Attachment 2

Component 1 – Remedial Investigation

Sustainable Remediation Summary - Remedial Investigation

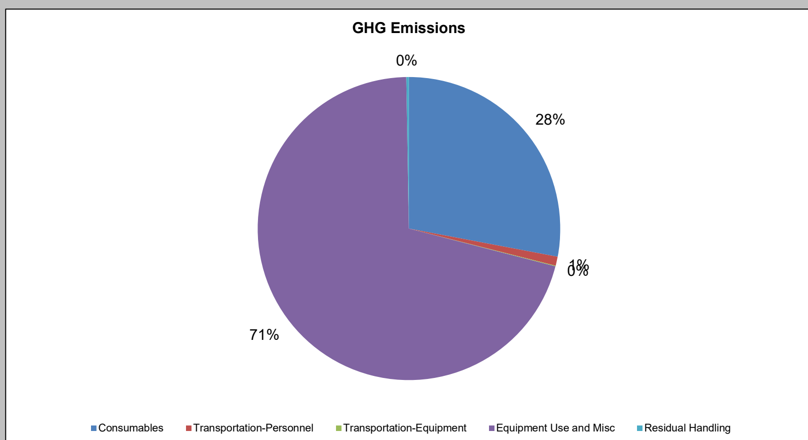
Activities	GHG Emissions	Percent Total	Total Energy Used	Percent Total	Water Consumption	Percent Total	Electricity Usage	Percent Total	Onsite NOx Emissions	Percent Total	Onsite SOx Emissions	Percent Total	Onsite PM10 Emissions	Percent Total	Total NOx Emissions	Percent Total	Total SOx Emissions	Percent Total	Total PM10 Emissions	Percent Total	Accident Risk Fatality	Percent Total	Accident Risk Injury	Percent Total
	metric ton	%	MMBTU	%	gallons	%	MWH	%	metric ton	%	metric ton	%	metric ton	%	metric ton	%	metric ton	%	metric ton	%		%		%
Consumables	120.96	28.0	5.0E+04	92.0	NA	NA	NA	NA	NA	-	NA	-	NA	-	1.7E-01	10.0	2.6E-01	19.5	4.3E-02	24.7	NA	NA	NA	NA
Transportation-Personnel	4.21	1.0	5.3E+01	0.1	NA	NA	NA	NA	NA	-	NA	-	NA	-	1.4E-03	0.1	5.9E-04	0.0	2.9E-04	0.2	1.3E-04	38.3	1.1E-02	14.5
Transportation-Equipment	0.33	0.1	4.6E+00	0.0	NA	NA	NA	NA	NA	-	NA	-	NA	-	1.1E-04	0.0	4.4E-06	0.0	8.7E-06	0.0	1.9E-06	0.5	1.5E-04	0.2
Equipment Use and Misc	305.47	70.7	4.3E+03	7.9	1.3E+04	100.0	0.0E+00	0.0	1.3E-01	100.0	1.3E-02	100.0	1.2E-02	100.0	1.5E+00	89.9	1.1E+00	80.4	1.3E-01	75.1	2.0E-04	59.5	6.2E-02	84.7
Residual Handling	1.29	0.3	1.7E+01	0.0	NA	NA	NA	NA	0.0E+00	-	0.0E+00	-	0.0E+00	-	4.0E-04	0.0	7.2E-06	0.0	3.6E-05	0.0	5.6E-06	1.6	4.5E-04	0.6
Total	432.27	100.0	5.49E+04	100.0	1.32E+04	100.0	0.00E+00	0.0	1.27E-01	100.0	1.30E-02	100.0	1.24E-02	100.0	1.71E+00	100.0	1.33E+00	100.0	1.74E-01	100.0	3.40E-04	100.0	7.31E-02	100.0

