

Remedial Investigation Work Plan

276-284 Starr Street

NYSDEC BCP Site No. C224430

276-284 Starr Street, Brooklyn, Kings County, New York

Prepared for

Churches United For Fair Housing, Inc.

280 Starr Street

Brooklyn, New York 11237

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Acronyms and Abbreviations

µg/m ³	micrograms per cubic meter
AOC	Area of Concern
Applicant	Churches United For Fair Housing, Inc.
AST	aboveground storage tank
BBG	BBG Assessments, LLC
BCP	Brownfield Cleanup Program
BTEX	benzene, toluene, ethylbenzene, and xylenes
CAMP	community air monitoring plan
Carson Voci	Carson Voci Engineering and Geology, D.P.C.
cis-1,2-DCE	cis-1,2-dichloroethene
CUFFH	Churches United For Fair Housing, Inc.
cVOC	chlorinated volatile organic compound
DAC	Disadvantaged Community
DACAT	Disadvantaged Community Assessment Tool
DER	Division of Environmental Remediation
DER-10	<i>DER 10 / Technical Requirements for Site Investigation and Remediation</i>
DER-31	<i>DER 31 / Green Remediation</i>
DOT	United States Department of Transportation
DUSR	data usability summary report
ELAP	Environmental Laboratory Accreditation Program
EPA	United States Environmental Protection Agency
ESA	environmental site assessment
IA	indoor air
IDW	investigation-derived waste
Liberty	Liberty Environmental
MS/MSD	matrix spike/matrix spike duplicate
NTU	nephelometric turbidity unit
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
OA	outdoor air
Participant	Churches United For Fair Housing, Inc.
PCBs	Polychlorinated biphenyls
PCE	tetrachloroethene

PFAS	per- and polyfluoroalkyl substances
PFAS Guidance	<i>Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS)</i>
PID	photoionization detector
QAPP	<i>Quality Assurance Project Plan</i>
QA/QC	quality assurance/quality control
REC	recognized environmental condition
RI	remedial investigation
RIR	remedial investigation report
RIWP	<i>Remedial Investigation Work Plan</i>
SSSV	sub-slab soil vapor
SVI Guidance	<i>Guidance for Evaluating Soil Vapor Intrusion in the State of New York</i>
SV/IA	Soil Vapor/Indoor Air (Decision Matrices)
SVOC	semi-volatile organic compound
TCE	trichloroethene
TCL	Target Compound List
TO-15	EPA Method, Toxic Organics - 15
TOGS	Technical and Operational Guidance Series
UST	underground storage tank
VOC	volatile organic compound

Engineering Certification

I, Nicholas Krasnecky, P.E., certify that I am a New York State registered Professional Engineer and that this *Remedial Investigation Work Plan* was prepared in accordance with applicable statutes and regulations and in substantial conformance with the New York State Department of Conservation, Division of Environmental Remediation Program Policies “DER-10 / Technical Guidance for Site Investigation and Remediation” and “DER-31 / Green Remediation”.



Nicholas Krasnecky, P.E.
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August 3, 2026
Date

1 Introduction

Carson Voci Engineering and Geology, D.P.C. (Carson Voci), an affiliate of Terraphase Engineering, Inc., has prepared this *Remedial Investigation Work Plan* (RIWP) on behalf of Churches United For Fair Housing, Inc. (CUFFH; “Applicant”, “Volunteer”) for the New York State (NYS) Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP) Site No. C224430 identified as 276-284 Starr Street at 276-284 Starr Street in Brooklyn, New York (Site; Figure 1). The Applicant will implement the RIWP for the Site pursuant to the Brownfield Cleanup Agreement dated April 20, 2026, with the NYSDEC.

This RIWP has been prepared in accordance with NYSDEC Department of Environmental Remediation (DER) procedures set forth in the Program Policies “DER-10 / Technical Requirements for Site Investigation and Remediation” (DER-10; NYSDEC DER 2010) and “DER-31 / Green Remediation” (DER-31; NYDEC 2011), the New York State Department of Health (NYSDOH) Guidance for Evaluating Soil Vapor Intrusion in the State of New York (SVI Guidance; October 2006, with updates including February 2024) and Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC’s Part 375 Remedial Programs (April 2023), and complies with all applicable federal, state, and local laws, regulations, and requirements. The remedial investigation (RI) is a component of, and will facilitate but does not constitute, the overall remedy for the Site. The purpose of this RI is to determine the nature and extent of soil, groundwater, and soil vapor/indoor air contamination at the Site and to determine if an onsite contaminant source is present. The results of the RIR will be used to characterize the Site, develop a conceptual site model, and determine a course for remedial action.

1.1 Site Location and Description

The Site is currently owned by the Applicant, a Volunteer in the BCP. The approximately 0.18-acre Site consists of a rectangular parcel identified as Block 3200, Lot 19 on the New York City Tax Map (Figure 2). The Site is improved with a 13,500 square-foot (sf) one- and two-story building which was constructed circa 1931. The structure is currently used intermittently as an office and meeting space. The Applicant has not proposed any redevelopment plans at this time.

The Site is currently zoned as an M1-1 light manufacturing district and is in an urban area surrounded by other commercial, industrial, and residential properties. The immediate surrounding properties consist of residences to the northeast, commercial business and restaurants to the southeast, a commercial roller-skating rink to the southwest, and Starr Street to the northwest, followed by residences (Figure 3). Sensitive receptors within a ½ mile of the Site include two schools, to the east and south-southwest of the Site, respectively (Figure 4). Public utilities are present in the vicinity of the property; the specific locations will be investigated using ground-penetrating radar (GPR) as part of the remedial investigation activities described in Section 4.1.

1.2 Work Plan Organization

This RIWP is organized by the following sections:

1. **Introduction.**
2. **Background.** Presents pertinent information and characteristics of the Site relevant to the preparation of this RIWP.
3. **Prior Environmental Reporting.** Presents a detailed description of the pertinent information from the Phase II environmental site assessments (ESA).
4. **Remedial Investigation Sampling Plan.** Presents a detailed description of the RI sampling scope and procedures.
5. **Reporting.** Presents the proposed reporting for the activities in this RIWP
6. **Schedule.** Presents the proposed implementation schedule for the RIWP activities.
7. **References.** Presents a list of sources consulted in preparation of this RIWP.

This RIWP has been prepared in accordance with the Program Policies DER-10 and DER-31.

2 Background

The background of the Site and the surrounding properties has been evaluated by others and detailed in the following environmental assessment reports:

- *Phase I Environmental Site Assessment, 280-284 Starr Street, Brooklyn, New York, June 2022*, prepared by BBG Assessments, LLC (BBG 2022a; Appendix A);
- *Limited Phase II Subsurface Investigation, 280-284 Starr Street, Brooklyn, New York, July 2022*, prepared by BBG (BBG 2022b; Appendix A);

The above reports were reviewed for detail and accuracy. Pertinent information regarding recognized environmental conditions (RECs) at the Site and surrounding properties, and a description of the geology and hydrogeology of the Site, is summarized in this section.

2.1 Site Background

In June 2022, a Phase I ESA was completed for the Site by BBG on behalf of CUFFH prior to their purchase of the Site (BBG 2022a). The Phase I ESA scope of work was performed in accordance with ASTM Standard Practice E1527-13 and E1527-21, and included reviews of historical site development records, historical site operations records, environmental databases, and other source materials relevant to the identification of recognized environmental conditions (RECs) at the Site. At the time of the 2022 Phase I ESA, the Site was occupied by an antique goods store and a martial arts gym.

The Phase I ESA indicated that the Site was initially developed with the current structure in the 1931 for use as a store fixture manufacturer. From 1937 through 1965 the building was occupied by a machine shop (Queens Machine Corporation), and from 1970 through 2008 the property was occupied by garment companies including Quarex Knitting Mills (1970 to at least 1973) and PJ Knitting Mills (1985 to 2008). The building was most recently used as an antique store and fitness studio/martial arts gym prior to CUFFH's purchase of the property. The building is currently unoccupied with plans for intermittent use as an office and meeting space until future transition to use as a full-time commercial office and meeting space.

Based on this information, the historical operations were identified as a REC due to the likelihood that petroleum products or hazardous substances (e.g. solvents or degreasers) had been stored, managed or generated on the property and that a release of these materials could have occurred. BBG also identified a vent pipe on the northern exterior of the building facing Starr Street. Due to the density of stored materials within the basement, the current or former presence of an aboveground storage tank (AST) or underground storage tank (UST) could not be fully evaluated, and the vent pipe was therefore identified as an REC.

The property's historical industrial uses and the presence of the UST were further investigated during the Phase II Subsurface Investigation performed by BBG (BBG 2022b) and subsequent Phase II ESA performed by Liberty (Liberty 2025) that are summarized in Section 3 of this RIWP.

2.2 Site Geology, Hydrogeology, and Topography

Based on the site reconnaissance conducted by Carson Voci and information reported in the Phase I ESA, the Site is relatively flat with a downward slope to the west-northwest with the building covering the majority of the Site. The majority of the Site consists of impermeable surfaces, and stormwater is anticipated to drain to the New York City Storm Sewer System. According to the United States Geological Survey's (USGS) Brooklyn, New York, 7.5 Minute Series topographic map, the Site is located approximately 35 feet above average mean sea level (Figure 1). No surface bodies of water or wetlands were observed at the Site, and the nearest surface body of water is Newtown Creek, approximately 2,500 feet to the west-northwest. Newtown Creek is identified by the National Wetlands Inventory¹ as an estuarine and marine deepwater wetland. No other wetlands were identified within a ½ mile of the Site (Figure 5).

According to the Natural Resources Conservation Service Web Soil Survey website,² the dominant soil composition in the vicinity of the Site is classified as Urban Land, till substratum, with 3 to 8 percent slopes. Urban land is characterized by a non-homogenous distribution of soil and fill types. Based on information accessed via the USGS website,³ the subject property is underlain by the Raritan Formation, which consists of unconsolidated, coarse detrital clay, sand, and gravel. According to the USGS *Bedrock-Surface Elevation and Overburden Thickness Maps of the Five Boroughs, New York City, New York, Figure 12*⁴, bedrock depth is estimated to be between 200 to 300 feet below ground surface (bgs)

Site-specific soil and groundwater information was not available for review at the time of this RIWP. According to the USGS Long Island Depth to Water and Hydrologic Conditions Viewer⁵, the depth to groundwater at the Site is estimated to be approximately 20-25 feet bgs. Based on the local topography and surface water features, groundwater is anticipated to flow to the northwest, towards Newtown Creek.

¹ <https://fwsprimary.wim.usgs.gov/wetlands/apps/wetlands-mapper/>

² <http://websoilsurvey.nrcs.usda.gov/app/>

³ <https://mrdata.usgs.gov/general/map-us.html>

⁴ <https://pubs.usgs.gov/dr/1176/dr1176.pdf>

⁵ <https://ny.water.usgs.gov/maps/li-dtw/>

3 Prior Environmental Reporting

In addition to the Phase I ESA and findings detailed in Section 2.1, BBG and Liberty completed limited Phase II ESAs at the Site in July 2022 and April 2024, respectively, to further characterize potential and existing environmental impacts to soil vapor and indoor air based on historic Site operations.

The results and conclusions of the previous investigation activities completed by BBG and Liberty are summarized in this section.

3.1 Limited Phase II ESA

BBG conducted a Limited Phase II ESA in July 2022 to investigate the RECs identified during the Phase I ESA at the Site (summarized in Section 2). The Phase II ESA scope of work included the performance of a ground penetrating radar survey, the installation and sampling of four sub-slab soil vapor probes, and the collection of four indoor air samples and one ambient air sample. The 2022 Phase II ESA prepared by BBG (Appendix A) was reviewed, and the results and conclusions are presented below.

Four sub-slab soil vapor samples (SV-1 through SV-4), four indoor air (IA) samples (IA1 through IA4), and one outdoor air (OA) sample (OA1) were collected at Site and analyzed for select Volatile Organic Compounds (VOCs)⁶ via EPA Method, Toxic Organics - 15 (TO-15). The results are summarized on Figure 6. Sub-slab soil vapor analytical results identified detections of carbon tetrachloride, cis-1,2-dichloroethene (cis-1,2-DCE), trichloroethene (TCE), tetrachloroethene (PCE), 1,1,1-trichloroethane (1,1,1-TCA), and methylene chloride. Sub-slab soil vapor samples collected in the partial basement contained PCE, TCE, and cis-1,2-DCE at concentrations independently (i.e. irrespective of paired indoor air samples) recommending mitigation per the SVI Guidance with updates through May 2017 (now updated through February 2024) with maximum concentrations of 1,180 $\mu\text{g}/\text{m}^3$, 48,300 $\mu\text{g}/\text{m}^3$, and 460 $\mu\text{g}/\text{m}^3$, respectively. Comparatively, in sub-slab soil vapor samples collected from the first floor, only TCE was identified at a concentration independently recommending mitigation in the SVI Guidance (maximum 83.6 $\mu\text{g}/\text{m}^3$).

Indoor air analytical results identified detections of TCE, PCE, 1,1,1-TCA, methylene chloride, and benzene. In the partial basement, indoor air samples contained TCE at concentrations recommending mitigation in the SVI Guidance with a maximum concentration of 81.4 $\mu\text{g}/\text{m}^3$. Comparatively, TCE was identified in one IA sample from the first floor at a concentration (7.88 $\mu\text{g}/\text{m}^3$) recommending mitigation.

In addition to soil vapor and indoor air sampling conducted at the Site, a GPR survey was conducted at the Site to investigate the presence of current or former USTs. At the time of the investigation, an evaluation of a storage tank vent pipe along the northern exterior of the building was conducted. The vent pipe was traced to the basement interior, where it penetrated the floor slab in the partial

⁶ Select VOCs included tetrachloroethene (PCE), trichloroethene (TCE), cis-1,2-dichloroethene (cis-1,2-DCE), 1,1-dichloroethene (1,1-DCE), carbon tetrachloride, 1,1,1-trichloroethane (1,1,1-TCA), methylene chloride, and vinyl chloride, and benzene, toluene, ethylbenzene, and xylenes (BTEX)

basement. No further visual or geophysical investigation was performed due to the presence of debris in the partial basement. As such, the location of current or former USTs could not be determined at the time of the assessment.

Based on the concentrations of VOCs identified in soil vapor and indoor air, BBG recommended that vapor mitigation be implemented at the Site. In addition, BBG recommended an additional GPR survey of the basement after it was cleared of debris to investigate the vent pipe which was observed to enter the slab in the basement.

3.2 Supplemental Limited Phase II ESA

Liberty conducted a supplemental limited Phase II ESA in April 2024 to further investigate impacts to soil vapor and indoor air identified by BBG. The Phase II ESA scope of work included the collection of three indoor air samples (IA-1 through IA-3) and their analysis for select VOCs⁷ via EPA Method TO-15.

The indoor air analytical results from the sampling event identified concentrations of TCE, cyclohexane, and toluene at concentrations greater than applicable guidance mitigation values for indoor air. In IA samples collected in the partial basement, TCE, cyclohexane, and toluene were identified at concentrations greater than applicable guidance mitigation values with maximum concentrations of 34 $\mu\text{g}/\text{m}^3$, 48 $\mu\text{g}/\text{m}^3$, and 59 $\mu\text{g}/\text{m}^3$, respectively. In IA samples collected from the first floor, TCE and cyclohexane were identified at concentrations greater than applicable guidance mitigation values with maximum concentrations of 2.4 $\mu\text{g}/\text{m}^3$ and 28 $\mu\text{g}/\text{m}^3$, respectively. Based on these results, Liberty recommended vapor mitigation followed by indoor air sampling to confirm compliance with applicable state regulations.

In April 2023, Liberty's review of property records revealed that a 1,080-gallon fuel oil UST was formerly used at the Site and was closed in place in 2001. No additional investigation of the UST was conducted by Liberty.

3.3 Areas of Concern

Based on the historical investigations described above, Carson Voci has organized the Site into Areas of Concern (AOCs) requiring additional investigation as part of the RI. The AOCs are described below and depicted on Figure 7:

- **AOC 1 – Suspected UST:** The suspected 1,080-gallon fuel oil UST was reportedly closed in place in 2001. The precise location of the UST is unknown; however, a suspected vent pipe was observed along the northwestern exterior of the building and traced into the partial basement. No additional investigation of the UST is believed to have been completed. If releases have occurred, potential receptors include occupants of the building through potential vapor intrusion of contaminants into indoor air and future construction workers through direct contact to soil if the basement slab is disturbed. Based on current conditions, no direct contact or

⁷ Select VOCs consisted of benzene, carbon tetrachloride, 1,1-DCE, cis-1,2-DCE, ethylbenzene, methylene chloride, PCE, toluene, 1,1,1-TCA, TCE, m&p-xylene, o-xylene, and vinyl chloride

ingestion of soil or groundwater is expected, and no discharge to surface water or sediment is reasonably anticipated based on distances to wetlands or surface water bodies.

- **AOC 2: Sitewide Historical Industrial Use:** The Site has a long history of industrial use, including use as a fixture manufacturer, a machine shop, and knitting mills. The limited Phase II ESAs described above have identified concentrations of chlorinated VOCs in sub-slab soil gas and indoor air. The source of these concentrations has not been identified. Potential receptors to contaminants include occupants of the building through potential vapor intrusion of contaminants into indoor air and future construction workers through direct contact to soil and/or groundwater if the basement slab is disturbed. Based on current conditions, no direct contact or ingestion of soil or groundwater is expected, and no discharge to surface water or sediment is reasonably anticipated based on distances to wetlands or surface water bodies.

4 Remedial Investigation Sampling Plan

The purpose of the RI is to delineate the nature and extent of contamination, determine if a potential source area exists at the Site, and allow for effective evaluation of multiple BCP cleanup track alternatives. Data collected during the RI will determine the basis for future remedial actions for the Site. The proposed investigation activities consist of soil, groundwater, sub-slab soil vapor (SSSV), and IA sampling.

The following personnel are proposed to be for the implementation of this RIWP. Qualifications of personnel are provided in Appendix B.

Personnel	Company	Role	Contact Information
Nick Krasnecky, PE	Carson Voci	Professional Engineer and Project Manager	201-552-0224 nicholas.krasnecky@terraphase.com
Alexander Strohl	Carson Voci	Quality Assurance Officer	570-447-0558 alexander.strohl@terraphase.com
Ellie Johnston	Carson Voci	Field Geologist	267-745-2611 ellie.johnston@terraphase.com
Cynthia Pagut	Pace Analytical Services	Laboratory Project Manager	508-898-9220 Cynthia.Pagut@pacelabs.com

The RI activities to further investigate the VOCs in soil vapor and indoor air, define the nature and extent of potential soil and groundwater contamination, and fully investigate and characterize the Site in accordance with NYSDEC BCP requirements are detailed in this section.

4.1 Site Reconnaissance and Geophysical Survey

Potential areas of concern identified in previously completed environmental reports (BBG 2022a; BBG 2022b; Liberty 2025), as described in Sections 3.1 and 3.2, will be targeted with soil, groundwater, and soil vapor sampling during the RI. Before starting intrusive drilling, several office-based and non-intrusive field activities are to be completed as outlined below.

4.1.1 Utility Clearance and UST Evaluation

Prior to the start of any field work, a public utility mark-out will be performed by calling New York 811 and recording the ticket number assigned. Utility mark-outs will be logged to document compliance with mark-out requirements. A minimum of 72 hours will be allowed to complete mark-outs starting on the business morning following the time of the initial mark out-call. Additional time may be required to ensure that all mark-outs are completed. A private utility detection company will be contracted to verify the location of utilities and subsurface structures and to ensure clearance for proposed boring and sample locations.

As part of the private utility survey, a geophysical survey will be completed within the partial basement to investigate for the presence of the closed-in-place UST.

4.1.2 Permitting

The selected drilling contractor will be responsible for acquiring any necessary permits associated with the RI activities.

4.1.3 Initial Site Investigation

If required, prior to intrusive sampling, a site walk will be completed to verify the locations of proposed sample locations and to coordinate work with the Site owner and regulators as appropriate. This initial inspection may also be conducted in conjunction with the private utility detection investigation.

4.2 General Investigation Guidance

The RI sampling will be conducted in general accordance with the appropriate techniques presented in DER-10, the general field sampling procedures presented in Sections 4.3 through 4.5 of this RIWP, and within the *Quality Assurance Project Plan* (QAPP; (Appendix C).

Samples will be collected using equipment that has been properly decontaminated and procedures appropriate to site-specific factors, including the matrix, the parameters to be analyzed, and the data quality objectives of specific tasks.

The volume of the sample collected will be sufficient to perform the analyses requested, as well as the quality assurance/quality control (QA/QC) requirements. Sample volumes, container types, and preservation techniques will also be confirmed with the approved laboratory.

Before leaving the Site, the sampler will:

- Check all paperwork for accuracy and completeness.
- Match the physical samples with the associated paperwork. The sampler will check for proper samples in the correct containers and that the field number on the samples corresponds with the numbers on the completed chains of custody.
- Verify that samples are properly stored and secure for transport.
- Clean and package all non-disposable equipment.
- Make sure the items on the sample tags, request forms, chain-of-custody record, and logbook match.
- Bag all disposable items to be discarded.
- Ensure that all sample containers are free of any debris.

To avoid cross-contamination, sampling equipment (defined as any piece of equipment which may contact a sample) will be decontaminated, as described in Section 4.6.

4.3 Soil Investigation and Characterization

The following subsections provide details of the proposed soil investigation and characterization program. Soil samples will be collected to assess the presence and/or nature and extent of VOC impacts in soil, likely stemming from the former industrial usage of the Site. Proposed soil sampling locations are included on Figures 7 and 8.

4.3.1 Soil Borings and Sample Locations

Up to 20 discrete soil samples (not including QA/QC samples) are anticipated to be collected from 12 soil borings, as detailed below:

- Soil borings advanced at the off-site MW-01 and MW-02 monitoring well locations (SB-01 and SB-02), prior to installation of the monitoring wells will be inspected to log lithology and screen for the potential presence of impacts. If impacts (visual, olfactory and PID evidence) are identified in the soil boring, samples may be collected at the respective inferred soil/groundwater interface to be held at the lab. These two borings will be installed to at least 5 feet below the water table.
- Eight soil borings, SB-03 through SB-10, will be advanced onsite throughout the first/ground floor of the building. Sixteen soil samples will be collected from these borings to determine the nature and extent of potential impacts throughout the first floor, as detailed in Section 4.3.3. Boring SB-05, SB-08, and SB-09 will be installed to at least 5 feet below the water table, where possible.
- Two soil borings, SB-11 and SB-12, will be advanced onsite in the partial basement of the building in the vicinity of two recessed areas in the concrete floor slab. Four soil samples will be collected from these borings to determine the nature and extent of potential impacts in these areas, as detailed in Section 4.3.3. Boring SB-11 will be installed to at least 5 feet below the water table, where possible.

The proposed samples, depths, analytical parameters, and rationale are detailed in Table 1 and the proposed soil sampling locations are presented on Figures 7 and 8.