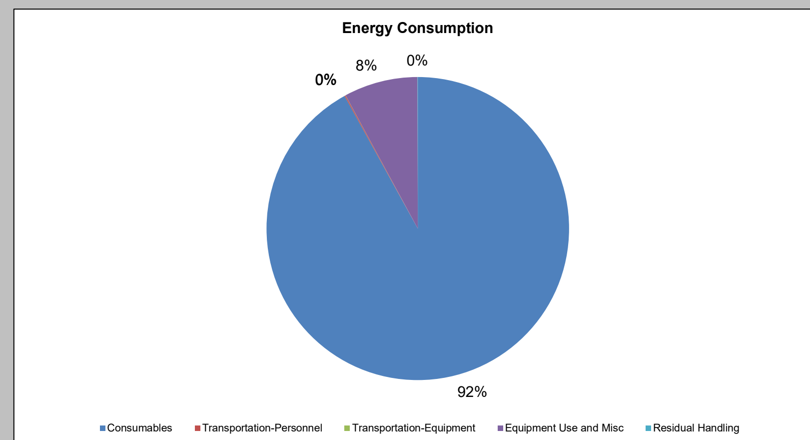
Additional Sustainability Metrics

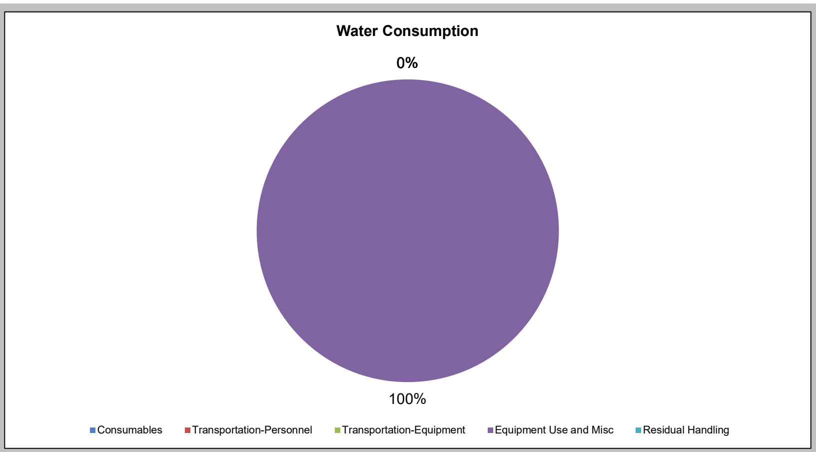
Non-Hazardous Waste Landfill Space (tons)	0.0
Hazardous Waste Landfill Space (tons)	0.0
Topsoil Consumption (yd^3)	0.0
Cost of Phase ($)	0.0
Lost Hours - Injury	0.6

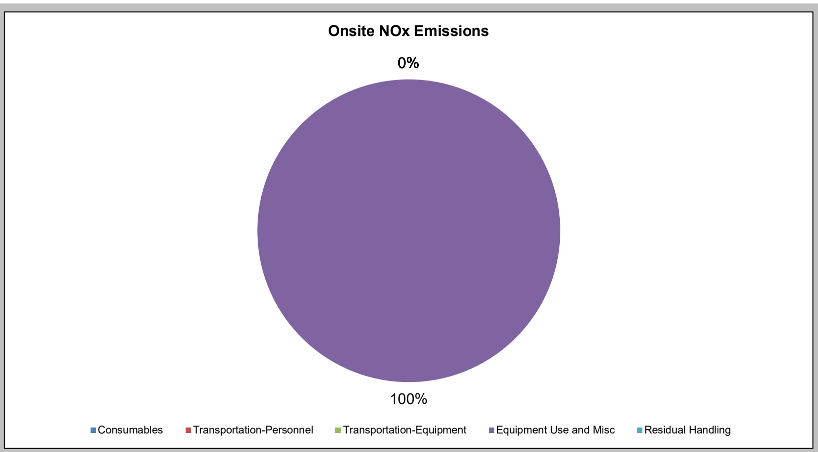
Footprint Reduction

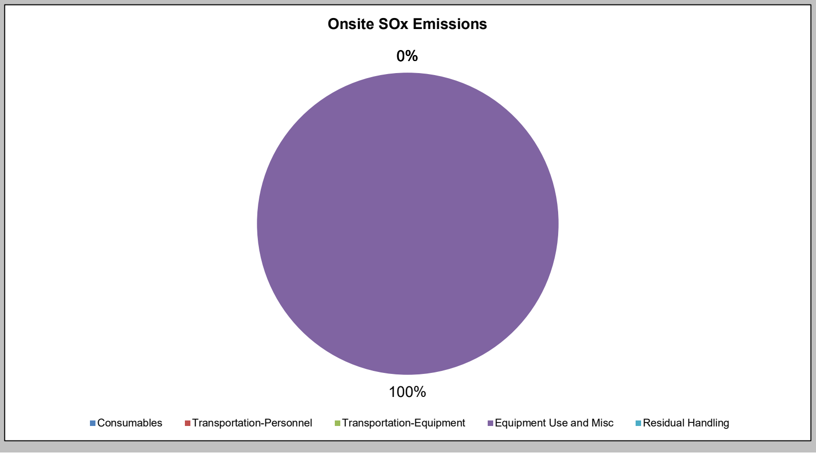
Total electricity replacement (MWh)	0.00E+00
Total electricity replacement (mmBtu)	0.00E+00
Percent electricity from renewable sources (%)	0.0%
Landfill gas reduction (metric ton CO_2 e)	0.00E+00
GHG emissions (metric ton CO2 e)	0.00E+00
NOx emissions (metric ton)	0.00E+00
SOx emissions (metric ton)	0.00E+00
PM10 emissions (metric ton)	0.00E+00