4.3.2 Soil Analytical Parameters

Up to 20 discrete soil samples are anticipated to be collected from the Site, depending on observed impacts. Discrete soil samples collected shall be analyzed for the following in accordance with Table 1:

- Target Compound List (TCL) VOCs via EPA Method 8260C/D;
- TCL SVOCs via EPA Method 8270D, including 1,4-Dioxane;
- TCL pesticides/herbicides via EPA Method 8081B and 8151A;
- Polychlorinated biphenyls (PCBs) via EPA Method 8082A;
- Total Analyte List (TAL) metals via EPA Methods 6010C, 9010C, 196A, and 7471B (including hexavalent chromium via EPA Method 7196A, and total cyanide via EPA Method SM 4500); and

- Per-and Polyfluoroalkyl Substances (PFAS).⁸

All analyses will be performed by an Environmental Laboratory Approval Program (ELAP) certified laboratory for the parameter being analyzed. Results will be provided with NYS Analytical Services Protocol (ASP) Category B deliverables and will be reviewed and validated by a third-party data validator, who will prepare a data usability summary report (DUSR) before data is incorporated into the final RI report (RIR) for the Site. Additional details regarding laboratory analyses are included in the QAPP (Appendix C). All data will be submitted to NYSDEC in electronic format in accordance with DER-10, Section 1.15.

QA/QC samples, including field duplicates and field blanks, shall be collected pursuant to Table 1 and in accordance with the QAPP. Blind duplicates will be collected at a frequency of 1 blind duplicate per 20 samples. Field blanks will be collected at a frequency of once per day. A laboratory-prepared trip blank will be provided and analyzed alongside the field samples. Details regarding sampling methods and analyses are provided in the QAPP (Appendix C).

4.3.3 Soil Sampling Procedures

The following procedures will be utilized to collect the soil samples at each boring location:

- Soil borings will be collected on a nominal continuous basis by advancing a 4- to 5-foot-long, stainless-steel macrocore sampler with a direct-push drill rig from the surface to the targeted termination depth or refusal. Each macrocore sampler will be equipped with factory-decontaminated, plastic acetate liners.
- Soil borings will be terminated at the water table in locations which are not selected to be converted to monitoring wells, unless impacts are observed at the base of the boring. In borings that are selected to be converted to monitoring wells, the boring will be advanced a minimum of five feet below the inferred water table.
- Soil borings will be inspected and classified in accordance with the Unified Soil Classification System. Soil borings will be field screened utilizing a photoionization detector (PID) and by visual and olfactory inspection for the presence of impacts. A graphic log of each soil boring will be prepared with appropriate stratification lines, lithologic descriptions, sample identifications, PID readings, sample depth intervals, and dates. The horizontal position of the soil borings will be measured via GPS.
- A minimum of two soil samples will be collected from each onsite soil boring (i.e., SB-03 through SB-12). One sample in the 0- to 2-foot bgs interval and one sample in the 2-foot bgs to 15-foot bgs depth. Soil samples will be collected from the 6-inch interval exhibiting the highest PID reading and/or visual and olfactory indication of impacts. Should significant impacts be observed in a soil boring, additional samples may be collected to be held at the laboratory, with analysis contingent upon the results of the shallower samples.

⁸ Soil samples will be analyzed for PFAS, which include the 40 PFAS compounds listed in accordance with NYSDEC's Part 375 Remedial Programs 2023 guidance document *Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS)* and EPA Method 1633A.

- Should significant visual and olfactory indication of impacts be observed, soil samples will be collected from off-site⁹ soil borings SB-01 and SB-02. The contingent soil sample(s) will be collected from the 6-inch interval immediately above the water table and will be held at the lab.
- If visual, olfactory, or PID evidence indicate the presence of impacts below the water table in any soil boring, additional soil samples will be collected in the saturated zone to delineate the vertical extent of soil contamination above Protection of Groundwater Soil Cleanup Objectives.
- The VOC aliquot will be placed in En Core® samplers (or Terracore Samplers) per EPA Method 5035A, which will immediately be placed on ice. The aliquot for the remaining analytical parameters will be homogenized and placed in a laboratory-provided glass sample jar, which also will immediately be placed on ice. One sample will be collected from each of the proposed sampling intervals.
- Samples for per- and poly-fluoroalkyl substances (PFAS) will be collected at all locations. The samples will be collected in accordance with the NYSDEC Part 375 Remedial Programs *Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS)* guidance document (PFAS Guidance; 2023), which includes ensuring all materials which may contact the soil to be sampled are compatible.
- Upon termination of each boring, the boring will be backfilled with Site soils to grade, and restored with concrete or equivalent to match existing conditions.
- All non-disposable sampling equipment (defined as any piece of equipment which may contact a sample) will be decontaminated as outlined in Section 4.6 prior to advancing the next soil boring.
- One blind duplicate sample and one matrix spike/matrix spike duplicate (MS/MSD) will be collected per 20 discrete soil samples. The blind duplicate sample(s) will be collected and analyzed as outlined Table 1.
- A field blank will be collected as outlined in Table 1 prior to completion of the soil sampling activities.

4.4 Groundwater Investigation and Characterization

Permanent groundwater wells will be installed to characterize groundwater impacts at the Site. The wells will also be utilized to determine the groundwater flow direction and gradient. The proposed groundwater well locations are included on Figures 7 and 8.

Based on the site reconnaissance conducted by Carson Voci, the two-story portion of the structure and partial basement can only be accessed by a direct-push “handcart” rig (i.e. Geoprobe 420M) due to doorway widths. Therefore, the installation of monitoring wells within these areas may be limited based on the depth to groundwater and underlying soil types. The proposed monitoring well locations and

⁹ Because the boring locations are off-site, evidence of impact in the unsaturated zone is not necessarily indicative of contamination at the Site. Therefore, these borings will be installed with intention of logging soil at the monitoring well locations, with contingent soil samples being collected if evidence of significant impacts is identified.

construction were selected based on the size of the drilling equipment that can access specific areas of the building. The photo log provided as Appendix D presents these access restrictions.

Six permanent groundwater monitoring wells are anticipated to be installed at the Site at the locations shown on Figures 7 and 8, and as detailed below:

- Two exterior permanent wells within the off-site sidewalk in front of the building (northwest of the Site).
- Up to four interior permanent wells in soil borings throughout the interior of the Site building, anticipated to be at locations SB-05, SB-08, SB-09, and SB-11. The interior well locations are dependent on field observations made at the time of the investigation (i.e., presence of groundwater, field indications of contamination, etc.), with the generally anticipated locations presented on Figures 7 and 8.

The wells will be installed pursuant to the procedure described in Section 4.4.1.

4.4.1 Groundwater Well Installation

A licensed NYS well driller will be contracted to install the proposed permanent groundwater wells, per the details provided below, at the locations shown on Figures 7 and 8.

- Each well will be installed by advancing a 4- to 5-foot-long, stainless-steel hollow rod (minimum 3-inch inner diameter) with an expendable tip using a direct-push drill rig from the surface to the targeted termination depth (approximately 25-35 feet bgs). Monitoring well termination depths and screen intervals will be determined based on field observations. Should impacts be identified in shallow monitoring wells, Carson Voci plans to prepare a supplemental letter work plan for NYSDEC review and approval to install and sample deeper wells.
- The wells will be constructed with 10 feet of 2-inch, Schedule 40, 0.010-inch slotted PVC well screen and 2-inch, Schedule 40, PVC well riser to ground surface.
- The boring annulus will be filled with #2 Morie sand to 2 feet above the well screen, bentonite to the top of the water table, and grout to the existing grade surface.
- The wells will be finished with a flush-mount vault of appropriate size and load rating.
- After the grout has set (minimum of 24 hours), the wells will be developed to remove any silt and sediment from the well and the sand pack. Wells will be developed until the water reaches 50 nephelometric turbidity units (NTUs) or less or ten well volumes are removed, whichever is encountered first. Development water will be collected in 55-gallon steel drums and the drums will be characterized and disposed as outlined in Section 4.7.

The interior wells will be constructed similar to the exterior wells, but will be constructed with ten feet of "pre-pack" 1-inch, Schedule 40, 0.010-inch slotted PVC well screen and 1-inch, Schedule 40, PVC riser to ground surface.

Following installation, the horizontal position of the wells will be surveyed by a licensed professional surveyor. The wells will be sampled at least 7 days after well development.

4.4.2 Groundwater Analytical Parameters

Up to six groundwater samples per sampling event will be collected from the permanent wells, pursuant to Table 2. Groundwater samples collected shall be analyzed for the following in accordance with Table 2:

- TCL VOCs via EPA Method 8260C/D;
- TCL SVOCs via EPA Method 8270D, including 1,4 Dioxane;
- TCL pesticides/herbicides via EPA Method 8081B and 8151A;
- PCBs via EPA Method 8082A;
- TAL metals via EPA Methods 6010D, 6020B, and 7470A (including hexavalent chromium via EPA Method 7196A, and total cyanide via EPA Method SM 4500); and
- PFAS via EPA Method 1633A.

All analyses will be performed by an ELAP certified laboratory for the parameter being analyzed. Results will be provided with ASP Category B deliverables and will be reviewed and validated by a third-party data validator, who will prepare a DUSR before data is incorporated into the final RIR for the Site. Additional details regarding laboratory analyses are included in the QAPP (Appendix C). All data will be submitted to NYSDEC in electronic format in accordance with DER-10, Section 1.15.

QA/QC samples, including field duplicates and field blanks, shall be collected pursuant to Table 2 and in accordance with the QAPP. Blind duplicates will be collected at a frequency of 1 blind duplicate per 20 samples. Field blanks will be collected at a frequency of once per day. A laboratory-prepared trip blank will be provided and analyzed alongside the field samples. Details regarding sampling methods and analyses are provided in the QAPP (Appendix C).

4.4.3 Groundwater Sampling Procedures

Groundwater samples will be collected from the installed permanent wells no sooner than 7 days after installation and development to allow the groundwater to equilibrate. The wells will be sampled following EPA low-flow sampling techniques,¹⁰ as summarized below:

- The wells will be opened, and the headspace screened with a PID.
- A water-level gauge will be deployed in the well to measure the depth to water and depth of the well.
- A clean, decontaminated, submersible pump with dedicated Teflon®-lined tubing (or polyethylene tubing for PFAS sampling, as noted below) will be deployed to the target depth.
- The pump discharge tubing will be attached to a calibrated water quality meter.
- Groundwater quality measurements, including temperature, pH, dissolved oxygen, specific conductance, and oxidation-reduction potential, and the depth to groundwater will be measured every 5 minutes during the well purge.

¹⁰ The EPA low-flow sampling techniques can be access at:
<https://www.epa.gov/sites/default/files/2017-10/documents/eqasop-gw4.pdf>

- Once the groundwater parameters have stabilized pursuant to the EPA low-flow sampling method specifications, a groundwater sample will be collected directly from the pump effluent into the appropriate sample containers, which will immediately be placed on ice. If using a peristaltic pump for 1-inch diameter monitoring wells, an HDPE bailer will be advanced to collect a grab groundwater sample for VOC analysis.
- Upon the collection of each groundwater sample, the tubing and any other sampling equipment will be removed and the well closed.
- All non-disposable sampling equipment (defined as any piece of equipment which may contact a sample) will be decontaminated as outlined in Section 4.6 prior to sampling at the next well.
- One blind duplicate sample and one MS/MSD pair will be collected per 20 groundwater samples. The blind duplicate sample(s) will be collected and analyzed as outlined Table 2.
- A field blank will be collected as outlined in Table 2, prior to completion of the groundwater sampling activities.

Groundwater wells will be sampled for PFAS in accordance with Table 2 and the PFAS Guidance (NYSDEC 2023).

4.5 Sub-Slab Soil Vapor and Indoor Air Investigations

The following subsections provide details of the proposed SSSV and IA investigation program. SSSV and IA samples will be collected to further investigate the areal extent of the VOC impacts under the building footprint, and at the exterior of the building, potentially identify a localized area where an on-site cVOC source may be present, and evaluate potential volatile petroleum hydrocarbons in SSSV and IA. Analytical results of the Phase II ESAs (BBG 2022b; Liberty 2025) and the proposed sampling locations for SSSV and IA samples are included on Figures 6 through 8.

4.5.1 Sub-Slab Soil Vapor Sample Locations

Six SSSV samples (SSSV-1 through SSSV-6) will be collected at the Site, pursuant to Table 3. The proposed SSSV samples will be collected from below the building slab with co-located IA samples at select points as outlined in Section 4.5.2. The results will be compared to the SVI Guidance. A determination of “no further action”, “monitor”, or “mitigate” will be made based on the comparison of the SSSV and IA analytical results to the SV/IA Decision Matrices included in the SVI Guidance (NYSDOH 2006).

4.5.2 Indoor and Ambient Air Sample Locations

Co-located IA samples will be collected from the SSSV-1 through SSSV-6 sample locations (Figures 7 and 8). Sample locations have been selected in locations investigated during BBG’s soil vapor investigations as well as the uninvestigated one-story structure portion of the building. An OA sample will be collected from an upwind location during each day of sampling. Meteorological data will be collected each day of the sampling event to determine the prevailing wind direction to determine the location of the OA sample.

4.5.3 Sub-Slab Soil Vapor and Indoor Air Analytical Parameters

Six SSSV samples and six co-located IA samples will be collected from the Site. All samples collected shall be analyzed for VOCs by EPA Method TO-15.

All analyses will be performed by an ELAP certified laboratory for the parameter being analyzed. Results will be provided with ASP Category B deliverables and will be reviewed and validated by a third-party data validator, who will prepare a DUSR before data is incorporated into the final RIR for the Site. Additional details regarding laboratory analyses are included in the QAPP (Appendix C). All data will be submitted to NYSDEC in electronic format in accordance with DER-10, Section 1.15.

QA/QC samples, including field duplicates and field blanks, shall be collected pursuant to Table 3 and in accordance with the QAPP. Blind duplicates will be collected at a frequency of 1 blind duplicate per 20 samples. An OA sample will be collected concurrently with any SVI sampling activities.. Details regarding sampling methods and analyses are provided in the QAPP (Appendix C).

4.5.4 Sub-Slab Soil Vapor and Indoor Air Sampling Procedures

The following procedures will be used to collect the SSSV samples presented in Table 3 at each location shown on Figures 7 and 8.

4.5.4.1 Building Walk-Through and Questionnaire

A building walk thorough and questionnaire will be completed pursuant to the SVI Guidance. Any preferential flow pathways and materials stored within the building that may affect the sampling results will be noted. If possible, materials in the building will be removed from the sampling location to mitigate the effects on the sampling results. The building inventory checklist is included as Appendix E.

4.5.4.2 Vapor Pin® Installation

Temporary Vapor Pins® will be installed in accordance with the standard operating procedure provided as Appendix F to facilitate SSSV sampling. Temporary Vapor Pins® will be installed at locations SSSV-01 through SSSV-06.

4.5.4.3 Tracer Gas Test

Per SVI Guidance, a helium tracer gas will be used prior to the sampling of each soil vapor pin. The tracer gas is used to verify that the infiltration of outdoor (ambient) air is not occurring during sample collection. The procedures for conducting the tracer gas test are outlined below:

- An approximate 1- to 2-quart enclosure will be placed over the vapor pin, and the interface between the enclosure and the ground surface will be sealed with modeling clay or a polyurethane foam gasket to prevent intrusion of outside air into the sampling apparatus.
- A tank containing ultra-high purity helium (99.999 percent) will be connected to the side port of the enclosure and enough helium will be released to displace any ambient air within the enclosure to maintain positive pressure.

- Following the application of the tracer gas, one to three volumes of soil vapor/trapped air will be purged from the soil vapor port using a Gilian GilAir-3 air sample pump (or equivalent). A Dielectric MGD-2002 helium detector (or equivalent) will be used to check for tracer gas in the purged soil vapor; if less than 10 percent of the tracer gas is detected, a soil vapor sample can be collected from the soil vapor port.
- If greater than 10 percent of the tracer gas is detected in the purged soil vapor, a determination will be made to fix the vapor pin seal or abandon and reinstall the vapor pin.

4.5.4.4 Sub-Slab Soil Vapor and Indoor Air Sampling

Upon completion and passing of the tracer gas test, the SSSV and IA sampling will be conducted as outlined below:

- SSSV, IA, and OA samples will be collected using laboratory-evacuated, certified-clean, 6-liter Summa® canisters with 2-hour laboratory calibrated flow regulators.
- All sampling flow rates will be less than the maximum flow rate of 0.2 liters per minute (NYSDOH 2006) and the flow-regulators will be provided by a NYSDEC certified analytical laboratory.
- Summa canisters will be completely evacuated to negative pressure (30 inches of mercury vacuum) before use. The following specific procedures will be utilized to ensure proper collection of samples with the Summa® canisters:
 - Verification and documentation of the initial vacuum reading of the canister.
 - Confirmation that the canister valve is fully closed (the knob should be turned clockwise).
 - Removal of the fitting from the top of the canister and attachment of the flow controller to the top of the canister.
 - Initiation of sample collection by opening the valve on the canister counterclockwise and documentation of the “start” time.
 - Periodic sampling progress monitoring to note the vacuum. It may be necessary to terminate sampling slightly before the desired full sampling duration if the canister vacuum is waning near the end of sampling.
 - Valve closure at the end of the sampling period by turning clockwise until hand tight. Documentation of the “end” time and “end” vacuum. While the ideal reading on the can gauge should be slightly negative, the actual Summa® canister vacuum will be tested with a calibrated gauge at the laboratory.
 - Removal of the flow controller and packaging for shipment to the laboratory.
 - Replacement of the fitting on top of the canister.
 - Documentation of the final vacuum of the canister and complete the chain-of-custody record (to be provided by the laboratory).
- Co-located IA samples and the OA sample(s) will be collected from breathing height between 3 and 5 feet above the ground surface.

- Samples will be submitted to an ELAP and NYSDEC certified analytical laboratory for VOC analysis by EPA Method TO-15.

The heating, ventilation, and air conditioning system will be in operation a minimum of 24 hours before the sample collection commences and set for its normal operation (as if the building were occupied) during the sampling event.

4.6 Decontamination Procedures

Sampling equipment will be decontaminated when switching between boreholes or wells using the following procedures:

- New disposable gloves will be used for each decontamination procedure to prevent cross-contamination of equipment.
- Equipment shall be scrubbed with brushes using a solution of Alconox™ and distilled water.
- Equipment shall then be triple rinsed with analyte-free distilled water.
- Sampling equipment that is not readily decontaminated shall be discarded after each use. Discarded decontamination solutions shall be accumulated and containerized in United States Department of Transportation (DOT) 17H-rated drums or equivalent.

4.7 Investigation-Derived Waste Management

Investigation-derived waste (IDW) is expected to be generated during the RI activities and will be managed in accordance with applicable federal, state, and local regulations. The anticipated IDW generated, and the management procedures, are outlined below:

- It is anticipated all soil boring cuttings will be utilized to backfill borings. Direct-push well installation methods generally do not generate waste. Excess soil boring cuttings not used to backfill borings will be collected into DOT-approved 55-gallon drums and staged on Site temporarily for off-site disposal at a permitted facility.
- After installation of the permanent groundwater wells, the wells will be developed to clear the sand filter pack and remove any sediment from the well prior to sampling. The development water will be containerized in DOT-approved 55-gallon drums and staged on Site temporarily for off-site disposal at a permitted facility.
- Groundwater purged during groundwater sampling activities will be containerized in DOT-approved 55-gallon drums and staged on Site temporarily for off-site disposal at a permitted facility.
- Unless significantly soiled, personal protective equipment wastes will be disposed in the trash.

IDW procedures have been developed to minimize both the risk of exposure to contamination and the spread of contamination during field activities at the Site. All personnel who come into designated work areas, including contractors and observers, will be required to adhere strictly to the conditions imposed herein and to the provisions of the site-specific *Health and Safety Plan*, included as Appendix G.

Pending field sampling data and selected disposal facility requirements, Carson Voci will collect waste characterization samples, as needed. Waste will be disposed of within 90 days of completion of RI activities.

4.8 Surveying Assessment

All newly installed monitoring wells sampled as part of this RI will be surveyed by a New York Licensed Surveyor to obtain horizontal and vertical coordinates and grade elevations. Measuring point elevations from newly installed monitoring wells will also be surveyed to enable groundwater flow contouring. Horizontal coordinates will be based upon the NYS Plane Coordinate System, Long Island Zone, North American Datum of 1983 (NAD 83) in United States survey feet. Vertical elevations will be measured for top-of-casing (measuring point) and grade elevations referenced to North American Vertical Datum of 1988 (NAVD88).

4.9 Community Air Monitoring Plan

A community air monitoring plan (CAMP) will be implemented during any intrusive subsurface activities to conduct monitoring and protection for potential off-site receptors. During the RI activities, the Site building will be unoccupied. The CAMP scope of work will include the use of one downwind air monitoring station and one upwind or work zone air monitoring station, each equipped with one PID and one particulate meter. Upwind concentrations will be measured at the start of each workday, and periodically throughout the day, to establish background concentrations. As residences exist adjacent to and within 20 feet of the proposed work areas, special requirements will be implemented as applicable. When working at the exterior of the building, continuous monitoring locations will reflect the nearest potentially exposed individual and/or the location of ventilation system intakes for nearby structures, and engineering controls will be used to prevent control exposure to dust and potential odors related to Site-activities.

Daily reporting of any exceedances, CAMP station locations, and wind directions, will be provided to NYSDEC and NYSDOH. CAMP data results will be included in the final RIR along with locations of monitoring stations, monitoring equipment, procedures, and contaminant action levels. The *NYSDOH Generic Community Air Monitoring Plan* is included as Appendix H.

4.10 Green and Sustainable Remediation

Green and sustainable remediation (GSR) principles and techniques will be implemented to the extent feasible in the design, implementation, and site management of the remedial investigation as per “DER-31 / Green Remediation” (DER-31).

Best Management Practices (BMP), as defined by the EPA, aim to reduce the environmental footprint of activities associated with assessing and remediating contaminated sites. The BMPs involve specific activities to address the core elements of greener cleanups as per DER-31, including (1) reduce total energy use and increase the percentage of energy from renewable resources, (2) reduce air pollutants and greenhouse gas emissions, (3) reduce water use and preserve water quality, (4) conserve material resources and reduce waste, and (5) protect land and ecosystem services.

- BMPs taken for the remedial investigation will include: Selecting service providers, product suppliers, and analytical laboratories from the local area;
- Identifying the nearest facility to be used for disposing of non-hazardous and/or hazardous waste;
- Reducing travel through increased teleconferencing;
- Integrating sources of on-site renewable energy to power hand-held devices, portable equipment, and stationery monitoring systems;
- Using non-invasive or minimally invasive technologies such as portable vapor/gas detection systems using photoionization for screening purposes.
- Choosing products, packing material, and equipment that have reuse or recycling potential;
- Minimizing the need for disposable single-use items, such as plastic bags; and
- Choosing fixed laboratories demonstrating a strong commitment to environmental performance, such as routine use of management practices identified by the International Institute for Sustainable Laboratories.

The following metrics have been identified to be tracked throughout the investigation to truth test assumptions and assess progress towards the GSR goals:

- Materials Management, including off-site disposal and on-site material import quantities;
- Greenhouse Gas Emissions and Air Pollutants; and
- Total Energy Use

The GSR techniques and principles implemented during the investigation activities, including BMPs and the tracking metrics, will be summarized in the RIR.

4.11 Disadvantaged Community Assessment

New York State defines a Disadvantaged Community (DAC) as “a community that bears burdens of negative public health effects, environmental pollution, and climate change impacts, and possesses certain socioeconomic criteria or comprises high-concentrations of low- and moderate-income households”.

The Disadvantaged Community Assessment Tool (DACAT)¹¹ is a screening tool created by NYSDEC to help lead agencies assess disproportionality and consider whether a potentially affected disadvantaged community has an increased likelihood of experiencing a moderate to large impact based on existing burdens or vulnerabilities as compared to relevant non-DACs. According to DACAT, the Site is located within a DAC.

Carson Voci does not anticipate that implementation of the RIWP will create or increase significant pollution burdens within the community. Through the implementation of the BMPs described above, pollution burdens related to the project with the potential for small impacts, including potential air emissions, noise, odors, solid or hazardous waste generation and management, will be reduced to the extent practicable and minimize impact to the surrounding community. The GSR techniques and principles implemented during the investigation activities, including BMPs and the tracking metrics, will be summarized in the RIR.

4.12 Qualitative Exposure Assessment

A qualitative human health exposure assessment will be performed following the collection of all RI data in accordance with Section 3.3(c)4 of DER-10 and NYSDOH guidance for performing a qualitative exposure assessment (DER-10, Appendix 3B [NYSDEC 2010]).

The exposure assessment will:

- Describe the nature and size of the population currently exposed or which may reasonably be expected to be exposed to the contaminants that are present at or migrating from a site;
- Include a determination of the reasonably anticipated future land use of the site and affected off-site areas;
- Identify the reasonably anticipated future groundwater use;
- Characterize the exposure setting, identifying current and reasonably foreseeable exposure pathways;
- Evaluate contaminant fate and transport; and,
- Be developed in accordance with the DER-10 Appendix 3B, for human health exposure assessments.

The results of the qualitative exposure assessment will be provided in the final RI report. According to Section 3.10.1 of DER-10, and the “Fish and Wildlife Resources Impact Analysis Decision Key” in DER-10 Appendix 3C, a fish and wildlife exposure assessment is not needed for this Site.

¹¹ <https://www.nyserda.ny.gov/ny/Disadvantaged-Communities>

5 Reporting and Deliverables

Carson Voci and the Applicant will commence implementation of this RIWP following receipt of NYSDEC's written approval. Carson Voci will notify NYSDEC no less than 7 days in advance of RIWP implementation, unless NYSDEC provides written agreement to a shorter period. Carson Voci will also provide NYSDEC notice as to any change in the approved project schedule.

5.1 Daily Reports

Daily reports will be prepared and submitted to NYSDEC and NYSDOH for each day of RI field implementation. The reports will be submitted by the end of the following workday, reporting the activities conducted during the prior day's work, and will include:

- A summary of on-site work completed;
- Immediate notification to NYSDEC and NYSDOH (within 24 hours) of any CAMP exceedances and corrective actions taken;
- A summary of any community complaints with relevant details (i.e., name, phone numbers),
- A summary of CAMP findings, including any exceedances.
- Prompt communication to NYSDEC's project manager of any discovery of previously unknown contaminated media during RI activities; and
- Provision of a Site map to identify locations discussed in progress reports provided to NYSDEC.

5.2 Monthly Reports

Monthly reports will be submitted to NYSDEC and NYSDOH project managers during intrusive activities only. Monthly reports will be submitted by the 10th of the following month of the reporting period and will include:

- Activities relative to the Site during the previous reporting period and those anticipated for the next reporting period, including a quantitative presentation of work performed (i.e., tons of material exported and imported, etc.);
- Description of approved activity modifications, including changes to scope of work and/or schedule;
- Sampling results received following internal data review and validation, as applicable; and
- An update of the remedial schedule, including the percentage of project completion, unresolved delays encountered or anticipated that may affect the future schedule, and efforts made to mitigate such delays.

5.3 Remedial Investigation Report and Remedial Action Work Plan

A RIR will be prepared to summarize the results and findings of the completed RI, inclusive of any supplemental RIs, if necessary. The RIR will include all data developed during the RI, summarize the results of the RI, and outline the recommended remedial actions along with Site management procedures based on the findings of the RI. The RIR will also summarize the actions taken to implement the RIWP, include a detailed synopsis of all RIWP work performed, figures depicting the layout of the Site with sampling locations, figures presenting the analytical results and analyses performed, soil boring logs, monitoring well installation logs, tables presenting all laboratory data results, soil vapor screening level comparison, laboratory data packages, DUSRs, and sampling field forms.

Following completion of the RIR, a remedial action work plan will be prepared to provide conclusions and recommendations for the Site, address soil management and disposal procedures, and address installation of any necessary remedial technologies that will help mitigate any potential exposure to the community, workers, or future inhabitants of the building structure. The remedial action work plan may be submitted with the RIR.

6 Schedule

The estimated project schedule is presented in the table below and provided in a Gantt Chart format as Appendix I:

Estimated Project Schedule

Remedial Task	Estimated Implementation Timeframe
Submittal of Draft RIWP	May 26, 2026
NYSDEC and NYSDOH review of Draft RIWP	May – June 2026
Address NYSDEC/NYSDOH comments and submit Final, RIWP	July 30, 2026
Implementation of RIWP	August 24 to September 4, 2026
Submittal of Draft RIR	October 2026
NYSDEC and NYSDOH review of Draft RIR	November – December 2026
Address NYSDEC/NYSDOH comments and submit Final, RIR	January 2027
Prepare and Submit Draft RAWP	January - February 2027
RAWP Public Comment Period, Issuance of Decision Document	March –May 2027
RAWP Implementation	June – September 2027
Submittal of Final Engineering Report (FER)	November 2027
NYSDEC and NYSDOH review of Draft FER	November – December 2027
Address NYSDEC/NYSDOH comments and submit Final, FER	January 2028
Issuance of Certificate of Completion	March 2028

7 References

- BBG Assessments, LLC (BBG). 2022a. *Phase I Environmental Site Assessment, 280-284 Starr Street, Brooklyn, New York 11237*. June.
- . 2022b. *Limited Phase II Environmental Site Assessment, 280-284 Starr Street, Brooklyn, New York 11237*. July 19.
- Liberty Environmental (Liberty). 2024. *Phase II Environmental Site Assessment, 276-284 Starr Street, Brooklyn, NY 11237*. April 24.
- New York State Department of Environmental Conservation (NYSDEC). 2018. *NYSDEC Electronic Data Deliverable Manual*. November. <https://www.dec.ny.gov/chemical/62440.html>
- . 2023. *Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS)*. April. https://www.dec.ny.gov/docs/remediation_hudson_pdf/pfassampanaly.pdf.
- NYSDEC, Division of Water. 2023. "Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations." Technical and Operational Guidance Series (TOGS) Memorandum 1.1.1 in State Pollutant Discharge Elimination Standards Permit Program. February 2023 Addendum to the June 1998 Edition. https://www.dec.ny.gov/docs/water_pdf/togs111.pdf.
- NYSDEC, Division of Environmental Remediation (DER). 2010. *DER-10 / Technical Guidance for Site Investigation and Remediation (DER-10)*. May 3. <https://www.dec.ny.gov/regulations/67386.html>.
- . 2011. *DER-31 / Green Remediation*. January 20.
- New York State Department of Health (NYSDOH). 2006. *Guidance for Evaluating Soil Vapor Intrusion in the State of New York*. October 26; updated February 2024. https://www.health.ny.gov/environmental/investigations/soil_gas/svi_guidance/docs/svig_final2006_complete.pdf.
- United States Environmental Protection Agency (EPA). 2022. *Standard Operating Procedure for Low-Stress (Low Flow) / Minimal Drawdown Ground-Water Sample Collection*. <https://www.epa.gov/sites/default/files/2015-06/documents/finalsops1217.pdf>. November 22.

Tables

- 1 Soil Sampling Plan
- 2 Groundwater Sampling Plan
- 3 Sub-Slab Soil Vapor and Indoor Air Sampling Plan

Table 1
Soil Sampling Plan
Remedial Investigation Work Plan
276-284 Starr Street - NYSDEC BCP Site No. C224430
276-284 Starr Street, Brooklyn, New York

Area	Soil Boring	Soil Sample IDs	Total Depth (feet bgs)	Sample Depth (feet bgs)	TCL VOCs	TCL SVOCs ¹	TAL Metals ⁴	TCL PCBs	TCL Pest/Herb	PFAS	Sample Rationale
					EPA Method 8260	EPA Method 8270	EPA Method 6010	EPA Method 8082A	EPA Method 8081B/8151A	EPA Method 1633	
					<i>Terracores</i>	<i>1 - 8 oz. Glass Jar</i>				<i>1 - 8 oz. Glass Jar</i>	
Sidewalk (Off-site)	SB-01	SB-01-##-##	TBD ⁵	TBD ⁵	H	H	H	H	H	H	Sample may be collected if impacts are identified
	SB-02	SB-02-##-##	TBD ⁵	TBD ⁵	H	H	H	H	H	H	Sample may be collected if impacts are identified
Ground Floor	SB-03	SB-03-##-##	TBD ²	TBD ² within 0-2	X	X	X	X	X	X	Delineate nature and extent of potential impacts in soil
		SB-03-##-##		TBD ³ below 2	X	X	X	X	X	X	Delineate nature and extent of potential impacts in soil
	SB-04	SB-04-##-##	TBD ²	TBD ² within 0-2	X	X	X	X	X	X	Delineate nature and extent of potential impacts in soil
		SB-04-##-##		TBD ³ below 2	X	X	X	X	X	X	Delineate nature and extent of potential impacts in soil
	SB-05	SB-05-##-##	TBD ²	TBD ² within 0-2	X	X	X	X	X	X	Delineate nature and extent of potential impacts in soil
		SB-05-##-##		TBD ³ below 2	X	X	X	X	X	X	Delineate nature and extent of potential impacts in soil
	SB-06	SB-06-##-##	TBD ²	TBD ² within 0-2	X	X	X	X	X	X	Delineate nature and extent of potential impacts in soil
		SB-06-##-##		TBD ³ below 2	X	X	X	X	X	X	Delineate nature and extent of potential impacts in soil
	SB-07	SB-07-##-##	TBD ²	TBD ² within 0-2	X	X	X	X	X	X	Delineate nature and extent of potential impacts in soil
		SB-07-##-##		TBD ³ below 2	X	X	X	X	X	X	Delineate nature and extent of potential impacts in soil
	SB-08	SB-08-##-##	TBD ²	TBD ² within 0-2	X	X	X	X	X	X	Delineate nature and extent of potential impacts in soil
		SB-08-##-##		TBD ³ below 2	X	X	X	X	X	X	Delineate nature and extent of potential impacts in soil
	SB-09	SB-09-##-##	TBD ²	TBD ² within 0-2	X	X	X	X	X	X	Delineate nature and extent of potential impacts in soil
		SB-09-##-##		TBD ³ below 2	X	X	X	X	X	X	Delineate nature and extent of potential impacts in soil
	SB-10	SB-10-##-##	TBD ²	TBD ² within 0-2	X	X	X	X	X	X	Delineate nature and extent of potential impacts in soil
		SB-10-##-##		TBD ³ below 2	X	X	X	X	X	X	Delineate nature and extent of potential impacts in soil
Basement	SB-11	SB-11-##-##	TBD ²	TBD ² within 0-2	X	X	X	X	X	X	Delineate nature and extent of potential impacts in soil
		SB-11-##-##		TBD ³ below 2	X	X	X	X	X	X	Delineate nature and extent of potential impacts in soil
	SB-12	SB-12-##-##	TBD ²	TBD ² within 0-2	X	X	X	X	X	X	Delineate nature and extent of potential impacts in soil
		SB-12-##-##		TBD ³ below 2	X	X	X	X	X	X	Delineate nature and extent of potential impacts in soil
QAQC**	TBD	DUP-SO-01	TBD	TBD	X	X	X	X	X	X	Collected at a frequency of 1 per 20 samples
	TBD	MS/MSD	TBD	TBD	X	X	X	X	X	X	Collected at a frequency of 1 per 20 samples
	--	FB-SO-yymmdd	--	--	X	X	X	X	X	X	Collected once per day or 1 per 20 samples, whichever is more
Total No. of Samples					20	20	20	20	20	20	

Notes:

X = Sample to be collected for proposed analysis

H = Sample to be collected and held for proposed analysis

1. SVOCs analysis to include 1,4-Dioxane

2. Sample depth between 0 and 2 ft bgs to be determined based on PID readings and visual/olfactory observations.

3. Sample depth below 2 ft bgs to be determined based on PID readings and visual/olfactory observations. Additional sample(s) to be collected for vertical delineation if significant impacts are observed in sample collected based on field screening.

4. Metals analysis to include hexavalent and trivalent chromium and cyanide.

5. Soil borings will be advanced only for field screening. If impacts (PID readings and visual/olfactory observations) are identified, samples may be collected at the inferred soil/groundwater interface to be held at the lab.

* See QAPP for additional details on laboratory methods, sampling containers, and associated sampling requirements

** Quality Assurance and Quality Control samples to be collected in accordance with and at the frequency outlined the RIWP and QAPP

Acronyms

##-## = top and bottom in feet bgs of sample depth interval

bgs = below ground surface

EPA = United States Environmental Protection Agency

Herb = herbicides

PCBs = polychlorinated biphenyls

Pest = pesticides

PFAS = per- and polyfluoroalkyl substances

PID = photionization detector

SVOCs = semi-volatile organic compounds

TAL = target analyte list

TCL = target compound list

VOCs = volatile organic compounds

Table 2
Groundwater Sampling Plan
Remedial Investigation Work Plan
276-284 Starr Street - NYSDEC BCP Site No. C224430
276-284 Starr Street, Brooklyn, New York

Groundwater Well	Soil Sample IDs	TCL VOCs	TCL SVOCs ¹	TAL Metals (Total + Dissolved) ²	TCL PCBs	TCL Pest/Herb	PFAS	Sample Rationale
		EPA Method 8260	EPA Method 8270	EPA Method 6010B	EPA Method 8082A	EPA Method 8081B/8151A	EPA Method 1633	
MW-01	MW-01-yymmdd	X	X	X	X	X	X	Delineate nature and extent of potential impacts in groundwater
MW-02	MW-02-yymmdd	X	X	X	X	X	X	Delineate nature and extent of potential impacts in groundwater
MW-03	MW-03-yymmdd	X	X	X	X	X	X	Delineate nature and extent of potential impacts in groundwater
MW-04	MW-04-yymmdd	X	X	X	X	X	X	Delineate nature and extent of potential impacts in groundwater
MW-05	MW-05-yymmdd	X	X	X	X	X	X	Delineate nature and extent of potential impacts in groundwater
MW-06	MW-06-yymmdd	X	X	X	X	X	X	Delineate nature and extent of potential impacts in groundwater
QAQC	DUP-GW-01	X	X	X	X	X	X	Collected at a frequency of 1 per 20 samples
	MS/MSD	X	X	X	X	X	X	Collected at a frequency of 1 per 20 samples
	FB-GW-yymmdd	X	X	X	X	X	X	Collected once per day or 1 per 20 samples, whichever is more
	TB-yymmdd	X						Analyzed at a frequency of one per cooler containing aqueous samples for VOC analysis
Total No. of Samples		6	6	6	6	6	6	

Notes:

X = Sample to be collected for proposed analysis

1. SVOCs analysis to include 1,4-Dioxane

2. Metals analysis to include hexavalent and trivalent chromium and cyanide.

* See QAPP for additional details on laboratory methods, sampling containers, and associated sampling requirements

** Quality Assurance and Quality Control samples to be collected in accordance with the RIWP and QAPP

Acronyms

bgs = below ground surface
OCP = organochlorine pesticides including technical chlordane
Herb = herbicides
PCBs = polychlorinated biphenyls
Pest = pesticides
PFAS = per- and polyfluoroalkyl substances
SVOCs = semi-volatile organic compounds
TAL = target analyte list
TCL = target compound list
TPH-mo = total petroleum hydrocarbons as motor oil
VOCs = volatile organic compounds
yymmdd = year/month/day

Table 3**Sub-Slab Soil Vapor and Indoor Air Sampling Plan**

Remedial Investigation Work Plan

276-284 Starr Street - NYSDEC BCP Site No. C224430

276-284 Starr Street, Brooklyn, New York

Sub-Slab Soil Vapor/Indoor Air Sample Location	Soil Sample IDs	Sample Depth (feet)	EPA Air Method TO-15	Sample Rationale
SSSV-01	SSSV-01-yyymmdd	0.5 bgs	X	Delineate nature and extent of impacts in soil vapor
SSSV-02	SSSV-02-yyymmdd	0.5 bgs	X	Delineate nature and extent of impacts in soil vapor
SSSV-03	SSSV-03-yyymmdd	0.5 bgs	X	Delineate nature and extent of impacts in soil vapor
SSSV-04	SSSV-04-yyymmdd	0.5 bgs	X	Delineate nature and extent of impacts in soil vapor
SSSV-05	SSSV-05-yyymmdd	0.5 bgs	X	Delineate nature and extent of impacts in soil vapor
SSSV-06	SSSV-06-yyymmdd	0.5 bgs	X	Delineate nature and extent of impacts in soil vapor
IA-01	IA-01-yyymmdd	3-5 ags	X	Delineate nature and extent of impacts in indoor air
IA-02	IA-02-yyymmdd	3-5 ags	X	Delineate nature and extent of impacts in indoor air
IA-03	IA-03-yyymmdd	3-5 ags	X	Delineate nature and extent of impacts in indoor air
IA-04	IA-04-yyymmdd	3-5 ags	X	Delineate nature and extent of impacts in indoor air
IA-05	IA-05-yyymmdd	3-5 ags	X	Delineate nature and extent of impacts in indoor air
IA-06	IA-06-yyymmdd	3-5 ags	X	Delineate nature and extent of impacts in indoor air
OA-01	OA-01-yyymmdd	3-5 ags	X	Assess ambient/background conditions in outdoor air
TBD	DUP-SV-01	--	X	Collected at a frequency of 1 per 20 samples
Total No. of Samples			12	

Notes:

X = Sample to be collected for proposed analysis

* See QAPP for additional details on laboratory methods, sampling containers, and associated sampling requirements

** Quality Assurance and Quality Control samples (including outdoor air samples) to be collected in accordance with the RIWP and QAPP

Acronyms

ags = above ground surface

bgs = below ground surface

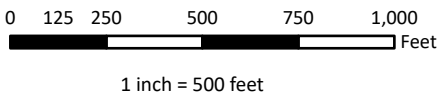
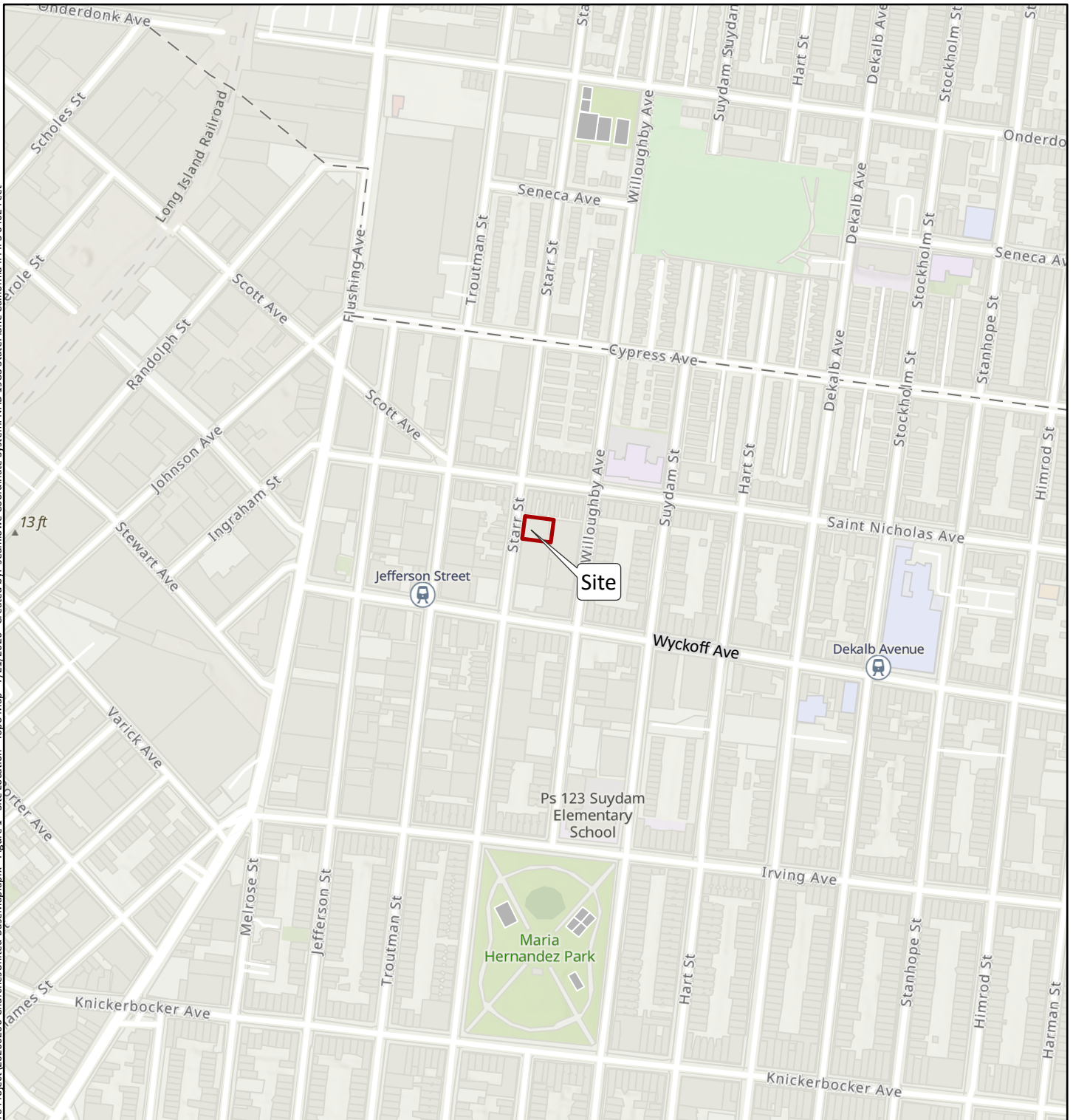
EPA = United States Environmental Protection Agency

TO-15 = toxic organics 15

Figures

- 1 Site Location – Topo Map
- 2 Site Location – Tax Map
- 3 Surrounding Land Use
- 4 Sensitive Receptors
- 5 Surrounding Wetlands
- 6 Limited Phase II ESA Soil Vapor and Indoor Air Sampling Results
- 7 Site Layout and Areas of Concern
- 8 Proposed Remedial Investigation Sample Locations – Ground Floor
- 9 Proposed Remedial Investigation Sample Locations – Basement

File: Z:\Projects\CV05 - Churches United for Fair Housing\001\Pro Project\20260206.ChurchesUnited-BaseMap.aprx - Figure 1 - Site Location - Topo Map - 7/21/2026 Created by: sean.love Coordinate System: NAD 1983 StatePlane California II FIPS 0402 Feet



Legend

 Site Boundary

Base Map: ESRI World Topographic Map
(data providers include HERE, Garmin, USGS, et al.)