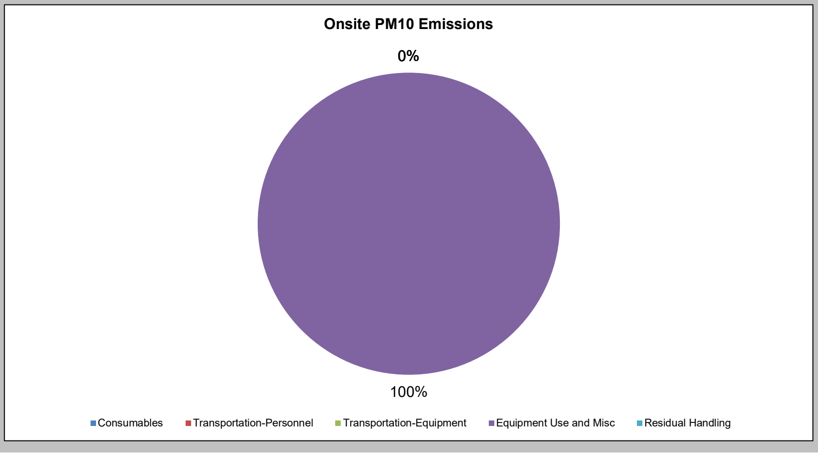


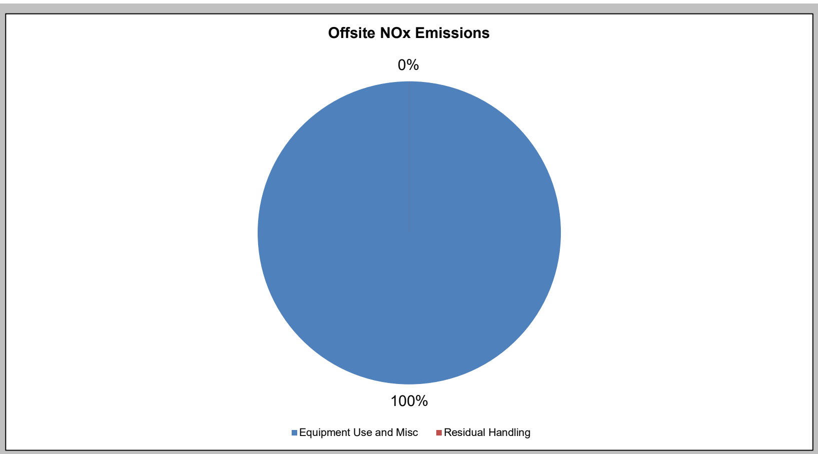


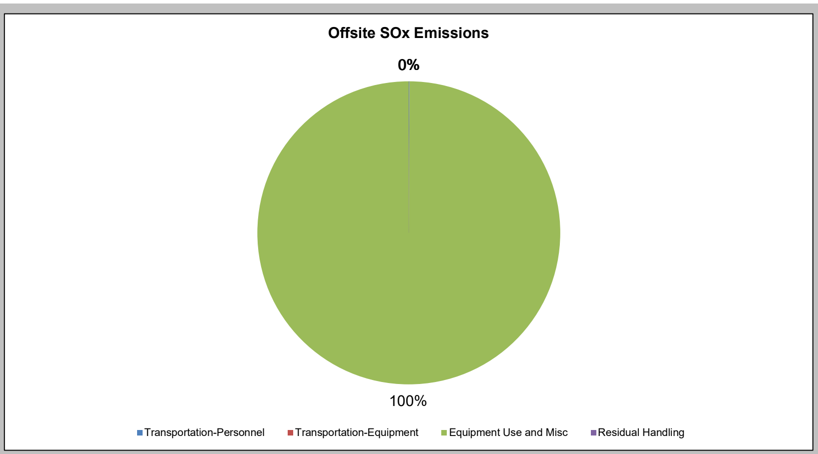

Water Consumption
0%
100%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling

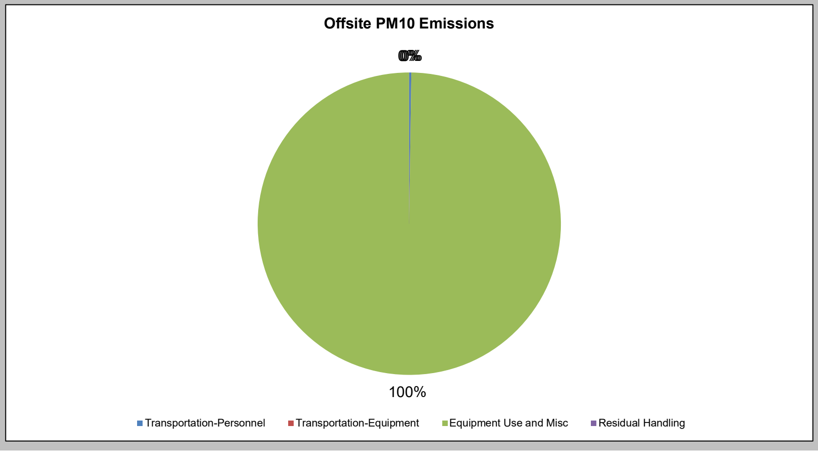

Onsite NOx Emissions
0%
100%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling

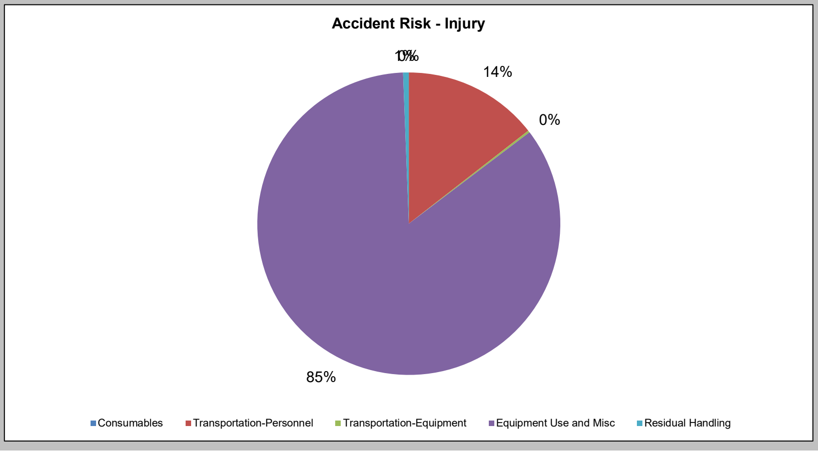

Onsite SOx Emissions
0%
100%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling

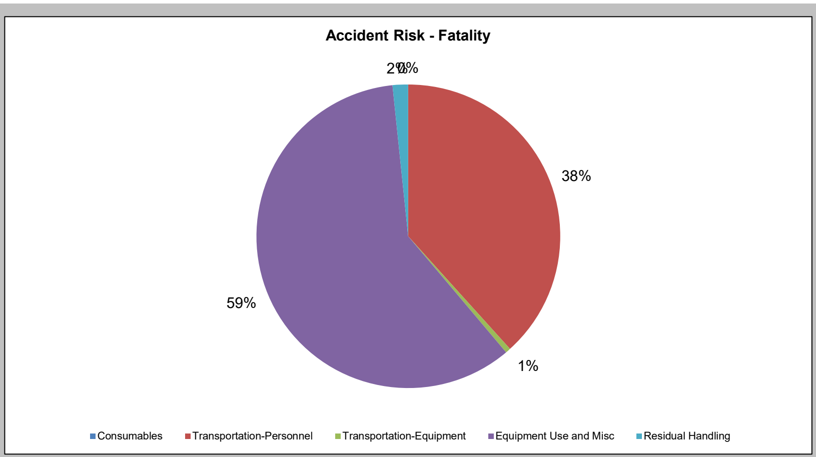

Onsite PM10 Emissions
0%
100%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling


Offsite NOx Emissions
0%
100%
Equipment Use and Misc
Residual Handling


Offsite SOx Emissions
0%
100%
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling


Offsite PM10 Emissions
0%
100%
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling


Accident Risk - Injury
14%
0%
85%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling


Accident Risk - Fatality
2%
0%
38%
59%
1%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling

APPENDIX H – QEP QUALIFICATIONS

Victoria Whelan, PG, QEP

Associate Principal

Summary of Experience

Ms. Whelan is a Certified Professional Geologist and Qualified Environmental Professional with nearly 20 years of experience in environmental assessment. She has performed and managed field investigations and remedial activities at numerous sites on Long Island and throughout the Metro New York area. She has skillfully conducted all aspects of environmental investigations and remediation. Her primary focus is to accurately assess, investigate, remediate, and maintain environmental integrity for real estate transactions and the redevelopment of brownfield or similarly environmental impaired properties.

She manages all aspects of projects with the New York State Department of Environmental Conservation (NYSDEC) Brownfield (BCP) and Voluntary Cleanup Program (VCP), the New York City Office of Environmental Remediation (NYC OER), the New York City Department of Environmental Protection (NYCDEP) and the United States Environmental Protection Agency (USEPA).

Relevant Project Experience

NYCOER PROJECTS

Project Manager, Chester Street Brooklyn Supportive Housing Project, Brooklyn, New York. Managed all aspects of environmental project from due diligence investigation services, Phase I Environmental Site Assessment, and Phase II Environmental Site Investigation services to assisting client through NYCOER Voluntary Cleanup Program (VCP). Submitted and received approval for remedial investigation work plan, remedial investigation report, remedial action work plan, and construction health and safety plan, including a community air monitoring program. Managed removal of 12 buried aboveground storage tanks (ASTs). Managed waste characterization study to evaluate various soil types for disposal. Cost effectively utilized the NYC Clean Soil Bank as a disposal site and backfill source. Secured grant funding after receiving Notice of Satisfaction (NOS) for a Track 1 Cleanup.

Environmental Project Manager, Manhattan Avenue, Affordable Housing Project, Brookyn, New York. Member of team that helped Ownership develop a new seven-story residential building on former factory site. Proposed development covered nearly 8,000 square feet of the property, including affordable housing with amenities such as a rear yard, recreation space, and children's play place. Site's contaminants included heavy metals and semi-volatile organic compounds. Hazardous and non-hazardous waste and non-hazardous was removed from the property as part of remediation efforts to address source material. Goal Soil Cleanup Objectives (SCOs) could not be achieved after remediation due to shallow groundwater. A track 4 Cleanup was achieved on this site by installing a composite cover inclusive of a vapor barrier. The project was completed on-time and on budget for the client to receive a NOS.

Project Manager, Bronx Community Development Project, Bronx, New York. Provided environmental services as client purchased, investigated, and remediated site for 81-unit community development, parking area and recreational area. The project is enrolled in NYC OER's VCP. Completed a Phase I ESA, VEA, Phase II ESI, RAWP and RAR.

Education

B.S., Geology, State University of New York at Oswego, 2001-2005; James Cook University 2004-2005

Licenses & Registrations

Registered Professional Geologist – 2017, New York, # 000318

Certified Professional Geologist, New York State

Qualified Environmental Professional, Institute of Professional Environmental Practice

Areas of Specialization

- Geology
- NYCOER VCP
- NYSBCP
- Environmental Assessments
- Environmental Site Investigation and Remediation
- UST Closures/Assessments
- Regulatory Compliance Planning and Permitting

Victoria Whelan, PG, QEP

Associate Principal

During remediation perimeter air monitoring was performed as per the CAMP. Designed oversaw removal of contaminated soil and installation of chemical vapor barrier during redevelopment.

NYSDEC BROWNFIELD PROJECTS

Principal-in-Charge, Former Auto Wreckers Site, Bronx, New York. Project is in the NYSDEC BCP with a planned Track 1 Cleanup. The site was successfully rezoned, and the proposed project will include 212 affordable housing apartments, 22,000 square feet (sf) of retail space, and parking. As remedial excavation was conducted it was quickly determined that the initial remedial plan would not satisfy the requirements for the project. As PIC, worked with the ownership, architect, accountant and construction team to steer the project towards new remedial goals without impacting project schedule. Remedial elements include a large-scale groundwater treatment system to address petroleum impacted groundwater and excavation of all source material ranging from depths of 2 to 15 feet below grade.