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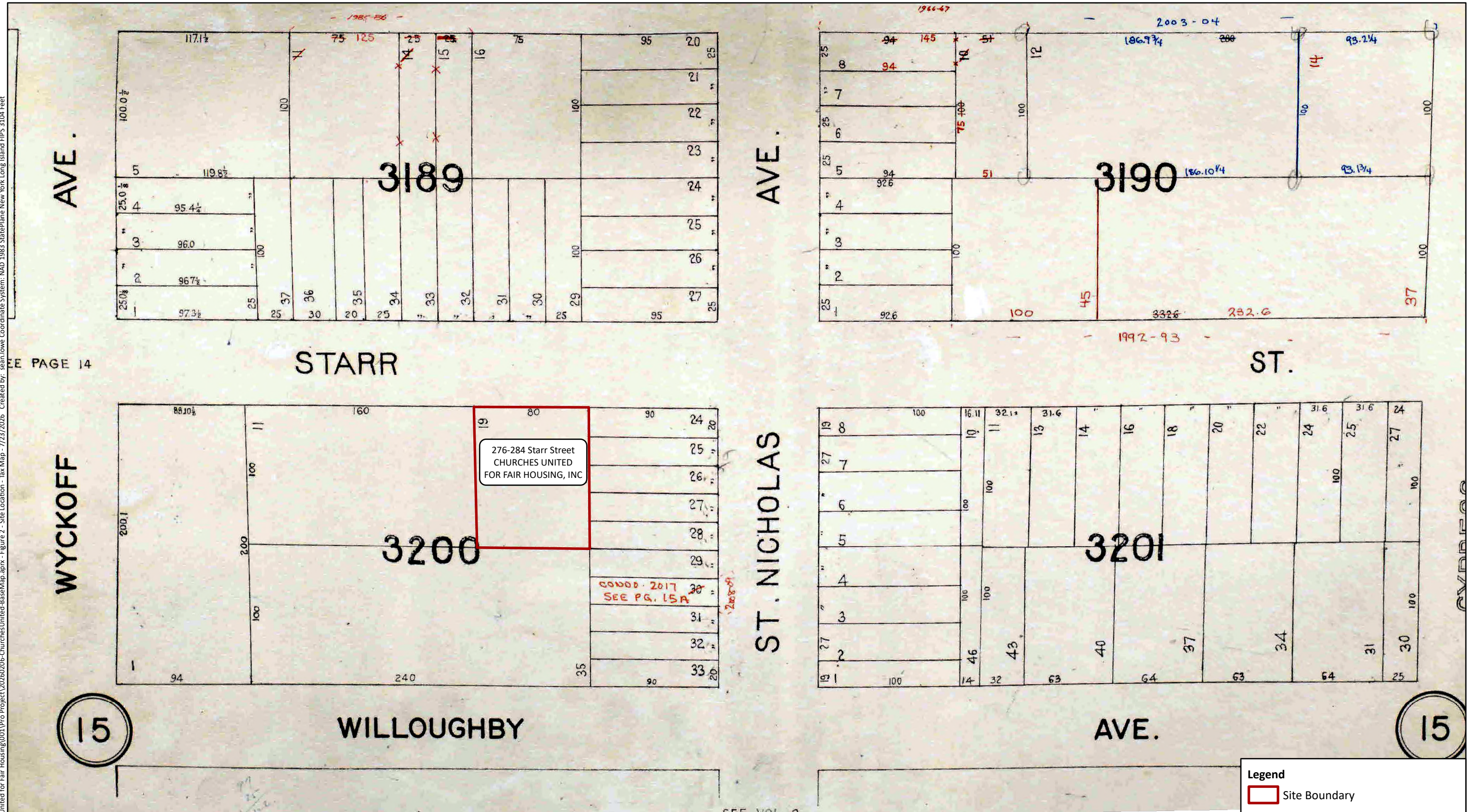
PROJECT: 276-284 Starr Street
Brooklyn, NY 11237

PROJECT NUMBER: CV05.001.0001

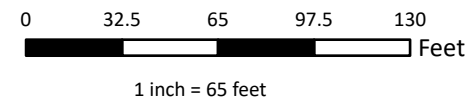
Site Location - Topo Map

FIGURE 1

File: Z:\Projects\CV05 - Churches United for Fair Housing\001\Pro Project\20260206-ChurchesUnited-BaseMap.aprx - Figure 2 - Site Location Tax Map - 7/23/2026 Created by: sean.lowe Coordinate System: NAD 1983 StatePlane New York Long Island FIPS 3104 Feet



Tax map source: New York City Tax Map, Borough 3, Book 27, Section 11,
Volume 2, Page 241, 01/01/2008



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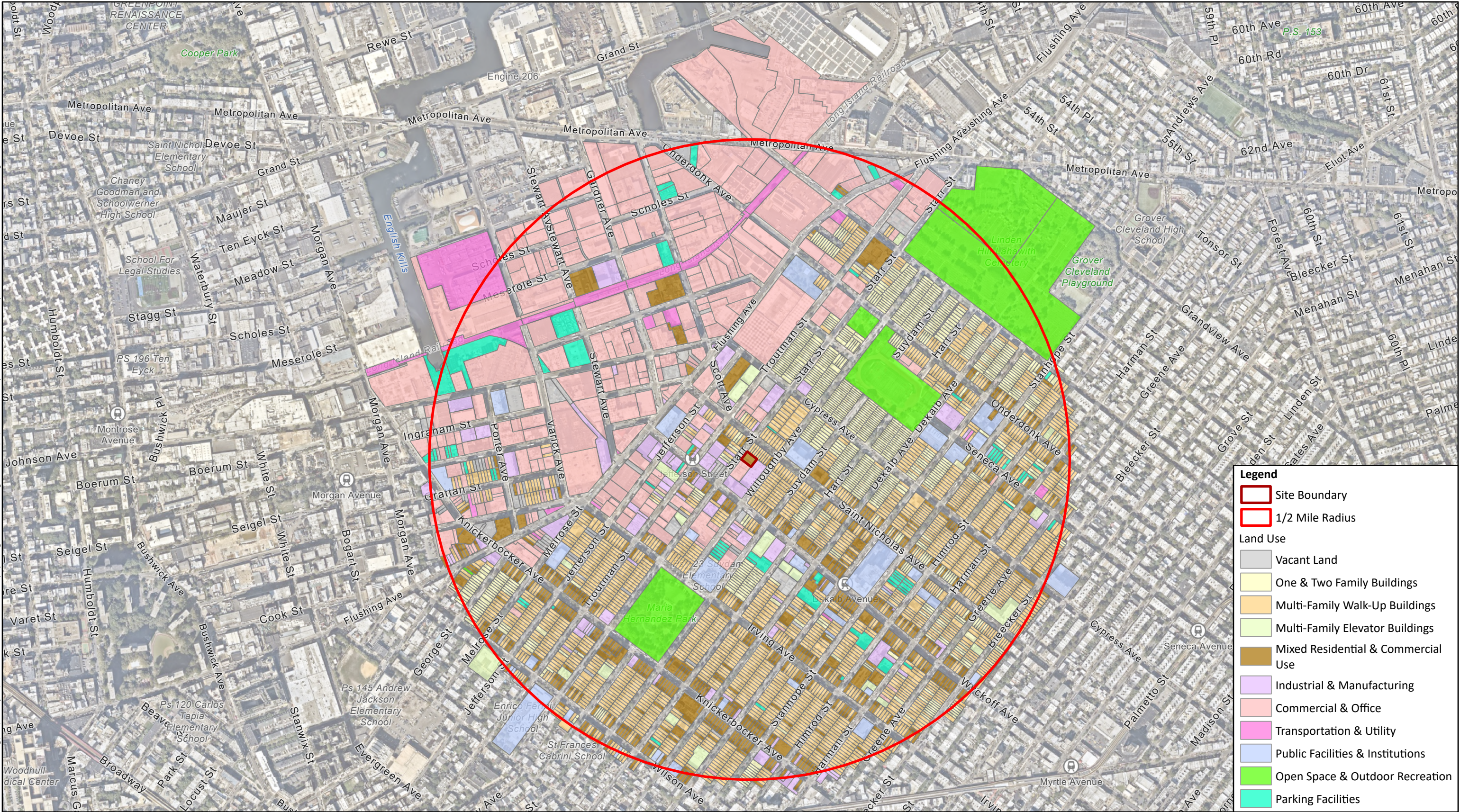
PROJECT: 276-284 Starr Street
Brooklyn, NY 11237

PROJECT NUMBER: CV05.001.001

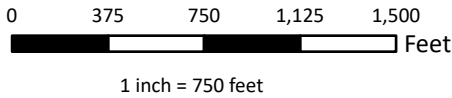
Site Location - Tax Map

FIGURE 2

File: Z:\Projects\CV05 - Churches United for Fair Housing\001\Pro Project\20260206-ChurchesUnited-BaseMap.aprx - Figure 3 - Surrounding Land Use - 7/21/2026 Created by: sean.love Coordinate System: NAD 1983 StatePlane New York Long Island FIPS 3104 Feet



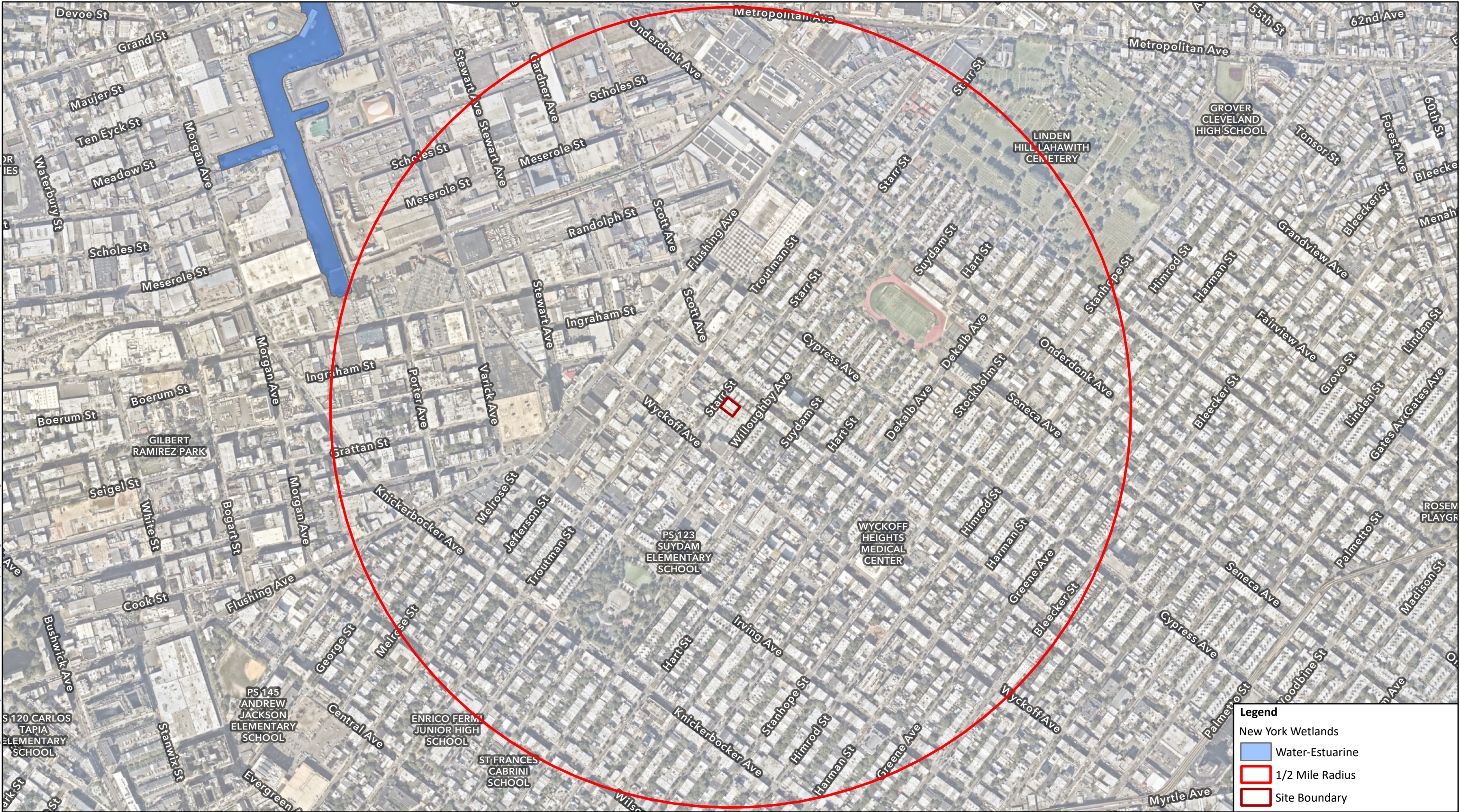
Aerial imagery source: Nearmap (October 1, 2025)



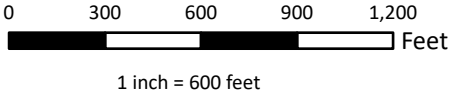
SAFETY FIRST carsonvoci engineering and geology dpc an affiliate of Terraphase Engineering Inc.	CLIENT: Churches United for Fair Housing	Surrounding Land Use
	PROJECT: 276-284 Starr Street Brooklyn, NY 11237	
	PROJECT NUMBER: CV05.001.001	

FIGURE 3

File: Z:\Projects\CV05 - Churches United for Fair Housing\001\Pro Project\20260206-ChurchesUnited-BaseMap.aprx - Figure 5 - Surrounding Wetlands - 7/21/2026 Created by: sean.love Coordinate System: NAD 1983 StatePlane New York Long Island FIPS 3104 Feet

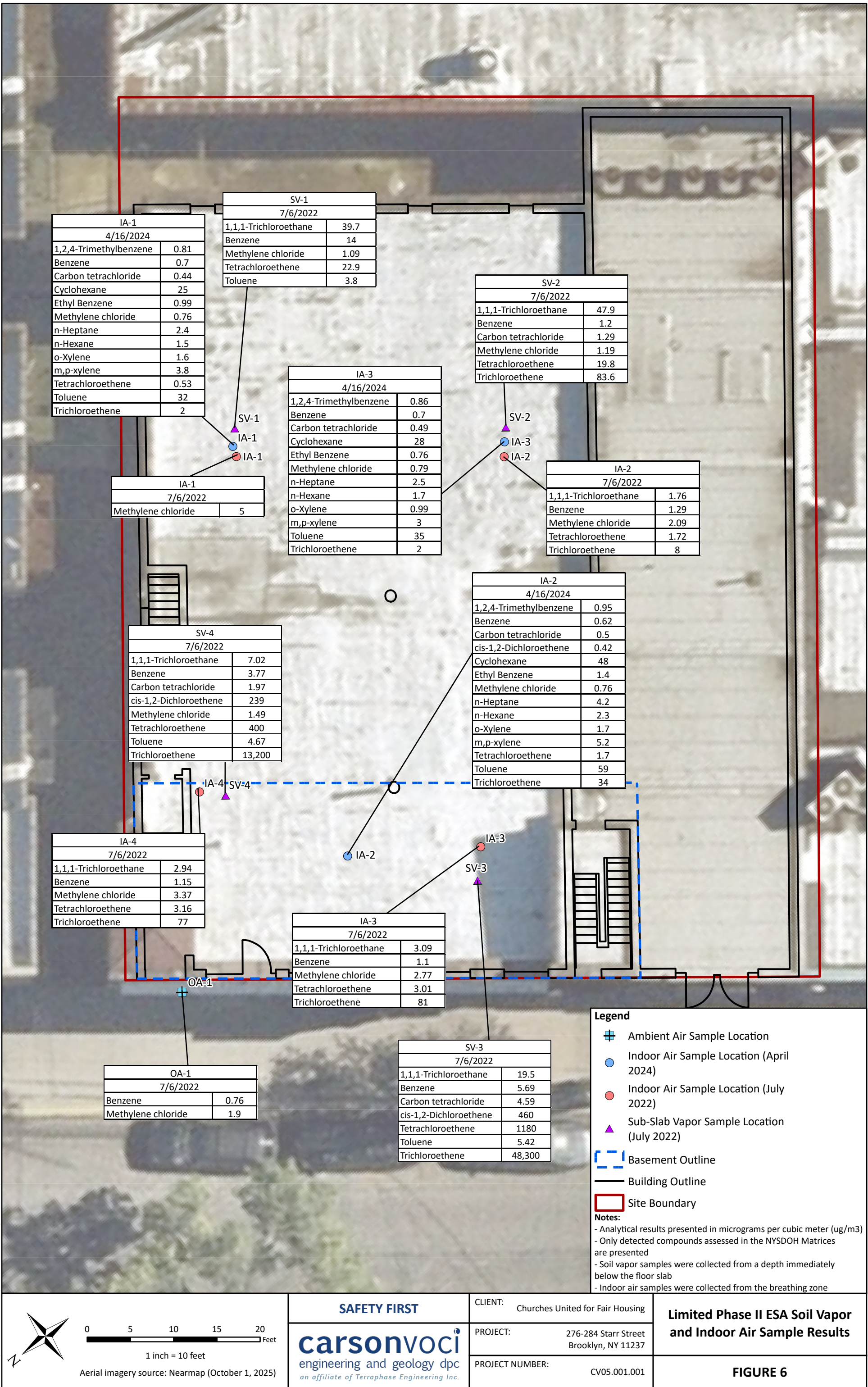


Aerial imagery source: Nearmap (October 1, 2025)

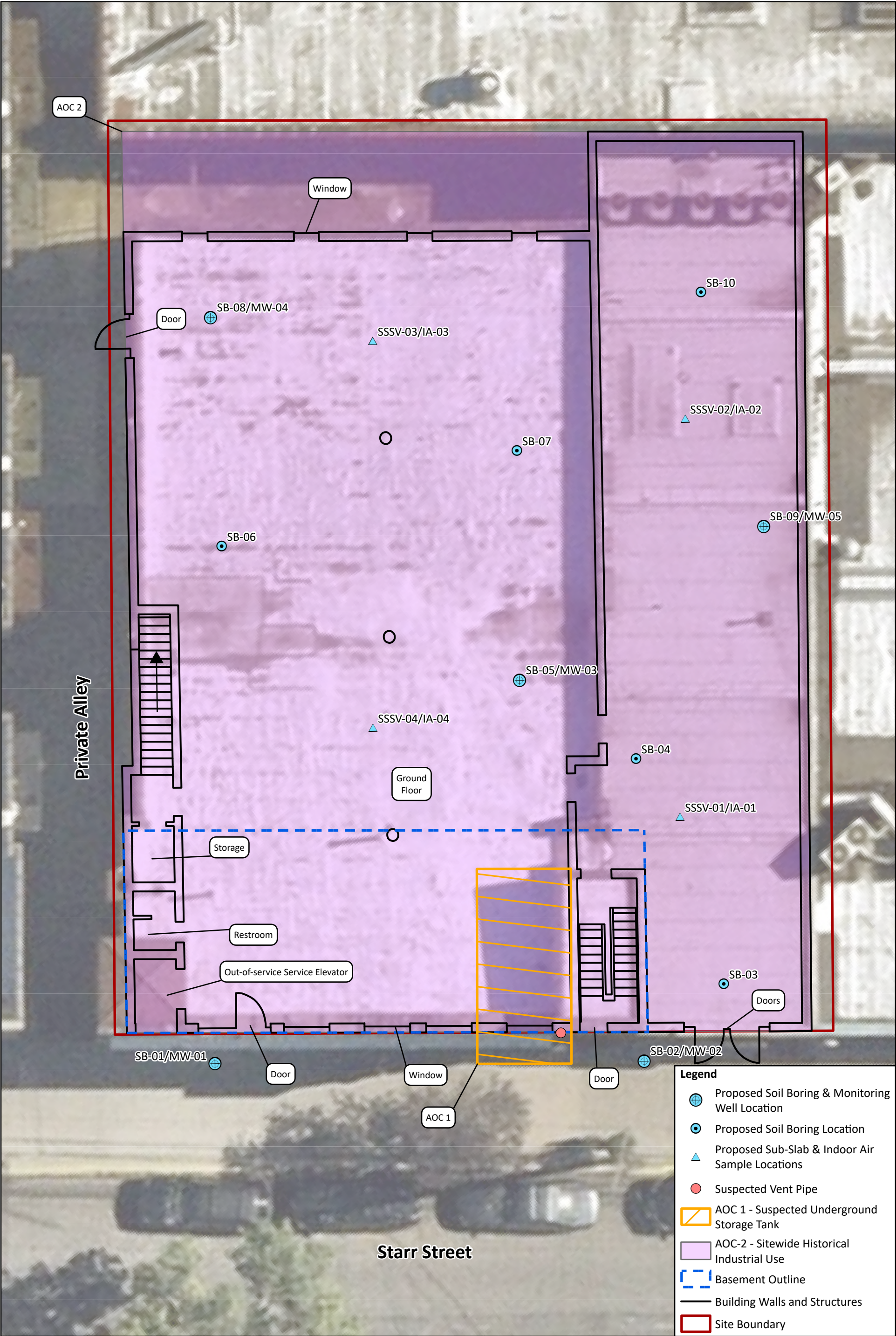


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	PROJECT: 276-284 Starr Street Brooklyn, NY 11237	
	PROJECT NUMBER: CV05.001.001	FIGURE 5

File: Z:\Projects\CV05 - Churches United for Fair Housing\001\Pro Project\20260206-ChurchesUnited-BaseMap.aprx - Figure 6 - Limited Phase II ESA Soil Vapor and Indoor Air Sample Results - 7/22/2026 Created by: sean.love Coordinate System: NAD 1983 StatePlane New York Long Island FIPS 3104 Feet

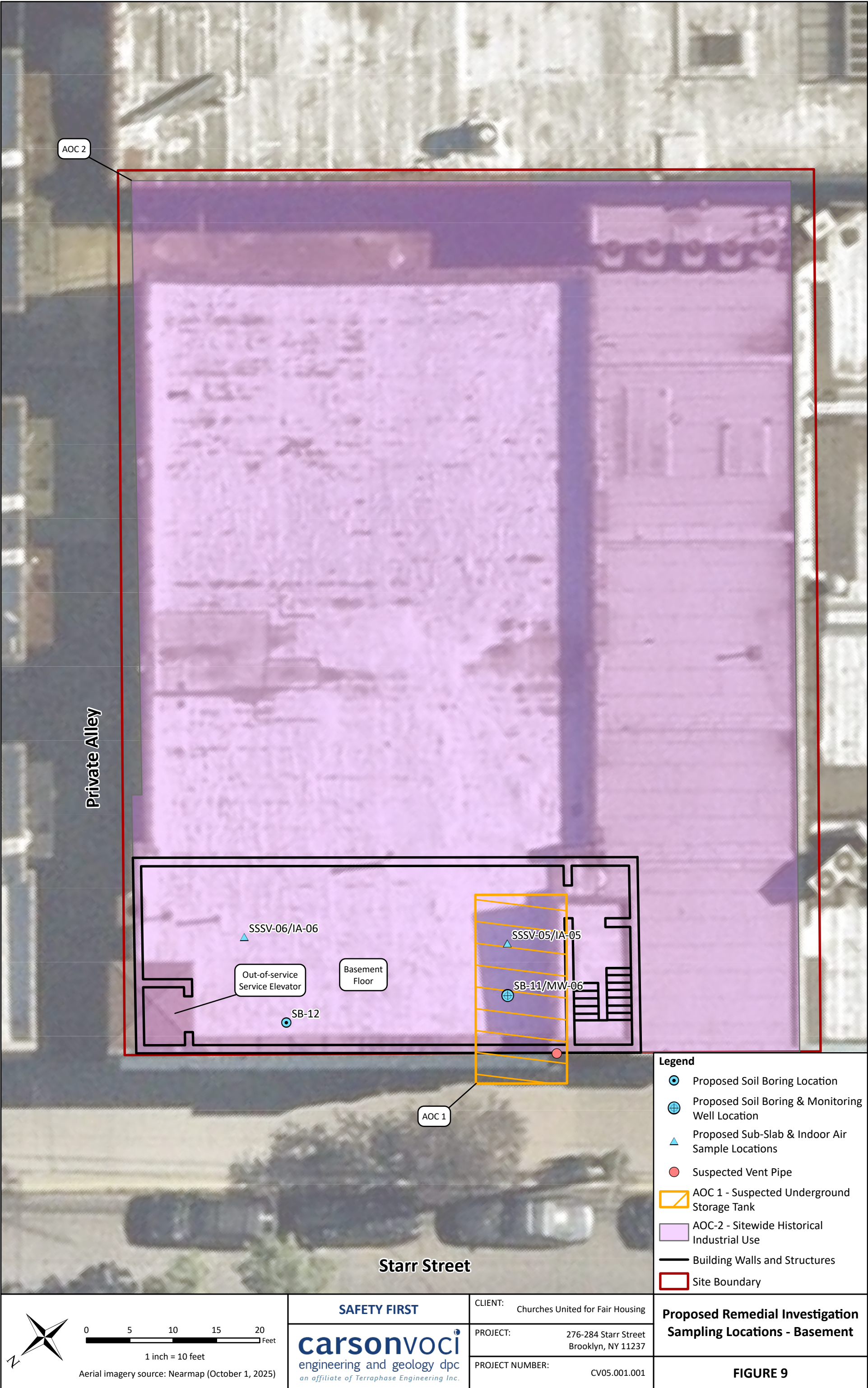


File: Z:\Projects\CV05 - Churches United for Fair Housing\001\Pro Project\20260206-ChurchesUnited-BaseMap.aprx - Figure 8 - Proposed Remedial Investigation Sampling Locations - Ground Floor - 7/30/2026 Created by: sean.lowe Coordinate System: NAD 1983 StatePlane New York Long Island FIPS 3104 Feet



 0 5 10 15 20 Feet 1 inch = 10 feet Aerial imagery source: Nearmap (October 1, 2025)	SAFETY FIRST carsonvoci engineering and geology dpc an affiliate of Terraphase Engineering Inc.	CLIENT: Churches United for Fair Housing	Proposed Remedial Investigation Sampling Locations - Ground Floor
		PROJECT: 276-284 Starr Street Brooklyn, NY 11237	
		PROJECT NUMBER: CV05.001.001	FIGURE 8

File: Z:\Projects\CV05 - Churches United for Fair Housing\001\Pro Project\20260206-ChurchesUnited-BaseMap.aprx - Figure 9 - Proposed Remedial Investigation Sampling Locations - Basement - 7/30/2026 Created by: sean.iowe Coordinate System: NAD 1983 StatePlane New York Long Island FIPS 3104 Feet



Appendix A

Previous Environmental Investigation Reports



The insight you need. The independence you trust.

LIMITED PHASE II ESA REPORT

280-284 Starr Street

280-284 Starr Street
Brooklyn, New York 11237
BBG Project No.: 0522008490

Prepared For

Churches United for Fair Housing
7 Marcus Garvey Boulevard
New York, New York 11206

Report Date

July 19, 2022

Prepared By

BBG Assessments, LLC
Locations Nationwide

BBG Main Contact

Paul Stellato
pstellato@bbgres.com

July 19, 2022

Churches United for Fair Housing
c/o Mr. Rob Solano
280-284 Starr Street
Brooklyn, New York 11237

RE Phase II Environmental Site Assessment of
280-284 Starr Street
280-284 Starr Street
Brooklyn, New York 11237
BBG Project No.: 0522008490

Dear Mr. Solano:

BBG Assessments, LLC (BBG) has completed a Phase II Limited Environmental Site Assessment of the above referenced property. The work was conducted in accordance with BBG's letter of engagement and generally accepted industry standards. This report was prepared solely for the use of Churches United for Fair Housing (hereinafter "Client") and any party specifically referenced in Section 1.4 User Reliance. No other party shall use or rely on this report or the findings herein, without the prior written consent of BBG.

Sincerely,

BBG ASSESSMENTS, LLC

Prepared By:



Matthew Smelski
Project Manager

Reviewed By:



Paul Stellato
Managing Director

TABLE OF CONTENTS

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Appendix 2	Photographs
Appendix 3	Analytical Report

1.0 INTRODUCTION

In accordance with our Proposal dated June 17, 2022 BBG is pleased to submit our Limited Phase II Environmental Site Assessment Report of the property located at 280-284 Starr Street, Brooklyn, New York 11237, herein referred to as the "Property."

1.1 Background and Purpose

Property Name:	280-284 Starr Street
Property Address:	280-284 Starr Street
City, State Zip Code:	Brooklyn, NY 11237

BBG's June 10, 2022 Phase I Environmental Site Assessment (ESA) identified the following Recognized Environmental Conditions (RECs) in connection with the Property.

- The Subject Property was undeveloped land until 1920, when it was developed with the current building for light manufacturing purposes. In 1933 the building was occupied by a company that manufactured store fixtures. Between 1937 and 1965 it was occupied by a machine shop of the Queens Machine Corporation. Between 1970 and 2008 the building was occupied by garment companies, such as Quarex Knitting Mills (1970-1973) and PJ Knitting Mills Inc. (1985-2008). It is safe to assume that petroleum products such as lubricant oils, and hazardous substances such as solvents and degreasers were used at the onsite machine shop. Since these activities preceded current environmental regulations, unreported or unnoticed spills and leaks may have occurred, adversely impacting soil or groundwater quality at the Subject Property.
- A vent pipe was observed attached to the Subject Property façade. No evidence of ASTs or USTs were observed at the Subject Property. However, the basement was cluttered with merchandise, discarded cardboard boxes, and other materials that impeded visual observation. Given the age of the building, and its historical manufacturing use; it is reasonable to assume that an AST or a UST was located at the Subject Property. The presence of this vent pipe, that could be connected to an out-of-use storage tank, and is considered a REC.

The purpose of this investigation was to determine if elevated concentrations of volatile organic compounds (VOCs) may be present in soil vapor underlying the Property building and ambient indoor air within the Property building. A Property Topographic Map and Property Diagrams are included in Appendix 1. Photographs of the Property are provided in Appendix 2.

1.2 Limitations and Exceptions

- The scope of work completed was designed solely to meet the needs of BBG's Client. BBG shall not be liable for any unintended usage of this report by another party.
- No subsurface investigation can wholly eliminate uncertainty regarding the presence of contamination on a property. This assessment was designed to reduce, but not eliminate the potential for environmental concerns at the Property, within reasonable limits of time and cost. The Limited Phase II ESA is not intended to be exhaustive or all-inclusive and does not represent a guarantee of the identification of all possible environmental risk.
- Client is advised that if the Limited Phase II ESA is obtained with the intent of qualifying the purchaser as an innocent landowner, contiguous property owner, or bona fide prospective purchaser under CERCLA, there will be continuing obligations of due care and responsiveness and additional legal requirements that likely apply to such status. BBG accepts and undertakes no responsibility as to such requirements and advises that counsel be separately consulted with respect to such requirements.

1.3 Special Terms and Conditions

There are no special terms and conditions associated with this Limited Phase II ESA.

1.4 Reliance

This investigation was conducted on behalf of and for the exclusive use of Churches United for Fair Housing (Client). This report, and the findings contained herein, shall not, in whole or part, be disseminated or conveyed to or used by any other party without the prior written consent of BBG. Any unauthorized party using or relying upon the Report shall be liable to BBG for equitable compensation and appropriate punitive damages and shall be responsible to reimburse BBG for and indemnify, defend and hold BBG harmless from and against any and all costs, claims, liabilities, expenses, lost profits and damages arising as a direct or indirect result of such unauthorized use or reliance.

2.0 PHASE II ACTIVITIES

2.1 Preliminary Activities

Utility Clearance

A utility inspection was performed at the Property at least 72 hours prior to the initiation of the subsurface assessment. This inspection consisted of marking the underground utility locations by authorized utility locating personnel. Prior to commencement of the drilling activities, BBG retained GPRS, Inc. to perform a geophysical survey consisting of a combination of electromagnetic (EM) and ground-penetrating (GPR) technologies. The purpose of the survey was to verify utility locations and attempt to locate a potential UST in the sidewalk area. The GPR survey did not identify any USTs near the sidewalk area, nor on the Property, but it did verify that the vent pipe identified in BBG's Phase I ESA lead into the subsurface of the basement. The basement was unable to be scanned with the GPR or fully inspected due to a large collection of debris. As such, the terminus of the suspect vent pipe was unable to be determined.

2.2 Assessment and Sampling Methods

Sub-Slab Soil Gas Sampling

On July 6, 2022, BBG conducted a limited subsurface investigation to investigate potential impacts from the historical manufacturing operations on-Site. BBG collected four sub-slab soil gas sampling (SSGS) points from beneath the basement floor and first floor level for laboratory analysis, denoted as SV1 through SV4. The location of each sample collected is provided in Appendix 1.

BBG utilized a hammer drill tipped with a 16-inch-long masonry drill bit to create the subsurface soil vapor sampling points. Six-liter Summa canisters were used to collect the soil vapor samples. Through each of the drilled holes, BBG inserted a 0.625-inch diameter (two-inch long) stainless steel screen point connected to Teflon tubing to the desired sampling depths. Filter sand was then placed around the void spaces. A hydrated bentonite clay seal was then placed around the annular space surrounding the tubing to create an airtight seal to prevent the intrusion of ambient air during sampling.

BBG performed a leak check at each soil gas sampling point. In order to perform the leak check, BBG placed a shroud on top of each summa canister and saturated the shroud with helium gas. The helium percentage within the shroud was measured using a hand-held helium detector. Subsequently, each soil vapor sampling point was purged to fill a 1-liter Tedlar bag. The air

within the bag was then screened with the helium detector to ensure less than 10 percent of the helium measured in the shroud was present. The results of each leak test indicated that all sampling points were properly sealed at the ground surface. Following purging and the leak-check, soil vapor was collected over a one-hour period into a six-liter Summa canister at each sampling point (each summa canister was each equipped with a flow regulator set for a one-hour sampling period). The bottom depth of the soil vapor sampling points was approximately three inches below the concrete surfacing in the floor levels.

All sub-slab soil gas was collected in accordance with the New York State Department of Health (NYSDOH) Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York, October 2006 (the “Final Guidance”), revised May 2017.

Indoor/Ambient Air Sampling

Indoor air samples were collected in the vicinity of the corresponding SSGS samples, and an ambient outdoor air sample was also collected for background comparison purposes. The indoor air samples collected are denoted as IA1 through IA4, and OA1, respectively. All indoor air and outdoor air samples were collected using six-liter summa canisters equipped with regulators set for an eight-hour sampling period. No exterior doors were opened at the basement level during the course of the indoor air sampling period.

Following collection, all soil gas and indoor air samples were submitted to Pace Analytical National Lab in Mount Juliet, Tennessee under standard chain-of-custody protocol for analysis of specified list of select solvent VOCs in accordance with the New York State Department of Health (NYSDOH) Air Matrix. The specified list included the following: tetrachloroethene (PCE), trichloroethene (TCE), cis-1,2-dichloroethene (c12-DCE), 1,1-dichloroethene (11-DCE), carbon tetrachloride, 1,1,1-trichloroethane (111-TCA), methylene chloride, and vinyl chloride, as well as benzene, toluene, ethylbenzene, and xylenes (BTEX) by EPA Method TO-15.

2.3 Analytical Results

The NYSDOH Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York updated May 2017 does not currently have standards, criteria, or guidance values for concentrations of compounds in soil vapor as potential sources of indoor air impact. The NYSDOH uses decision matrices for TCE, PCE, c12-DCE, 11-DCE, carbon tetrachloride, 111-TCA, methylene chloride, and vinyl chloride, which compare sub-slab vapor concentrations to indoor air concentrations. There are three NYSDOH matrices, Matrix A, Matrix B and Matrix C that are used to determine the next step in the assessment/remediation process; ranging from “no further action” to “mitigate”, depending on the soil vapor and indoor air VOC concentrations being assessed. Each matrix addresses particular VOCs as follows:

- Matrix A – TCE, c12-DCE, 11-DCE and carbon tetrachloride
- Matrix B – PCE, 111-TCA and methylene chloride
- Matrix C – Vinyl chloride

The proper use of the NYSDOH matrices requires the collection of both sub-slab soil vapor and indoor air samples as part of the decision-making process. The matrices use established sub-slab soil vapor and indoor air concentrations to determine the next step. It should be noted that for each matrix, if the sub-slab soil vapor sample results exceed the maximum established value (60 ug/m³ for Matrices A and C, and 100 ug/m³ for Matrix B), then the default requirement is “mitigate.”

In addition, the remaining VOCs analyzed in the soil vapor and indoor air samples were also compared to the United States Environmental Protection Agency (USEPA). Specifically, the soil vapor samples were compared to the USEPA Residential Vapor Intrusion Screening Levels (VISLs) for Target Sub-Slab & Near-Source Soil Gas Concentrations for residential scenarios (most conservative values). A copy of the laboratory analytical report is provided in Appendix 3.

Sub-slab Soil Gas Results

The laboratory analytical data for the sub-slab soil gas samples collected from the Property is provided in Table 1:

Table 1: VOCs Detected in the Sub-Slab Soil Gas Samples

Sample ID Sample Date	SV-1 7/6/2022	SV-2 7/6/2022	SV-3 7/6/2022	SV-4 7/6/2022	Final Guidance Mitigation Level
Matrix A					
Carbon tetrachloride	ND	1.29	4.59	1.97	60
cis-1,2-Dichloroethene (DCE)	ND	ND	460	239	60
1,1-Dichloroethene (11-DCE)	ND	ND	ND	ND	60
Trichloroethene (TCE)	ND	83.6	48300	13200	60
Matrix B					
Methylene Chloride	1.09	1.19	ND	1.49	1,000
Tetrachloroethene (PCE)	22.9	19.8	1180	400	1,000
1,1,1-Trichloroethane (111-TCA)	39.7	47.9	19.5	7.02	1,000
Matrix C					
Vinyl chloride	ND	ND	ND	ND	60
Other VOCs					EPA VISL Residential
Benzene	14.0	1.20	5.69	3.77	12.0

1. All concentrations are expressed in micrograms per cubic meter (ug/m³).
2. ND - Parameter non-detected, below method detection limits.
3. Any result in bold exceeds Final Guidance recommendation to “mitigate.”

As shown, six select VOCs were detected in SSGS samples collected from the Property, including DCE, PCE, TCE, 111-TCA, methylene chloride, and carbon tetrachloride. Of these, DCE, PCE, and

TCE were reported at concentrations that exceed their respective Final Guidance default values whereby “mitigate” is recommended regardless of the presence or absence of DCE, PCE, and TCE in indoor air. PCE was detected in SSGS sample SV-3 at a concentration of 1,180 µg/m³, while DCE was reported at 239 to 460 µg/m³ within samples SV-3 & SV-4, and TCE was reported between 83.6 and 48300.0 µg/m³ in samples SV-2 through SV-4. Therefore, NYSDOH Matrix conclusion and default recommendation is to “mitigate.” No other VOCs targeted by this study were identified to exceed Final Guidance Mitigation Levels in any of the SSGS samples collected. Finally, benzene was detected in each SSGS sample collected, and exceeded its EPA Residential VISL in the sample collected from SV-1.

Indoor Air Results

The laboratory analytical data for the indoor air samples collected from the Property is provided in Table 2. Table 2 also includes analytical data for OA1 (outdoor air sample).

Table 2: VOCs Detected in the Indoor and Ambient Air Samples

Sample ID Sample Date	IA1 7/6/22	IA2 7/6/22	IA3 7/6/22	IA4 7/6/22	OA1 4/14/22	Final Guidance Mitigation Level
Matrix A						
Carbon tetrachloride	ND	ND	ND	ND	ND	1.0
cis-1,2-Dichloroethene (DCE)	ND	ND	ND	ND	ND	1.0
1,1-Dichloroethene (11-DCE)	ND	ND	ND	ND	ND	1.0
Trichloroethene (TCE)	ND	7.88	81.4	76.6	ND	1.0
Matrix B						
Methylene Chloride	5.00	2.09	2.77	3.37	1.90	10
Tetrachloroethene (PCE)	ND	1.72	3.01	3.16	ND	10
1,1,1-Trichloroethane (111-TCA)	ND	1.76	3.09	2.94	ND	10
Matrix C						
Vinyl chloride	ND	ND	ND	ND	ND	0.2
Other VOCs						EPA VISL Residential
Benzene	ND	1.29	1.10	1.15	0.760	0.36

1. All results are expressed in micrograms per cubic meter of air (µg/m³).
2. ND - Parameter non-detected, below method detection limits.
3. Any result in bold exceeds Final Guidance default recommendation to “mitigate.”

Based on the indoor air analytical results, PCE, TCE, 111-TCA, and methylene chloride were detected in the indoor air samples collected. TCE was the only VOC reported in the indoor air samples exceeding its respective Final Guidance Mitigation value for TCE of 1.0 µg/m³, with concentrations ranging from 7.88 to 81.4 µg/m³. TCE was also reported in each of the SSGS samples at concentrations that indicate mitigation is required, regardless of indoor air concentrations and/or when indoor air concentrations are below 3 µg/m³. Therefore, NYSDOH Matrix conclusion and recommendation is to “mitigate.” The outdoor air sample, denoted as OA1, detected methylene chloride; however, the reported concentration was below Final Guidance levels.

Finally, benzene was detected in each indoor air sample collected, including the ambient air sample. If you deduct the ambient air concentration from the indoor air results, the indoor air samples collected from IA2 and IA4 report benzene at a concentration exceeding its VISL.

3.0 FINDINGS, OPINIONS AND CONCLUSIONS

BBG conducted a Limited Phase II ESA at 280-284 Starr Street, Brooklyn, New York 11237 on July 6, 2022, and the findings, opinions and conclusions are summarized below:

- BBG directed a GPR survey at the Property to verify utility locations and attempt to locate a potential UST in the sidewalk area. The GPR survey did not identify any USTs near the sidewalk area, nor on the Property, but it did verify that the vent pipe identified in BBG's Phase I ESA lead into the subsurface of the basement. The basement was unable to be scanned with the GPR or fully inspected due to a large collection of debris. As such, the terminus of the suspect vent pipe was unable to be determined.
- Four sub-slab soil gas samples and four indoor air samples were collected from within the Property building (and one outdoor ambient air sample was collected for control) to screen the Property for evidence of a release from the former manufacturing operations on-Site. All samples were analyzed for a select list of VOCs as per the NYSDOH Matrix guidance: PCE, TCE, DCE, 11-DCE, carbon tetrachloride, 111-TCA, methylene chloride, and vinyl chloride, and BTEX by EPA Method TO-15.
- Laboratory analysis identified six select VOCs in SSGS samples collected from the Property, including DCE, PCE, TCE, 111-TCA, methylene chloride, and carbon tetrachloride. Of these, DCE, PCE, and TCE were reported at concentrations that exceed their respective Final Guidance default values whereby "mitigate" is recommended regardless of the presence or absence of DCE, PCE, and TCE in indoor air. Therefore, NYSDOH Matrix conclusion and default recommendation is to "mitigate." No other VOCs targeted by this study were identified to exceed Final Guidance Mitigation Levels in any of the SSGS samples collected.
- Laboratory analysis results of indoor air samples collected from the Property detected PCE, TCE, 111-TCA, and methylene chloride. TCE was the only VOC reported in the indoor air samples at concentrations ranging from 7.88 to 81.4 µg/m³, exceeding the respective Final Guidance Mitigation value for TCE of 1.0 µg/m³. TCE was also reported in each of the SSGS samples at concentrations that indicate mitigation is required, regardless of indoor air concentrations and/or when indoor air concentrations are below 3 µg/m³. Therefore, NYSDOH Matrix conclusion and recommendation is to "mitigate." The outdoor air sample detected methylene chloride; however, the reported concentration was below its Final Guidance Mitigation Levels.

Finally, benzene was detected in each indoor air sample collected, including the ambient air sample. If you deduct the ambient air concentration from the indoor air results, the indoor air samples collected from IA2 and IA4 report benzene at a concentration exceeding its VISL

This investigation identified DCE, PCE, and TCE at the Property at concentrations exceeding their NYSDOH Matrix guidelines in several of the SSGS samples, while also identifying TCE in exceedance of its NYSDOH Matrix guidelines in three of the indoor air samples. Furthermore, the concentrations of DCE, PCE, and TCE reported in the SSGS samples exceed their respective Final Guidance default values, whereby “mitigate” is recommended regardless of the presence or absence of their exceedances in indoor air. Finally, benzene was also detected at concentrations exceeding its VISL in two indoor air samples and one sub-slab sample.

BBG’s conclusions are based on the results of the Limited Phase II ESA performed at 280-284 Starr Street, Brooklyn, New York 11237. This investigation was intended to solely assess the RECs identified in the ESA and is not intended to satisfy the level of inquiry that may be necessary to support remedial solutions or determine migration pathways related to a contaminant release.

4.0 RECOMMENDATIONS

Based on the results of this Limited Phase II ESA, it appears that the former on-site operations have impacted the Property. Soil vapor and indoor air samples detected VOC compounds indicative of a release. Specifically, the chlorinated solvents, DCE, PCE, TCE, 111-TCA, methylene chloride, carbon tetrachloride, and benzene were detected. Of the VOCs detected, DCE, PCE, TCE, and benzene were reported at concentrations exceeding their respective regulatory health risk-based screening levels established by the NYSDOH or EPA VISLs in the soil gas and indoor air samples collected from the Property. Therefore, it appears that a vapor intrusion condition exists, which is likely associated with the historical manufacturing activities. The concentrations of DCE, PCE, and TCE reported in the soil gas samples also exceed the respective Final Guidance default values, whereby “mitigate” is recommended regardless of their presence or absence in indoor air. As such, BBG recommends that a Vapor Mitigation Specialist be retained, and proper vapor mitigation be implemented at the Property.

In addition, the GPR survey did not identify any USTs near the sidewalk area, nor on the Property, but it did verify that the vent pipe identified in BBG’s Phase I ESA lead into the subsurface of the basement. The basement was unable to be scanned with the GPR or fully inspected due to a large collection of debris. As such, the terminus of the suspect vent pipe was unable to be determined. BBG recommends that the basement debris be completely cleared to allow a further GPR assessment of that area to determine the terminus of the vent pipe.