Environmental Project Manager, Confidential Residential Development, Bronx, New York. The 1.5-acre property was enrolled in the NYSDEC Brownfield Cleanup Program. Remedial components included excavation of soil exceeding the Site-specific Track 4 SCOs ranging from 2-22 feet, construction and maintenance of a composite cover system, removal of multiple underground storage tanks (USTs) and injection of Regenox and ORC Advanced (ISCO treatment) into the groundwater. Remediation also involved implementation of a CAMP. The site building was equipped with a vapor barrier and an active sub-slab depressurization system (SSDS). Throughout the process, assisted with design, maintaining a schedule and development of a Site Management Plan (SMP) and Final Engineering Report (FER).

Principal-in-Charge, Clay Street, NYCOER to NYSBCP Site, Brooklyn New York. Project consists of three parcels that share a property boundary and is in an area known to have heavy contamination. As the Principal-in-Charge, guided a team including ownership, developer and architect from the NYCOER VCP to the NYSDEC BCP based on contamination identified during the initial Remedial Investigation. Strategically conducted additional investigation to get multiple parts of the project eligible for the program and to maximize the tax credits available. Development will include a much-needed community facility in the way of a medical center, an indoor children's play center, and residential house.

USEPA PROJECTS

Project Manager, Remediation System, Confidential Client, Hicksville, New York. Managed this USEPA Superfund site for nearly 15 years through the operations and maintenance phase including a long-term groundwater treatment program, off-site soil vapor intrusion evaluations, and a large-scale groundwater sampling program. Contaminants of concern included PCBs and volatile organic compounds (VOCs). The site was complicated by multiple overlapping plumes of groundwater contamination. Collaborated with multiple property owners and their consultants to successfully drive the remediation.

NYS SPILLS PROJECTS

Project Manager, Spill Investigation and Remediation Services, Hempstead, New York. Performed a Phase I Environmental Site Assessment (ESA) that identified a gas station on the Site from 1940 through 1962, until redevelopment in the 1970s as a current commercial building. A subsequent Phase II Environmental Site Investigation (ESI) identified petroleum impacted soils, groundwater, and the presence of light non-aqueous phase liquids (LNAPL). A NYSDEC Spill Case was opened, and a Spill Investigation Work Plan was approved. Managed the spill investigation activities which included a work plan of Vacuum Enhanced Fluid Recovery (VEFR) events to evaluate feasibility of collecting residual petroleum contamination from beneath the Site building using VEFR. As part of long-term remedial plan, Monitored Natural Attenuation (MNA) and biodegradation to assess MNA is viable remedial strategy for the Site after the remediation of the LNAPL.

Certifications/Training

- 40-Hour OSHA HAZWOPER Training and 8-Hour Refreshers
- 10-Hour OSHA Construction Safety Course

Victoria Whelan, PG, QEP

Associate Principal

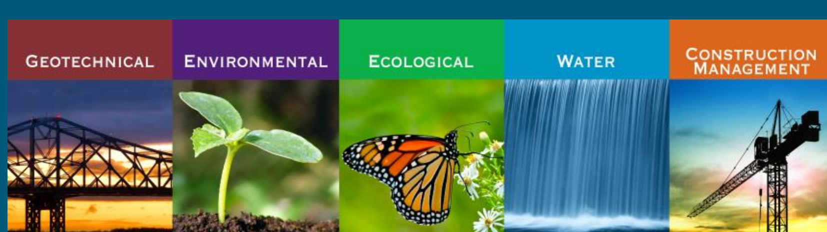
- First Aid/CPR Training
- LIRR Roadway Worker Training required by 49 CFR Part 214 Subpart C
- ARC Flash Training
- Confined Space Entry

Affiliations/Memberships

- Board Member - New York City Brownfield Partnership (NYCBP) 2022- present
- Committee Chair - Small Business Committee (NYCBP) 2022- present
- Member, New York State Council of Professional Geologists (NYSCPG)
- Member, American Council of Engineering Companies
- Member, Long Island Association of Professional Geologist

Honors & Awards

- Big Apple Brownfield Award - Hour Apartment House III
- Supportive Living Affordable Housing Award - Putnam Court
- Who's Who in Green Award - Atlantic Terrace



GZA GeoEnvironmental, Inc.