APPENDIX 1

FIGURES

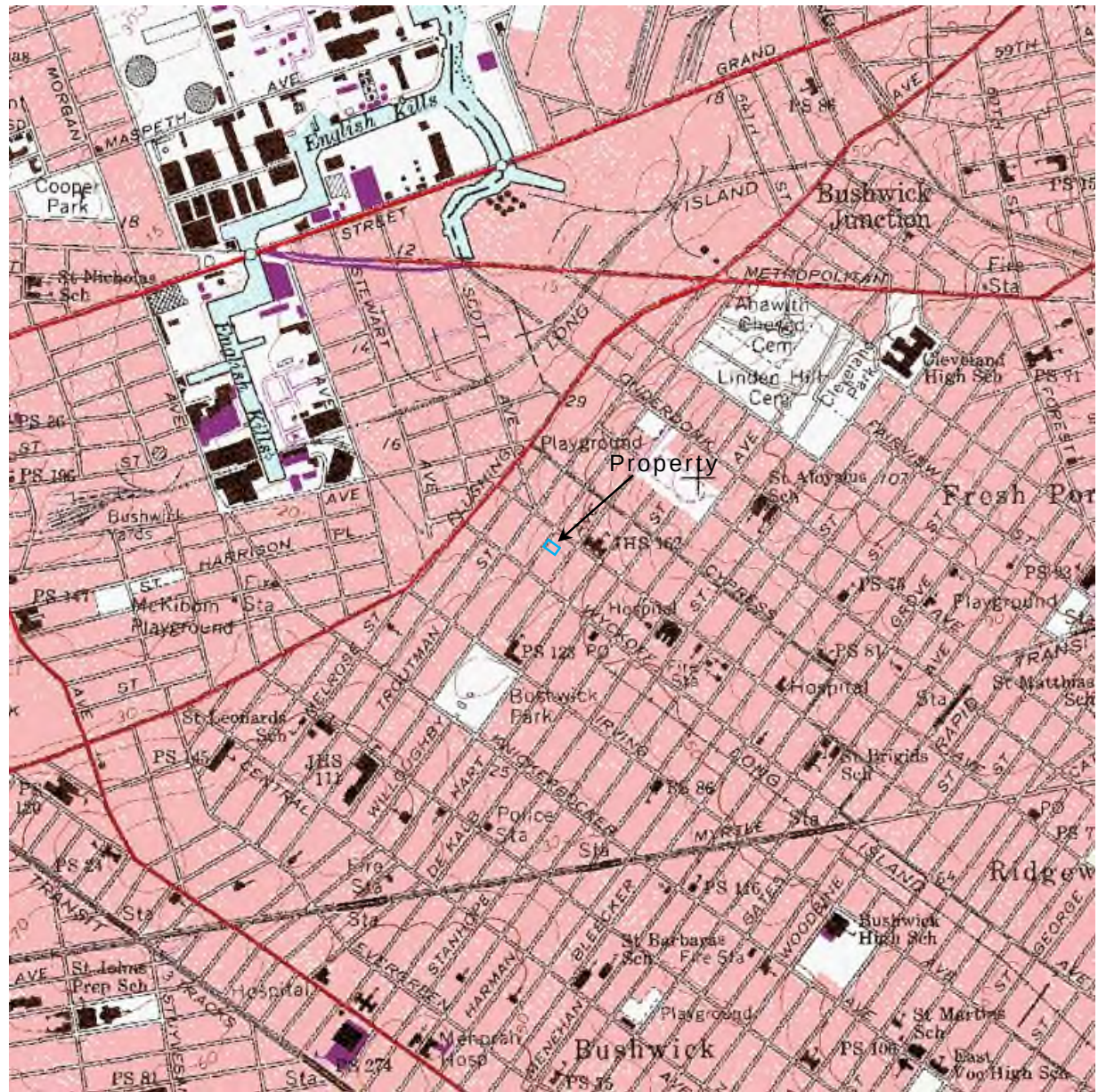
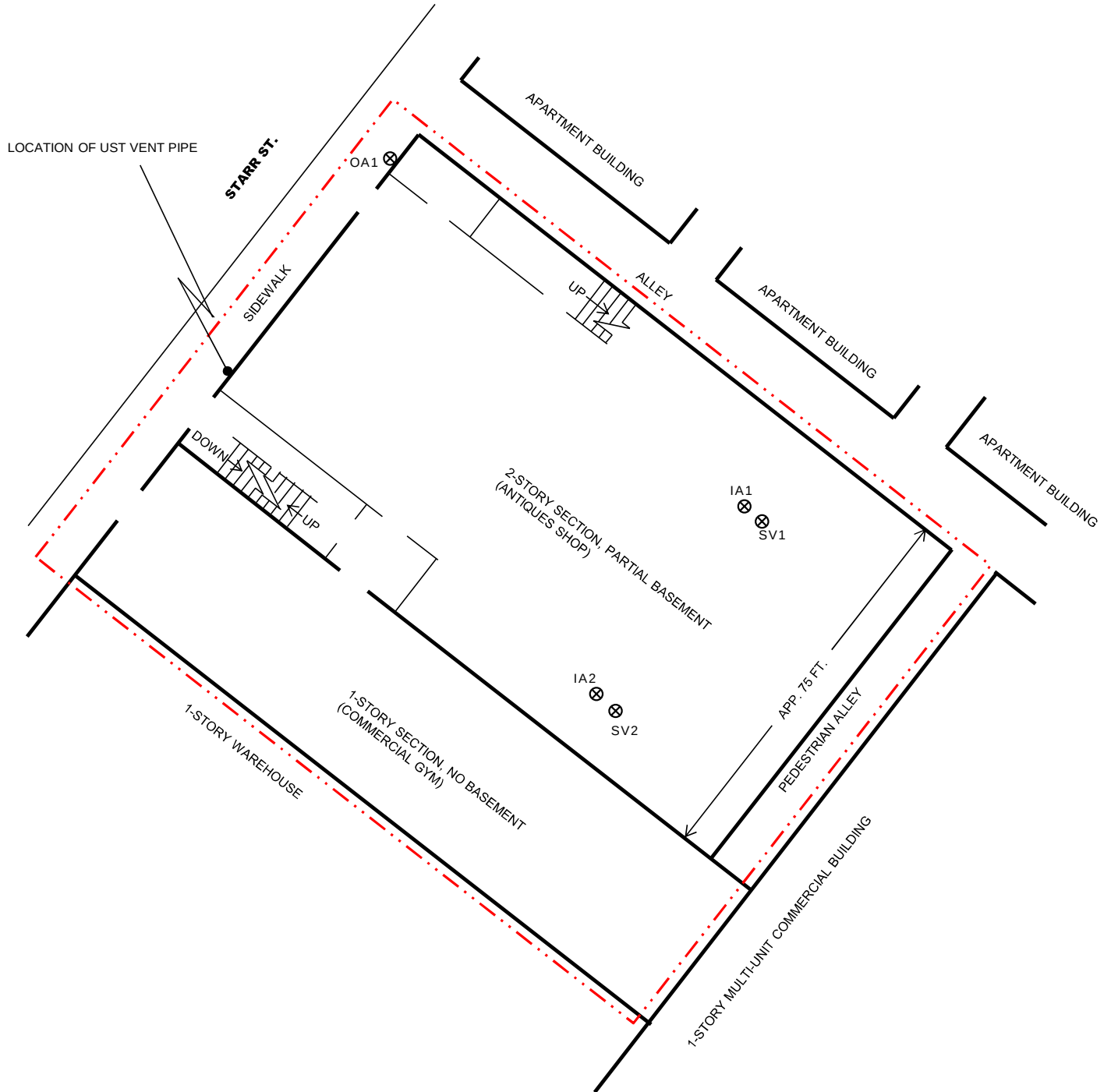


FIGURE 1 - TOPOGRAPHIC MAP

USGS Topographic Map, Brooklyn, NY Quadrangle (contour interval: 5 ft.)





NOTE
ALL INTERIOR DETAILS ARE APPROXIMATE AND BASED ON FIELD OBSERVATIONS

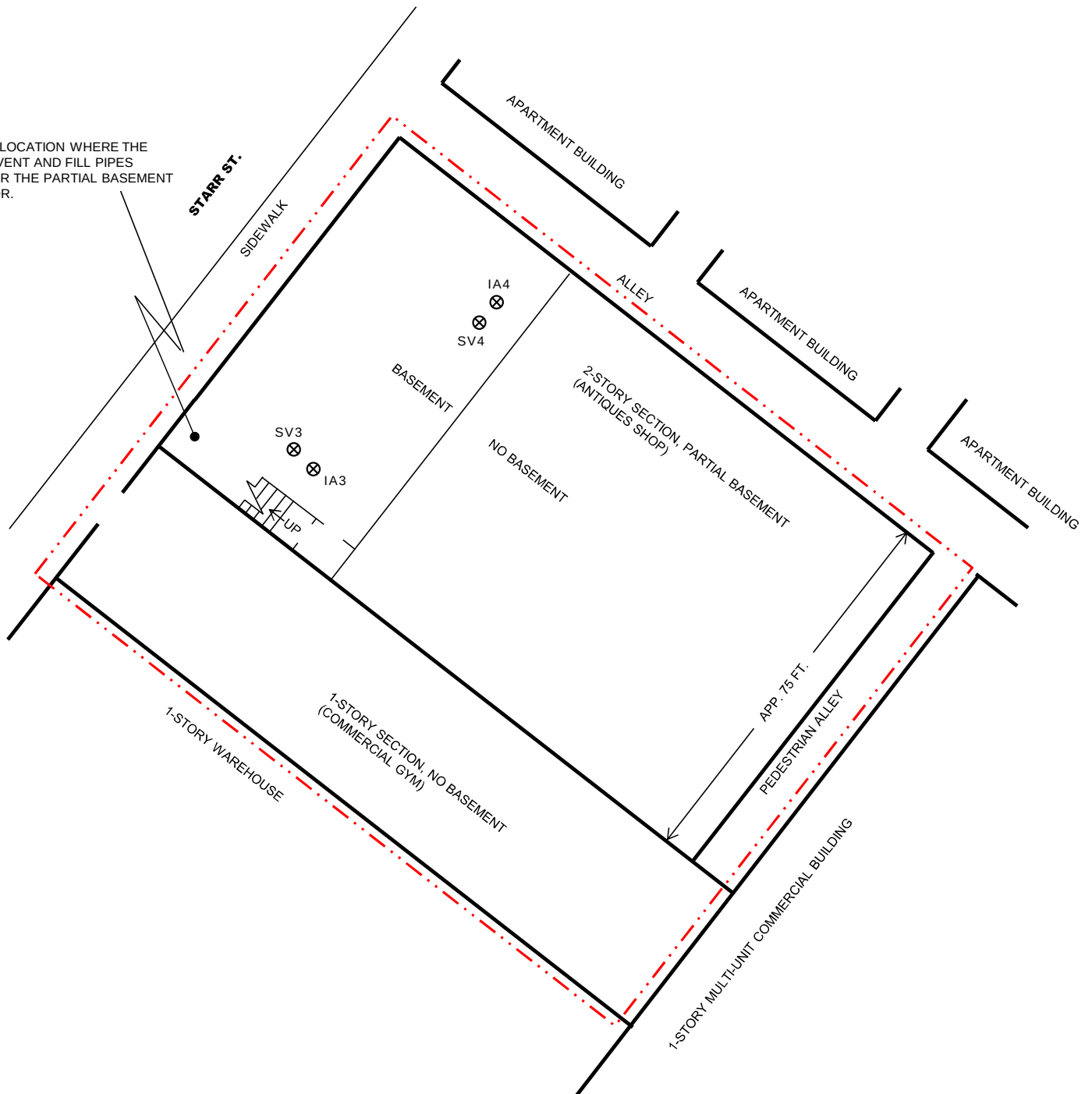
FIGURE 2 – 1ST FLOOR SKETCH
Base map source: Google Maps

NOT TO SCALE

KEY:
PATTERNED LINES ENCLOSE THE PROPERTY
⊗ DENOTES AIR & SOIL VAPOR SAMPLE LOCATIONS



APP. LOCATION WHERE THE
UST VENT AND FILL PIPES
ENTER THE PARTIAL BASEMENT
FLOOR.



NOTE
ALL INTERIOR DETAILS ARE APPROXIMATE AND BASED ON FIELD OBSERVATIONS

FIGURE 3 – BASEMENT SKETCH
Base map source: Google Maps

NOT TO SCALE

KEY:
PATTERNED LINES ENCLOSE THE PROPERTY
⊗ DENOTES AIR & SOIL VAPOR SAMPLE LOCATIONS



APPENDIX 2

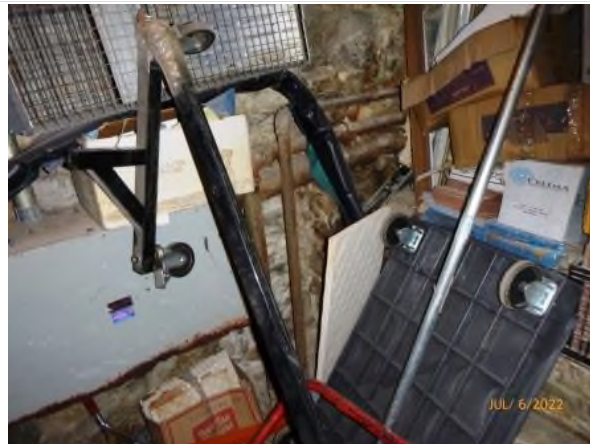
PHOTOGRAPHS



1. Site building looking east from across Starr Street



2. GPR survey in progress. UST vent pipe visible against building wall. Photographer facing northeast.



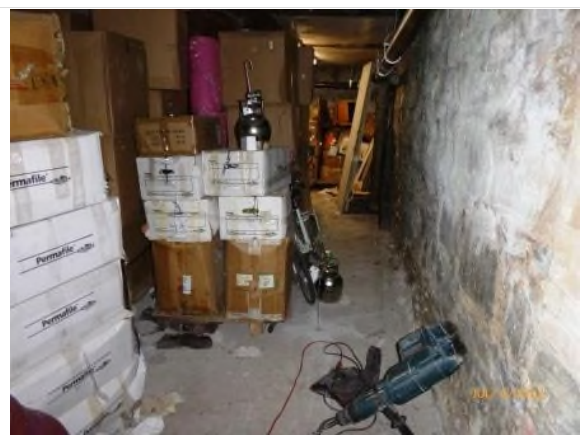
3. UST fill and vent lines dropping into the floor of the partial basement.



4. General conditions in the basement. IA3 shown.



5. SV2 and IA2 on the ground floor of the two-story Property building.



6. IA4 and SV4 in the partial basement of the two-story Property building.

APPENDIX 3

LABORATORY ANALYTICAL REPORT

July 11, 2022

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

BBG - San Diego, CA

Sample Delivery Group: L1512623
Samples Received: 07/07/2022
Project Number: 0522008490
Description: 280-284 Starr Street Brooklyn, NY

Report To: Matt Smelski
11440 W. Bernardo Court
Suite 104
San Diego, CA 92127

Entire Report Reviewed By:



Heather J Wagner
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.

Pace Analytical National

12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 www.pacenational.com

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¹ Cp
² Tc
³ Ss
⁴ Cn
⁵ Sr
⁶ Qc
⁷ Gl
⁸ Al
⁹ Sc

SAMPLE SUMMARY

SV1 L1512623-01 Air

				Collected by Frank G	Collected date/time 07/06/22 10:05	Received date/time 07/07/22 09:00
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (MS) by Method TO-15	WG1891869	1	07/08/22 15:10	07/08/22 15:10	DAH	Mt. Juliet, TN

SV2 L1512623-02 Air

				Collected by Frank G	Collected date/time 07/06/22 10:16	Received date/time 07/07/22 09:00
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (MS) by Method TO-15	WG1891869	1	07/08/22 15:48	07/08/22 15:48	DAH	Mt. Juliet, TN

SV3 L1512623-03 Air

				Collected by Frank G	Collected date/time 07/06/22 10:31	Received date/time 07/07/22 09:00
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (MS) by Method TO-15	WG1891869	1	07/08/22 16:25	07/08/22 16:25	DAH	Mt. Juliet, TN
Volatile Organic Compounds (MS) by Method TO-15	WG1892371	50	07/09/22 20:15	07/09/22 20:15	FKG	Mt. Juliet, TN
Volatile Organic Compounds (MS) by Method TO-15	WG1893092	400	07/11/22 15:30	07/11/22 15:30	MBF	Mt. Juliet, TN

SV4 L1512623-04 Air

				Collected by Frank G	Collected date/time 07/06/22 10:40	Received date/time 07/07/22 09:00
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (MS) by Method TO-15	WG1891869	1	07/08/22 17:03	07/08/22 17:03	DAH	Mt. Juliet, TN
Volatile Organic Compounds (MS) by Method TO-15	WG1892371	50	07/09/22 20:53	07/09/22 20:53	FKG	Mt. Juliet, TN

IA1 L1512623-05 Air

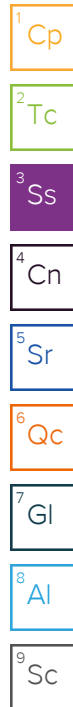
				Collected by Frank G	Collected date/time 07/06/22 16:17	Received date/time 07/07/22 09:00
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (MS) by Method TO-15	WG1891869	2	07/08/22 22:10	07/08/22 22:10	DAH	Mt. Juliet, TN
Volatile Organic Compounds (MS) by Method TO-15	WG1892371	5	07/09/22 22:50	07/09/22 22:50	FKG	Mt. Juliet, TN

IA2 L1512623-06 Air

				Collected by Frank G	Collected date/time 07/06/22 16:18	Received date/time 07/07/22 09:00
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (MS) by Method TO-15	WG1891869	1	07/08/22 17:41	07/08/22 17:41	DAH	Mt. Juliet, TN
Volatile Organic Compounds (MS) by Method TO-15	WG1892371	1	07/09/22 18:19	07/09/22 18:19	FKG	Mt. Juliet, TN

IA3 L1512623-07 Air

				Collected by Frank G	Collected date/time 07/06/22 16:22	Received date/time 07/07/22 09:00
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (MS) by Method TO-15	WG1891869	1	07/08/22 18:20	07/08/22 18:20	DAH	Mt. Juliet, TN



SAMPLE SUMMARY

IA4 L1512623-08 Air

Collected by
Frank G

Collected date/time
07/06/22 16:24

Received date/time
07/07/22 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (MS) by Method TO-15	WG1891869	1	07/08/22 18:58	07/08/22 18:58	DAH	Mt. Juliet, TN

OA1 L1512623-09 Air

Collected by
Frank G

Collected date/time
07/06/22 16:31

Received date/time
07/07/22 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (MS) by Method TO-15	WG1891869	1	07/08/22 19:36	07/08/22 19:36	DAH	Mt. Juliet, TN

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

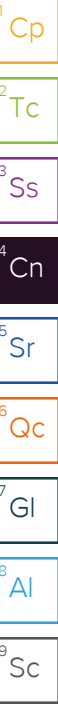
9 Sc

CASE NARRATIVE

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.



Heather J Wagner
Project Manager



Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1 ppbv	RDL2 ug/m3	Result ppbv	Result ug/m3	Qualifier	Dilution	Batch
Benzene	71-43-2	78.10	0.200	0.639	4.39	14.0		1	WG1891869
Carbon tetrachloride	56-23-5	154	0.200	1.26	ND	ND		1	WG1891869
1,1-Dichloroethene	75-35-4	96.90	0.200	0.793	ND	ND		1	WG1891869
cis-1,2-Dichloroethene	156-59-2	96.90	0.200	0.793	ND	ND		1	WG1891869
Ethylbenzene	100-41-4	106	0.200	0.867	ND	ND		1	WG1891869
Methylene Chloride	75-09-2	84.90	0.200	0.694	0.314	1.09	B	1	WG1891869
Tetrachloroethylene	127-18-4	166	0.200	1.36	3.37	22.9		1	WG1891869
Toluene	108-88-3	92.10	0.500	1.88	1.01	3.80		1	WG1891869
1,1,1-Trichloroethane	71-55-6	133	0.200	1.09	7.30	39.7		1	WG1891869
Trichloroethylene	79-01-6	131	0.200	1.07	ND	ND		1	WG1891869
Vinyl chloride	75-01-4	62.50	0.200	0.511	ND	ND		1	WG1891869
m&p-Xylene	1330-20-7	106	0.400	1.73	ND	ND		1	WG1891869
o-Xylene	95-47-6	106	0.200	0.867	ND	ND		1	WG1891869
(S) 1,4-Bromofluorobenzene	460-00-4	175	60.0-140		101				WG1891869

¹ Cp² Tc³ Ss⁴ Cn⁵ Sr⁶ Qc⁷ Gl⁸ Al⁹ Sc

Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1 ppbv	RDL2 ug/m3	Result ppbv	Result ug/m3	Qualifier	Dilution	Batch
Benzene	71-43-2	78.10	0.200	0.639	0.375	1.20		1	WG1891869
Carbon tetrachloride	56-23-5	154	0.200	1.26	0.205	1.29		1	WG1891869
1,1-Dichloroethene	75-35-4	96.90	0.200	0.793	ND	ND		1	WG1891869
cis-1,2-Dichloroethene	156-59-2	96.90	0.200	0.793	ND	ND		1	WG1891869
Ethylbenzene	100-41-4	106	0.200	0.867	ND	ND		1	WG1891869
Methylene Chloride	75-09-2	84.90	0.200	0.694	0.343	1.19	B	1	WG1891869
Tetrachloroethylene	127-18-4	166	0.200	1.36	2.91	19.8		1	WG1891869
Toluene	108-88-3	92.10	0.500	1.88	ND	ND		1	WG1891869
1,1,1-Trichloroethane	71-55-6	133	0.200	1.09	8.81	47.9		1	WG1891869
Trichloroethylene	79-01-6	131	0.200	1.07	15.6	83.6		1	WG1891869
Vinyl chloride	75-01-4	62.50	0.200	0.511	ND	ND		1	WG1891869
m&p-Xylene	1330-20-7	106	0.400	1.73	ND	ND		1	WG1891869
o-Xylene	95-47-6	106	0.200	0.867	ND	ND		1	WG1891869
(S) 1,4-Bromofluorobenzene	460-00-4	175	60.0-140		99.8				WG1891869

1
Cp2
Tc3
Ss4
Cn5
Sr6
Qc7
Gl8
Al9
Sc

Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1 ppbv	RDL2 ug/m3	Result ppbv	Result ug/m3	Qualifier	Dilution	Batch
Benzene	71-43-2	78.10	0.200	0.639	1.78	5.69		1	WG1891869
Carbon tetrachloride	56-23-5	154	0.200	1.26	0.729	4.59		1	WG1891869
1,1-Dichloroethene	75-35-4	96.90	0.200	0.793	ND	ND		1	WG1891869
cis-1,2-Dichloroethene	156-59-2	96.90	10.0	39.6	116	460		50	WG1892371
Ethylbenzene	100-41-4	106	0.200	0.867	ND	ND		1	WG1891869
Methylene Chloride	75-09-2	84.90	0.200	0.694	ND	ND		1	WG1891869
Tetrachloroethylene	127-18-4	166	10.0	67.9	174	1180		50	WG1892371
Toluene	108-88-3	92.10	0.500	1.88	1.44	5.42		1	WG1891869
1,1,1-Trichloroethane	71-55-6	133	0.200	1.09	3.59	19.5		1	WG1891869
Trichloroethylene	79-01-6	131	80.0	429	9020	48300		400	WG1893092
Vinyl chloride	75-01-4	62.50	0.200	0.511	ND	ND		1	WG1891869
m&p-Xylene	1330-20-7	106	0.400	1.73	ND	ND		1	WG1891869
o-Xylene	95-47-6	106	0.200	0.867	ND	ND		1	WG1891869
(S) 1,4-Bromofluorobenzene	460-00-4	175	60.0-140		96.3				WG1891869
(S) 1,4-Bromofluorobenzene	460-00-4	175	60.0-140		96.5				WG1892371
(S) 1,4-Bromofluorobenzene	460-00-4	175	60.0-140		94.3				WG1893092

1
Cp2
Tc3
Ss4
Cn5
Sr6
Qc7
Gl8
Al9
Sc

Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1 ppbv	RDL2 ug/m3	Result ppbv	Result ug/m3	Qualifier	Dilution	Batch
Benzene	71-43-2	78.10	0.200	0.639	1.18	3.77		1	WG1891869
Carbon tetrachloride	56-23-5	154	0.200	1.26	0.313	1.97		1	WG1891869
1,1-Dichloroethene	75-35-4	96.90	0.200	0.793	ND	ND		1	WG1891869
cis-1,2-Dichloroethene	156-59-2	96.90	0.200	0.793	60.3	239		1	WG1891869
Ethylbenzene	100-41-4	106	0.200	0.867	ND	ND		1	WG1891869
Methylene Chloride	75-09-2	84.90	0.200	0.694	0.429	1.49	B	1	WG1891869
Tetrachloroethylene	127-18-4	166	0.200	1.36	58.9	400		1	WG1891869
Toluene	108-88-3	92.10	0.500	1.88	1.24	4.67		1	WG1891869
1,1,1-Trichloroethane	71-55-6	133	0.200	1.09	1.29	7.02		1	WG1891869
Trichloroethylene	79-01-6	131	10.0	53.6	2470	13200		50	WG1892371
Vinyl chloride	75-01-4	62.50	0.200	0.511	ND	ND		1	WG1891869
m&p-Xylene	1330-20-7	106	0.400	1.73	ND	ND		1	WG1891869
o-Xylene	95-47-6	106	0.200	0.867	ND	ND		1	WG1891869
(S) 1,4-Bromofluorobenzene	460-00-4	175	60.0-140		97.5				WG1891869
(S) 1,4-Bromofluorobenzene	460-00-4	175	60.0-140		96.2				WG1892371

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1 ppbv	RDL2 ug/m3	Result ppbv	Result ug/m3	Qualifier	Dilution	Batch
Benzene	71-43-2	78.10	1.00	3.19	ND	ND		5	WG1892371
Carbon tetrachloride	56-23-5	154	0.400	2.52	ND	ND		2	WG1891869
1,1-Dichloroethene	75-35-4	96.90	0.400	1.59	ND	ND		2	WG1891869
cis-1,2-Dichloroethene	156-59-2	96.90	0.400	1.59	ND	ND		2	WG1891869
Ethylbenzene	100-41-4	106	1.00	4.34	ND	ND		5	WG1892371
Methylene Chloride	75-09-2	84.90	0.400	1.39	1.44	5.00	B	2	WG1891869
Tetrachloroethylene	127-18-4	166	1.00	6.79	ND	ND		5	WG1892371
Toluene	108-88-3	92.10	2.50	9.42	4.68	17.6		5	WG1892371
1,1,1-Trichloroethane	71-55-6	133	0.400	2.18	ND	ND		2	WG1891869
Trichloroethylene	79-01-6	131	1.00	5.36	ND	ND		5	WG1892371
Vinyl chloride	75-01-4	62.50	0.400	1.02	ND	ND		2	WG1891869
m&p-Xylene	1330-20-7	106	2.00	8.67	ND	ND		5	WG1892371
o-Xylene	95-47-6	106	1.00	4.34	ND	ND		5	WG1892371
(S) 1,4-Bromofluorobenzene	460-00-4	175	60.0-140		105				WG1891869
(S) 1,4-Bromofluorobenzene	460-00-4	175	60.0-140		96.1				WG1892371

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1 ppbv	RDL2 ug/m3	Result ppbv	Result ug/m3	Qualifier	Dilution	Batch
Benzene	71-43-2	78.10	0.200	0.639	0.403	1.29		1	WG1891869
Carbon tetrachloride	56-23-5	154	0.200	1.26	ND	ND		1	WG1891869
1,1-Dichloroethene	75-35-4	96.90	0.200	0.793	ND	ND		1	WG1891869
cis-1,2-Dichloroethene	156-59-2	96.90	0.200	0.793	ND	ND		1	WG1891869
Ethylbenzene	100-41-4	106	0.200	0.867	0.486	2.11		1	WG1891869
Methylene Chloride	75-09-2	84.90	0.200	0.694	0.602	2.09	B	1	WG1891869
Tetrachloroethylene	127-18-4	166	0.200	1.36	0.253	1.72		1	WG1891869
Toluene	108-88-3	92.10	0.500	1.88	5.59	21.1		1	WG1891869
1,1,1-Trichloroethane	71-55-6	133	0.200	1.09	0.323	1.76		1	WG1891869
Trichloroethylene	79-01-6	131	0.200	1.07	1.47	7.88		1	WG1892371
Vinyl chloride	75-01-4	62.50	0.200	0.511	ND	ND		1	WG1891869
m&p-Xylene	1330-20-7	106	0.400	1.73	1.52	6.59		1	WG1891869
o-Xylene	95-47-6	106	0.200	0.867	0.567	2.46		1	WG1891869
(S) 1,4-Bromofluorobenzene	460-00-4	175	60.0-140		101				WG1891869
(S) 1,4-Bromofluorobenzene	460-00-4	175	60.0-140		97.7				WG1892371

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1 ppbv	RDL2 ug/m3	Result ppbv	Result ug/m3	Qualifier	Dilution	Batch
Benzene	71-43-2	78.10	0.200	0.639	0.344	1.10		1	WG1891869
Carbon tetrachloride	56-23-5	154	0.200	1.26	ND	ND		1	WG1891869
1,1-Dichloroethene	75-35-4	96.90	0.200	0.793	ND	ND		1	WG1891869
cis-1,2-Dichloroethene	156-59-2	96.90	0.200	0.793	ND	ND		1	WG1891869
Ethylbenzene	100-41-4	106	0.200	0.867	0.695	3.01		1	WG1891869
Methylene Chloride	75-09-2	84.90	0.200	0.694	0.799	2.77	B	1	WG1891869
Tetrachloroethylene	127-18-4	166	0.200	1.36	0.444	3.01		1	WG1891869
Toluene	108-88-3	92.10	0.500	1.88	20.6	77.6		1	WG1891869
1,1,1-Trichloroethane	71-55-6	133	0.200	1.09	0.568	3.09		1	WG1891869
Trichloroethylene	79-01-6	131	0.200	1.07	15.2	81.4		1	WG1891869
Vinyl chloride	75-01-4	62.50	0.200	0.511	ND	ND		1	WG1891869
m&p-Xylene	1330-20-7	106	0.400	1.73	1.90	8.24		1	WG1891869
o-Xylene	95-47-6	106	0.200	0.867	0.688	2.98		1	WG1891869
(S) 1,4-Bromofluorobenzene	460-00-4	175	60.0-140		99.7				WG1891869

1Cp

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5Sr

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9Sc

Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1 ppbv	RDL2 ug/m3	Result ppbv	Result ug/m3	Qualifier	Dilution	Batch
Benzene	71-43-2	78.10	0.200	0.639	0.359	1.15		1	WG1891869
Carbon tetrachloride	56-23-5	154	0.200	1.26	ND	ND		1	WG1891869
1,1-Dichloroethene	75-35-4	96.90	0.200	0.793	ND	ND		1	WG1891869
cis-1,2-Dichloroethene	156-59-2	96.90	0.200	0.793	ND	ND		1	WG1891869
Ethylbenzene	100-41-4	106	0.200	0.867	0.649	2.81		1	WG1891869
Methylene Chloride	75-09-2	84.90	0.200	0.694	0.971	3.37	B	1	WG1891869
Tetrachloroethylene	127-18-4	166	0.200	1.36	0.466	3.16		1	WG1891869
Toluene	108-88-3	92.10	0.500	1.88	19.1	71.9		1	WG1891869
1,1,1-Trichloroethane	71-55-6	133	0.200	1.09	0.540	2.94		1	WG1891869
Trichloroethylene	79-01-6	131	0.200	1.07	14.3	76.6		1	WG1891869
Vinyl chloride	75-01-4	62.50	0.200	0.511	ND	ND		1	WG1891869
m&p-Xylene	1330-20-7	106	0.400	1.73	1.81	7.85		1	WG1891869
o-Xylene	95-47-6	106	0.200	0.867	0.658	2.85		1	WG1891869
(S) 1,4-Bromofluorobenzene	460-00-4	175	60.0-140		100				WG1891869

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Volatile Organic Compounds (MS) by Method TO-15

Analyte	CAS #	Mol. Wt.	RDL1 ppbv	RDL2 ug/m3	Result ppbv	Result ug/m3	Qualifier	Dilution	Batch
Benzene	71-43-2	78.10	0.200	0.639	0.238	0.760		1	WG1891869
Carbon tetrachloride	56-23-5	154	0.200	1.26	ND	ND		1	WG1891869
1,1-Dichloroethene	75-35-4	96.90	0.200	0.793	ND	ND		1	WG1891869
cis-1,2-Dichloroethene	156-59-2	96.90	0.200	0.793	ND	ND		1	WG1891869
Ethylbenzene	100-41-4	106	0.200	0.867	0.393	1.70		1	WG1891869
Methylene Chloride	75-09-2	84.90	0.200	0.694	0.546	1.90	B	1	WG1891869
Tetrachloroethylene	127-18-4	166	0.200	1.36	ND	ND		1	WG1891869
Toluene	108-88-3	92.10	0.500	1.88	1.90	7.16		1	WG1891869
1,1,1-Trichloroethane	71-55-6	133	0.200	1.09	ND	ND		1	WG1891869
Trichloroethylene	79-01-6	131	0.200	1.07	ND	ND		1	WG1891869
Vinyl chloride	75-01-4	62.50	0.200	0.511	ND	ND		1	WG1891869
m&p-Xylene	1330-20-7	106	0.400	1.73	0.929	4.03		1	WG1891869
o-Xylene	95-47-6	106	0.200	0.867	0.331	1.44		1	WG1891869
(S) 1,4-Bromofluorobenzene	460-00-4	175	60.0-140		101				WG1891869

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Method Blank (MB)

(MB) R3812521-2 07/08/22 08:47

Analyte	MB Result ppbv	MB Qualifier	MB MDL ppbv	MB RDL ppbv
Benzene	U		0.0715	0.200
Carbon tetrachloride	U		0.0732	0.200
1,1-Dichloroethene	U		0.0762	0.200
cis-1,2-Dichloroethene	U		0.0784	0.200
Ethylbenzene	U		0.0835	0.200
Methylene Chloride	0.136	U	0.0979	0.200
Tetrachloroethylene	U		0.0814	0.200
Toluene	U		0.0870	0.500
1,1,1-Trichloroethane	U		0.0736	0.200
Trichloroethylene	U		0.0680	0.200
Vinyl chloride	U		0.0949	0.200
m&p-Xylene	U		0.135	0.400
o-Xylene	U		0.0828	0.200
(S) 1,4-Bromofluorobenzene	96.4			60.0-140

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3812521-1 07/08/22 08:10 • (LCSD) R3812521-3 07/08/22 09:52

Analyte	Spike Amount ppbv	LCS Result ppbv	LCSD Result ppbv	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	3.75	4.21	3.99	112	106	70.0-130			5.37	25
Carbon tetrachloride	3.75	4.10	3.96	109	106	70.0-130			3.47	25
1,1-Dichloroethene	3.75	4.03	3.81	107	102	70.0-130			5.61	25
cis-1,2-Dichloroethene	3.75	3.91	3.78	104	101	70.0-130			3.38	25
Ethylbenzene	3.75	4.16	3.97	111	106	70.0-130			4.67	25
Methylene Chloride	3.75	3.53	3.36	94.1	89.6	70.0-130			4.93	25
Tetrachloroethylene	3.75	4.41	4.26	118	114	70.0-130			3.46	25
Toluene	3.75	4.18	4.05	111	108	70.0-130			3.16	25
1,1,1-Trichloroethane	3.75	4.03	3.88	107	103	70.0-130			3.79	25
Trichloroethylene	3.75	4.22	4.11	113	110	70.0-130			2.64	25
Vinyl chloride	3.75	4.00	3.82	107	102	70.0-130			4.60	25
m&p-Xylene	7.50	8.33	8.02	111	107	70.0-130			3.79	25
o-Xylene	3.75	4.10	3.95	109	105	70.0-130			3.73	25
(S) 1,4-Bromofluorobenzene				98.5	97.9	60.0-140				

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Method Blank (MB)

(MB) R3812884-3 07/09/22 06:16

Analyte	MB Result ppbv	MB Qualifier	MB MDL ppbv	MB RDL ppbv
Benzene	U		0.0715	0.200
cis-1,2-Dichloroethene	U		0.0784	0.200
Ethylbenzene	U		0.0835	0.200
Tetrachloroethylene	U		0.0814	0.200
Toluene	U		0.0870	0.500
Trichloroethylene	U		0.0680	0.200
m&p-Xylene	U		0.135	0.400
o-Xylene	U		0.0828	0.200
(S) 1,4-Bromofluorobenzene	93.6			60.0-140

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3812884-1 07/09/22 04:55 • (LCSD) R3812884-2 07/09/22 05:36

Analyte	Spike Amount ppbv	LCS Result ppbv	LCSD Result ppbv	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	3.75	4.67	4.73	125	126	70.0-130			1.28	25
cis-1,2-Dichloroethene	3.75	4.65	4.69	124	125	70.0-130			0.857	25
Ethylbenzene	3.75	4.70	4.74	125	126	70.0-130			0.847	25
Tetrachloroethylene	3.75	4.50	4.55	120	121	70.0-130			1.10	25
Toluene	3.75	4.61	4.65	123	124	70.0-130			0.864	25
Trichloroethylene	3.75	4.47	4.58	119	122	70.0-130			2.43	25
m&p-Xylene	7.50	9.45	9.51	126	127	70.0-130			0.633	25
o-Xylene	3.75	4.58	4.66	122	124	70.0-130			1.73	25
(S) 1,4-Bromofluorobenzene				97.9	97.6	60.0-140				

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Sr

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Qc

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Gl

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Al

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Sc

Method Blank (MB)

(MB) R3813319-3 07/11/22 10:39

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	ppbv		ppbv	ppbv
Trichloroethylene	U		0.0680	0.200
(S) 1,4-Bromofluorobenzene	95.0			60.0-140

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3813319-1 07/11/22 09:19 • (LCSD) R3813319-2 07/11/22 10:00

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	ppbv	ppbv	ppbv	%	%	%			%	%
Trichloroethylene	3.75	4.59	4.59	122	122	70.0-130			0.000	25
(S) 1,4-Bromofluorobenzene				96.2	97.2	60.0-140				

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

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9Sc

GLOSSARY OF TERMS

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

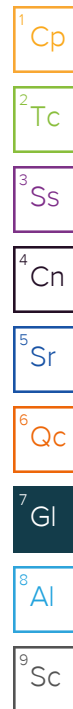
Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state "ND" (Not Detected) or "BDL" (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier Description

B	The same analyte is found in the associated blank.
J	The identification of the analyte is acceptable; the reported value is an estimate.



ACCREDITATIONS & LOCATIONS

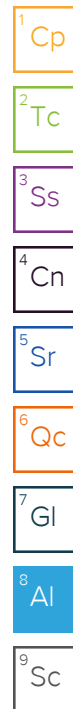
Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey--NELAP	TN002
California	2932	New Mexico ¹	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina ¹	DW21704
Georgia	NELAP	North Carolina ³	41
Georgia ¹	923	North Dakota	R-140
Idaho	TN00003	Ohio--VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LA000356
Kentucky ^{1 6}	KY90010	South Carolina	84004002
Kentucky ²	16	South Dakota	n/a
Louisiana	AI30792	Tennessee ^{1 4}	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas ⁵	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA -- ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA -- ISO 17025 ⁵	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA--Crypto	TN00003		

¹ Drinking Water ² Underground Storage Tanks ³ Aquatic Toxicity ⁴ Chemical/Microbiological ⁵ Mold ⁶ Wastewater n/a Accreditation not applicable

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.



Company Name/Address: BBG - San Diego, CA 11440 W. Bernardo Court Suite 104			Billing Information: BBG Accounts Payable 11440 W. Bernardo Court Suite 104 San Diego, CA 92127			Analysis			Chain of Custody Page <u>1</u> of <u>1</u>	
Report To: Matt Smelski			Email To: msmelski@bbgres.com						 PEOPLE ADVANCING SCIENCE MT JULIET, TN 12065 Lebanon Road Mt Juliet, TN 37122 Phone: 615-758-5858 Alt: 800-767-5859 Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: https://info.pacelabs.com/hubs/pas-standard-terms.pdf	
Project Description: 280-284 Starr Street Brooklyn, NY		City/State Collected: BROOKLYN, NY		Please Circle: PT MT CT ET					SDG # U512623 J054	
Phone: 559-441-3227		Client Project # 0522008490		Lab Project # BBGSDCA-280-284 STAR					Acctnum: BBGSDCA Template: T211713 Prelogin: P933516 PM: 873 - Heather J Wagner PB: <i>8606/mh</i>	
Collected by (print): FRANK GALDUN		Site/Facility ID #		P.O. #					Shipped Via: FedEX Ground	
Collected by (signature): <i>F. Galdu</i>		Rush? (Lab MUST Be Notified) ☐ Same Day ☐ Three Day ☐ Next Day ☐ Five Day ☒ Two Day		Date Results Needed					Rem./Contaminant Sample # (lab only)	
				Collection		Canister Pressure/Vacuum				
Sample ID	Can #	Flow Cont. #	Date	Time	Initial	Final				
SU1	011996	008401	7/6/22	0905	29.5	0	X			-01
SU2	021149	012366	7/6/22	0916	29	7	X			-02
SU3	006909	005872	7/6/22	0931	29	4	X			-03
SU4	012358	012350	7/6/22	0940	28.5	8	X			-04
IA1	008762	009394	7/6/22	0817	29.5	16	X			-05
IA2	011239	020159	7/6/22	0818	29.5	4.5	X			-06
IA3	020413	021517	7/6/22	0822	OVER 30	4	X			-07
IA4	007226	007510	7/6/22	0824	29	1.5	X			-08
OA1	012551	006363	7/6/22	0831	OVER 30	9	X			-09
Remarks: REPORT ONLY: PCE, TCE, CIS-1,2-DCE, 1,1-DCE, 1,1,1-TEA, CARBON TET., METHYLENE CHLORIDE, VINYL CHLORIDE, BTEX NOTE: IA1 REGULATORY EXTREMELY SLOW DRAW.										
Relinquished by: (Signature) <i>F. Galdu</i>			Date: 6/6/22		Time: 7:20 PM		Samples returned via: ☐ UPS ☐ FedEx ☐ Courier		Tracking #	
Relinquished by: (Signature)			Date:		Time:		Received by: (Signature)		Condition: (lab use only)	
Relinquished by: (Signature)			Date:		Time:		Received by: (Signature)		COC Seal Intact: ☐ Y ☐ N ☐ NA	
Relinquished by: (Signature)			Date:		Time:		Received for lab by: (Signature) <i>William Stinson</i>		NCF:	



505 Penn Street, Suite 400, Reading, PA 19601

610-375-9301

www.libertyenviro.com

April 24, 2024

Churches United for Fair Housing
c/o Mr. Rob Solano
280-284 Starr Street
Brooklyn, New York, 11237

**Re: Phase II Site Investigation
Churches United for Fair Housing Site
280-284 Starr Street
Brooklyn, New York
Liberty Project No. 220872.03**

Dear Mr. Solano:

Liberty Environmental, Inc. (Liberty) is pleased to provide this report summarizing the results of a Phase II Site Investigation (SI) recently completed at 280-284 Starr Street in Brooklyn, New York. The Phase II activities were conducted in accordance with Liberty's Proposal P230384, dated March 18, 2024, and were developed based on a Phase II report provided to Liberty by BBG Assessment, LLC (BBG) dated July 17, 2022. A Site Location Map is provided as Figure 1, and a Site Investigation Diagram is provided as **Error! Reference source not found.2**.

PROJECT BACKGROUND

According to a Phase I ESA conducted by BBG dated June 10, 2022, the following recognized environmental conditions (RECs) were found:

The subject property was undeveloped until 1920 when it was developed with the current building for light manufacturing purposes. In 1933, the building was occupied by a company that manufactured store fixtures. Between 1937 and 1965, it was occupied by a machine shop of the Queens Machine Corporation. Between 1970 and 2008, the building was occupied by garment companies, such as Quarex Knitting Mills (1970-1973) and PJ Knitting Mills Inc. (1985-2008). It is safe to assume that petroleum products such as lubricant oils, and hazardous substances such as solvents and degreasers were used at the onsite machine shop. Since these activities preceded current environmental regulations, unreported or unnoticed spills and leaks may have occurred, adversely impacting soil or groundwater quality at the Subject Property.

A vent pipe was observed attached to the Subject Property façade. No evidence of ASTs or USTs was observed at the Subject Property. However, the basement was cluttered with merchandise, discarded cardboard boxes, and other materials that impeded visual observation. Given the age of the building and its historical manufacturing use, it is reasonable to assume that an AST or a UST was located at the Subject Property. The presence of this vent pipe, which could be connected to an out-of-use storage tank, is considered a REC.

On July 6, 2022, BBG conducted a limited subsurface investigation to investigate potential impacts from the historical manufacturing operations on-Site. BBG collected four sub-slab soil gas sampling (SSGS) points from beneath the basement floor and first floor level for laboratory analysis, denoted as SV1 through SV4. Indoor air samples were collected in the vicinity of the corresponding SSGS samples, and an ambient outdoor air sample was also collected for background comparison purposes. The indoor air samples collected are denoted as IA1 through IA4, and OA1, respectively. All indoor air and outdoor air samples were collected using six-liter summa canisters equipped with regulators set for an eight-hour sampling period. No exterior doors were opened at the basement level during the indoor air sampling period. All samples collected were analyzed for tetrachloroethene (PCE), trichloroethene (TCE), cis-1,2-dichloroethene (c12-DCE), 1,1-dichloroethene (11-DCE), carbon tetrachloride, 1,1,1 trichloroethane (111-TCA), methylene chloride, and vinyl chloride, as well as benzene, toluene, ethylbenzene, and xylenes (BTEX) by EPA Method TO-15.

Lab results detected DCE, PCE, TCE, 111-TCA, methylene chloride, and carbon tetrachloride in soil vapor samples collected. Of these, DCE, PCE, and TCE were reported at concentrations that exceed their respective Final Guidance default values whereby “mitigate” is recommended regardless of the presence or absence of DCE, PCE, and TCE in indoor air. PCE was detected in SV-3 at a concentration of 1,180 $\mu\text{g}/\text{m}^3$, while DCE was reported at 239 to 460 $\mu\text{g}/\text{m}^3$ within samples SV-3 & SV-4, and TCE was reported between 83.6 and 48300.0 $\mu\text{g}/\text{m}^3$ in samples SV-2 through SV-4. Therefore, NYSDOH Matrix conclusion and default recommendation is to “mitigate.” No other VOCs targeted by this study were identified to exceed Final Guidance Mitigation Levels in any of the samples collected. Finally, benzene was detected in each sample collected, and exceeded its EPA Residential VISL in the sample collected from SV-1.

Lab results detected PCE, TCE, 111-TCA, and methylene chloride were detected in the indoor air samples collected. TCE was the only VOC reported in the indoor air samples exceeding its respective Final Guidance Mitigation value for TCE of 1.0 $\mu\text{g}/\text{m}^3$, with concentrations ranging from 7.88 to 81.4 $\mu\text{g}/\text{m}^3$. TCE was also reported in each of the SSGS samples at concentrations that indicate mitigation is required, regardless of indoor air concentrations and/or when indoor air concentrations are below 3 $\mu\text{g}/\text{m}^3$. Therefore, NYSDOH Matrix conclusion and recommendation is to “mitigate.” The outdoor air sample, denoted as OA1, detected methylene chloride; however, the reported concentration was below Final Guidance levels. Finally, benzene was detected in each indoor air sample collected, including the ambient air sample. If the ambient air concentration was deducted from the indoor air results, the indoor air samples collected from IA-2 and IA-4 report benzene at a concentration exceeding its VISL.

BBG recommended that a Vapor Mitigation Specialist be retained, and proper vapor mitigation be implemented at the property.

Indoor Air Sampling

On April 16, 2024, indoor air samples were collected from the partial basement and first floor of the building complex. Samples IA-1 and IA-2 were collected on the first floor and IA-3 was collected in the partial basement. Indoor air quality samples were collected over a 24-hour period. Indoor sampling was conducted using laboratory-supplied, pre-cleaned, 6-liter, stainless steel

canisters under a vacuum (Summa canister). The vacuum reading in each Summa canister was checked prior to and at the completion of the sampling event. After the samples were collected, the Summa canisters were remanded to York Analytical located in Stratford, Connecticut, for analysis under proper chain-of-custody documentation. All air samples were analyzed for Benzene, Carbon Tetrachloride, 1,1-Dichloroethene, cis-1,2-Dichloroethene, Ethylbenzene, Methylene Chloride, Tetrachloroethylene, Toluene, 1,1,1-Trichloroethane, Trichloroethylene, m&p-Xylene, o-Xylene, and vinyl chloride using EPA Method TO-15.

ANALYTICAL RESULTS

Indoor Air Sample Results

A summary of the indoor air analytical data is provided as Table 1.

For IA-1, Trichloroethylene was detected at a concentration of 2.3 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$), which is above the final guidance mitigation level. For IA-2, Trichloroethylene was detected at a concentration of 34 $\mu\text{g}/\text{m}^3$, which is above the final guidance mitigation level. Toluene was also detected at 59 $\mu\text{g}/\text{m}^3$ which is above the final mitigation level. For IA-3, Trichloroethylene was detected at a concentration of 2.4 $\mu\text{g}/\text{m}^3$, which is above the final guidance mitigation level. All three indoor air samples had elevated concentrations of cyclohexane above the final guidance mitigation level. Other VOCs were detected in the indoor air samples collected but were below the final guidance mitigation level.

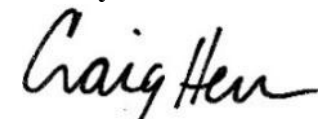
A copy of the laboratory analytical report for the indoor air analyses is provided as attachment 1.

CONCLUSIONS AND RECOMMENDATIONS

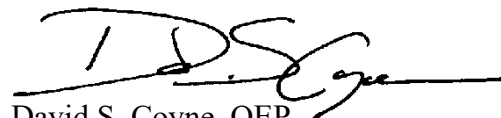
All three indoor air samples had elevated concentrations of Trichloroethylene and cyclohexane above the final guidance mitigation level. IA-2 had elevated concentrations of toluene. It is recommended that proper mitigation be performed, and that indoor air sampling be conducted to ensure compliance with state regulations.

We hope that this information is helpful to you, and we appreciate the opportunity to be of service to you on this project. Should you have any questions regarding this report, please feel free to call us at (610) 375-9301.

Sincerely,
Liberty Environmental, Inc.



Craig Herr, PG, LSRP
Project Manager



David S. Coyne, QEP
Principal

Attachments:

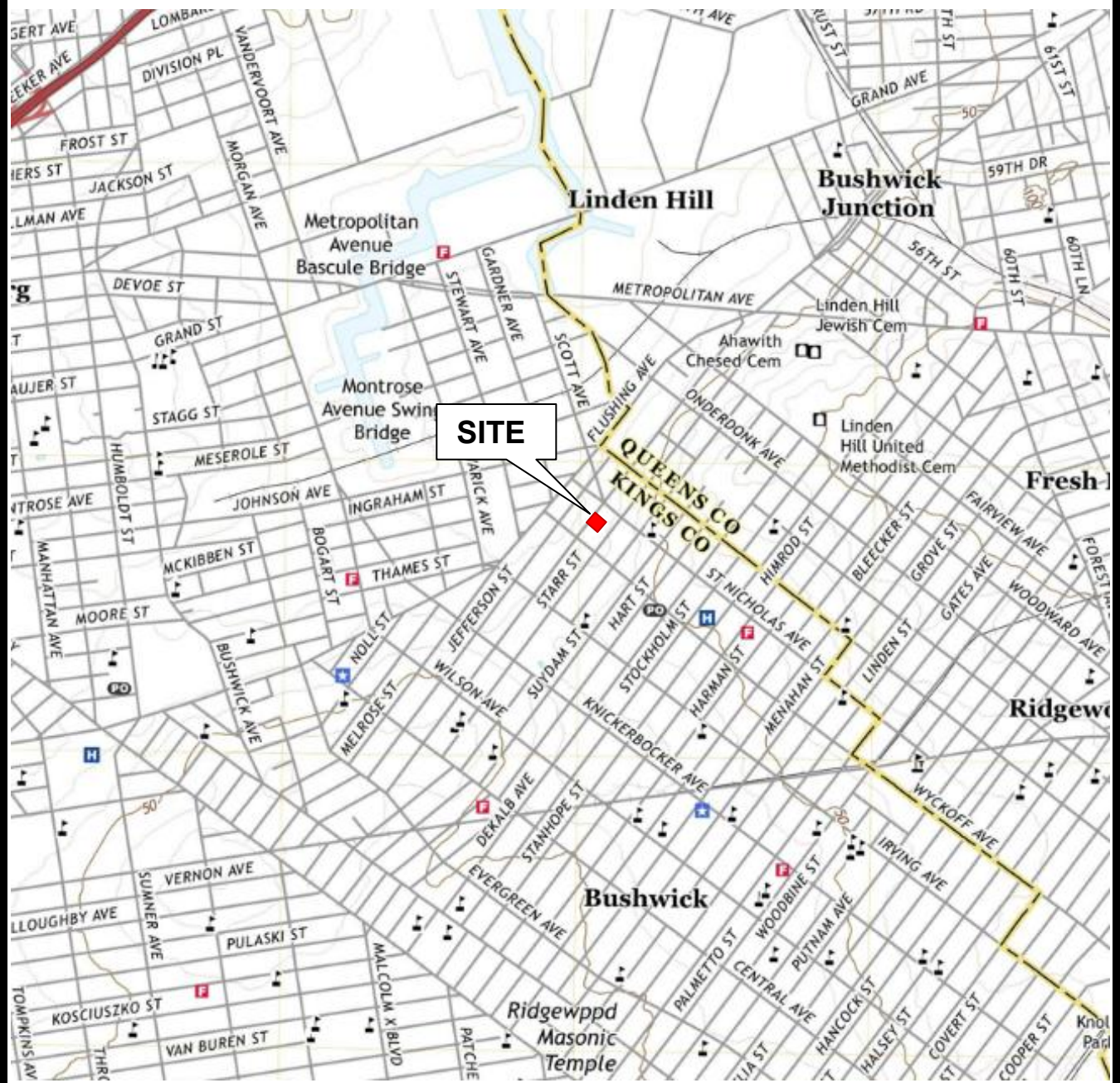
Figure 1: Site Location Map

Figure 2: Site Investigation Diagram

Table 1: Summary of VOC Analytical Results

Attachment 1: Laboratory Analytical Results

FIGURES



505 PENN STREET, SUITE 400
READING, PA 19601
PHONE: (610)-375-9301
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SITE LOCATION MAP

FIGURE 1

CHURCHES UNITED FOR FAIR HOUSING OFFICES

276 STARR STREET, BOROUGH OF BROOKLYN

BROOKLYN, NEW YORK

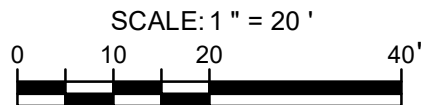
APPROX. SCALE IN FEET



LIBERTY PROJECT 220872



NOTE: THIS DRAWING INTENDED FOR ILLUSTRATIVE PURPOSES ONLY, AS PART OF A SITE CHARACTERIZATION.
NOT TO BE USED AS A BASIS FOR ENGINEERING OR DESIGN
NOTE: BUILDING FEATURES ARE APPROXIMATE AND BASED ON BBG PHASE II SITE SKETCHES.



505 Penn St. Suite 400
Reading, PA 19601
Phone: 610-375-9301
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Figure 2: Indoor Air Sampling Locations April 16, 2024

Churches United For Fair Housing

276-284 Starr Street
Brooklyn, New York (Block 3200, Lot 19)

PROJECT NO.: 220872.02

REV: 0

PREPARED BY: JRY

DATE: JUNE 4, 2025

SCALE: 1" = 20'

APPROVED BY: JPC

TABLES

TABLE 1
Summary of Volatile Organic Compound Analytical Results for Indoor Air
 280-284 Starr Street Site
 Brooklyn, New York
 Liberty Project 220872.03

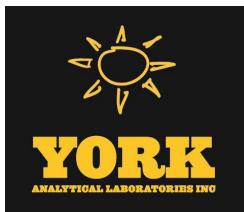
Sample Identification	IA-1	IA-2	IA-3	Final Guidance Mitigation Level
Location	1st Floor	1st Floor	Basement	
Date	4/16/2024	4/16/2024	4/16/2024	
Compound	Results and Screening Values in $\mu\text{g}/\text{m}^3$			
Matrix A				
Trichloroethylene	2.3	34	2.4	1
cis-1,2-Dichloroethene	<0.078	0.42	<0.087	1
1,1-Dichloroethene	<0.078	<0.087	<0.087	1
Carbon tetrachloride	0.44	0.50	0.49	1
Matrix B				
Tetrachloroethylene	0.53	1.7	<0.59	10
1,1,1-Trichloroethane	0.43	<0.48	<0.48	10
Methylene chloride	0.76	0.76	0.8	10
Matrix C				
Vinyl chloride	<0.10	<0.11	<0.11	0.2
Matrix D				
Benzene	0.70	0.62	0.70	10
Ethylbenzene	0.99	1.4	0.76	10
Naphthalene	<0.82	<0.92	<0.92	10
Cyclohexane	25	48	28	10
1,2,4-Trimethylbenzene	0.81	0.95	0.86	10
1,3,5-Trimethylbenzene	<0.39	0.43	<0.43	10
Matrix E				
m- & p-Xylene	3.8	5.2	3.0	20
Matrix F				
Toluene	32	59	35	50

Notes:

Values preceded by a "<" indicate concentrations below the laboratory reporting limit.

Values in bold and yellow shading exceed the Final Guidance Mitigation Level

ATTACHMENT 1
LABORATORY ANALYTICAL RESULTS



Technical Report

prepared for:

Liberty Environmental, Inc

600 3rd Avenue, 2nd Floor

New York NY, 10016

Attention: Andre Matthews

Report Date: 04/22/2024

Client Project ID: 280-284 Starr Street

York Project (SDG) No.: 24D1066

Stratford, CT Laboratory IDs:
NY:10854, NJ: CT005, PA: 68-0440, CT: PH-0723



Richmond Hill, NY Laboratory IDs:
NY:12058, NJ: NY037, CT: PH-0721, NH: 2097,
EPA: NY01600

120 RESEARCH DRIVE
www.YORKLAB.com

STRATFORD, CT 06615
(203) 325-1371



132-02 89th AVENUE
FAX (203) 357-0166

RICHMOND HILL, NY 11418
ClientServices@yorklab.com

Report Date: 04/22/2024
Client Project ID: 280-284 Starr Street
York Project (SDG) No.: 24D1066

Liberty Environmental, Inc
600 3rd Avenue, 2nd Floor
New York NY, 10016
Attention: Andre Matthews

Purpose and Results

This report contains the analytical data for the sample(s) identified on the attached chain-of-custody received in our laboratory on April 17, 2024 and listed below. The project was identified as your project: **280-284 Starr Street**.

The analyses were conducted utilizing appropriate EPA, Standard Methods, and ASTM methods as detailed in the data summary tables.

All samples were received in proper condition meeting the customary acceptance requirements for environmental samples except those indicated under the Sample and Analysis Qualifiers section of this report.

All analyses met the method and laboratory standard operating procedure requirements except as indicated by any data flags, the meaning of which are explained in the Sample and Data Qualifiers Relating to This Work Order section of this report and case narrative if applicable.

The results of the analyses, which are all reported on dry weight basis (soils) unless otherwise noted, are detailed in the following pages.

Please contact Client Services at 203.325.1371 with any questions regarding this report.

<u>York Sample ID</u>	<u>Client Sample ID</u>	<u>Matrix</u>	<u>Date Collected</u>	<u>Date Received</u>
24D1066-01	IA-1	Indoor Ambient Air	04/16/2024	04/17/2024
24D1066-02	IA-2	Indoor Ambient Air	04/16/2024	04/17/2024
24D1066-03	IA-3	Indoor Ambient Air	04/16/2024	04/17/2024

General Notes for York Project (SDG) No.: 24D1066

1. The RLs and MDLs (Reporting Limit and Method Detection Limit respectively) reported are adjusted for any dilution necessary due to the levels of target and/or non-target analytes and matrix interference. The RL(REPORTING LIMIT) is based upon the lowest standard utilized for the calibration where applicable.
2. Samples are retained for a period of thirty days after submittal of report, unless other arrangements are made.
3. York's liability for the above data is limited to the dollar value paid to York for the referenced project.
4. This report shall not be reproduced without the written approval of York Analytical Laboratories, Inc.
5. All analyses conducted met method or Laboratory SOP requirements. See the Sample and Data Qualifiers Section for further information.
6. It is noted that no analyses reported herein were subcontracted to another laboratory, unless noted in the report.
7. This report reflects results that relate only to the samples submitted on the attached chain-of-custody form(s) received by York.
8. Analyses conducted at York Analytical Laboratories, Inc. Stratford, CT are indicated by NY Cert. No. 10854, NJ Cert No. CT005, PA Cert No. 68-04440, CT Cert No. PH-0723; those conducted at York Analytical Laboratories, Inc., Richmond Hill, NY are indicated by NY Cert. No. 12058, NJ Cert No. NY037, CT Cert No. PH-0721, NH Cert No. 2097, EPA Cert No. NY01600.

Approved By:



Cassie L. Mosher
Laboratory Manager

Date: 04/22/2024





Sample Information

Client Sample ID: IA-1

York Sample ID: 24D1066-01

York Project (SDG) No.

Client Project ID

Matrix

Collection Date/Time

Date Received

24D1066

280-284 Starr Street

Indoor Ambient Air

April 16, 2024 8:55 am

04/17/2024

VOA, TO15 Isooctane (2,2,4-TMP) Add On

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA TO15 PREP

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
540-84-1	* 2,2,4-Trimethylpentane	ND		ppbv	0.0392	0.784	EPA TO-15 Certifications:	04/19/2024 12:00	04/19/2024 23:31	YR

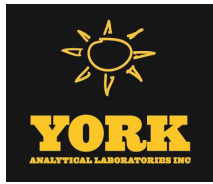
Volatile Organics, EPA TO15 Full List

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA TO15 PREP

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
630-20-6	* 1,1,1,2-Tetrachloroethane	ND		ug/m ³	0.54	0.784	EPA TO-15 Certifications:	04/19/2024 12:00	04/19/2024 23:31	YR
71-55-6	1,1,1-Trichloroethane	ND		ug/m ³	0.43	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
79-34-5	1,1,2,2-Tetrachloroethane	ND		ug/m ³	0.54	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	ND		ug/m ³	0.60	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
79-00-5	1,1,2-Trichloroethane	ND		ug/m ³	0.43	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
75-34-3	1,1-Dichloroethane	ND		ug/m ³	0.32	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
75-35-4	1,1-Dichloroethylene	ND		ug/m ³	0.078	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
120-82-1	1,2,4-Trichlorobenzene	ND	TO-CC V, TO-LC S-L	ug/m ³	0.58	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
95-63-6	1,2,4-Trimethylbenzene	0.81		ug/m ³	0.39	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
106-93-4	1,2-Dibromoethane	ND		ug/m ³	0.60	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
95-50-1	1,2-Dichlorobenzene	ND		ug/m ³	0.47	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
107-06-2	1,2-Dichloroethane	ND		ug/m ³	0.32	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
78-87-5	1,2-Dichloropropane	ND		ug/m ³	0.36	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
76-14-2	1,2-Dichlorotetrafluoroethane	ND		ug/m ³	0.55	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
108-67-8	1,3,5-Trimethylbenzene	ND		ug/m ³	0.39	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR



Sample Information

Client Sample ID: IA-1

York Sample ID: 24D1066-01

York Project (SDG) No.

24D1066

Client Project ID

280-284 Starr Street

Matrix

Indoor Ambient Air

Collection Date/Time

April 16, 2024 8:55 am

Date Received

04/17/2024

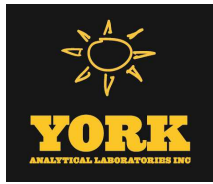
Volatile Organics, EPA TO15 Full List

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA TO15 PREP

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
106-99-0	1,3-Butadiene	ND		ug/m ³	0.52	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
541-73-1	1,3-Dichlorobenzene	ND		ug/m ³	0.47	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
142-28-9	* 1,3-Dichloropropane	ND		ug/m ³	0.36	0.784	EPA TO-15 Certifications:	04/19/2024 12:00	04/19/2024 23:31	YR
106-46-7	1,4-Dichlorobenzene	ND		ug/m ³	0.47	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
123-91-1	1,4-Dioxane	ND		ug/m ³	0.56	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
78-93-3	2-Butanone	2.1		ug/m ³	0.23	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
591-78-6	* 2-Hexanone	ND		ug/m ³	0.64	0.784	EPA TO-15 Certifications:	04/19/2024 12:00	04/19/2024 23:31	YR
107-05-1	3-Chloropropene	ND		ug/m ³	1.2	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
108-10-1	4-Methyl-2-pentanone	ND		ug/m ³	0.32	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
67-64-1	Acetone	26		ug/m ³	1.4	2,942	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/22/2024 16:23	YR
107-13-1	Acrylonitrile	0.41		ug/m ³	0.17	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
71-43-2	Benzene	0.70		ug/m ³	0.25	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
100-44-7	Benzyl chloride	ND	TO-CC V	ug/m ³	0.41	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
75-27-4	Bromodichloromethane	ND		ug/m ³	0.53	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
75-25-2	Bromoform	ND		ug/m ³	0.81	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
74-83-9	Bromomethane	ND		ug/m ³	0.30	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
75-15-0	Carbon disulfide	ND		ug/m ³	0.24	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
56-23-5	Carbon tetrachloride	0.44		ug/m ³	0.12	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
108-90-7	Chlorobenzene	ND		ug/m ³	0.36	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR



Sample Information

Client Sample ID: IA-1

York Sample ID: 24D1066-01

York Project (SDG) No.

24D1066

Client Project ID

280-284 Starr Street

Matrix

Indoor Ambient Air

Collection Date/Time

April 16, 2024 8:55 am

Date Received

04/17/2024

Volatile Organics, EPA TO15 Full List

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA TO15 PREP

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
75-00-3	Chloroethane	ND		ug/m ³	0.21	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
67-66-3	Chloroform	0.42		ug/m ³	0.38	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
74-87-3	Chloromethane	1.4		ug/m ³	0.16	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
156-59-2	cis-1,2-Dichloroethylene	ND		ug/m ³	0.078	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
10061-01-5	cis-1,3-Dichloropropylene	ND		ug/m ³	0.36	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
110-82-7	Cyclohexane	25		ug/m ³	0.27	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
124-48-1	Dibromochloromethane	ND		ug/m ³	0.67	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
75-71-8	Dichlorodifluoromethane	2.6		ug/m ³	0.39	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
141-78-6	* Ethyl acetate	2.1		ug/m ³	0.56	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
100-41-4	Ethyl Benzene	0.99		ug/m ³	0.34	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
87-68-3	Hexachlorobutadiene	ND		ug/m ³	0.84	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
67-63-0	Isopropanol	200	B	ug/m ³	3.6	2.942	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/22/2024 16:23	YR
80-62-6	Methyl Methacrylate	ND		ug/m ³	0.32	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
1634-04-4	Methyl tert-butyl ether (MTBE)	ND		ug/m ³	0.28	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
75-09-2	Methylene chloride	0.76		ug/m ³	0.54	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
91-20-3	* Naphthalene	ND	TO-CC V	ug/m ³	0.82	0.784	EPA TO-15 Certifications: NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
142-82-5	n-Heptane	2.4		ug/m ³	0.32	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
110-54-3	n-Hexane	1.5		ug/m ³	0.28	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
95-47-6	o-Xylene	1.6		ug/m ³	0.34	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
179601-23-1	p- & m- Xylenes	3.8		ug/m ³	0.68	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR



Sample Information

Client Sample ID: IA-1

York Sample ID: 24D1066-01

York Project (SDG) No.
24D1066

Client Project ID
280-284 Starr Street

Matrix
Indoor Ambient Air

Collection Date/Time
April 16, 2024 8:55 am

Date Received
04/17/2024

Volatile Organics, EPA TO15 Full List

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA TO15 PREP

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
622-96-8	* p-Ethyltoluene	0.66		ug/m ³	0.39	0.784	EPA TO-15 Certifications:	04/19/2024 12:00	04/19/2024 23:31	YR
115-07-1	* Propylene	2.1		ug/m ³	0.13	0.784	EPA TO-15 Certifications:	04/19/2024 12:00	04/19/2024 23:31	YR
100-42-5	Styrene	0.33		ug/m ³	0.33	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
127-18-4	Tetrachloroethylene	0.53		ug/m ³	0.53	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
109-99-9	* Tetrahydrofuran	ND		ug/m ³	0.46	0.784	EPA TO-15 Certifications:	04/19/2024 12:00	04/19/2024 23:31	YR
108-88-3	Toluene	32		ug/m ³	0.30	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
156-60-5	trans-1,2-Dichloroethylene	ND		ug/m ³	0.31	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
10061-02-6	trans-1,3-Dichloropropylene	ND		ug/m ³	0.36	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
79-01-6	Trichloroethylene	2.3		ug/m ³	0.11	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
75-69-4	Trichlorofluoromethane (Freon 11)	1.4		ug/m ³	0.44	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
108-05-4	Vinyl acetate	ND		ug/m ³	0.28	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
593-60-2	Vinyl bromide	ND		ug/m ³	0.34	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR
75-01-4	Vinyl Chloride	ND		ug/m ³	0.10	0.784	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/19/2024 23:31	YR

Sample Information

Client Sample ID: IA-2

York Sample ID: 24D1066-02

York Project (SDG) No.
24D1066

Client Project ID
280-284 Starr Street

Matrix
Indoor Ambient Air

Collection Date/Time
April 16, 2024 9:00 am

Date Received
04/17/2024

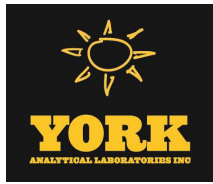
VOA, TO15 Isooctane (2,2,4-TMP) Add On

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA TO15 PREP

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
540-84-1	* 2,2,4-Trimethylpentane	ND		ppbv	0.0438	0.876	EPA TO-15 Certifications:	04/19/2024 12:00	04/20/2024 00:17	YR



Sample Information

Client Sample ID: IA-2

York Sample ID: 24D1066-02

York Project (SDG) No.

Client Project ID

Matrix

Collection Date/Time

Date Received

24D1066

280-284 Starr Street

Indoor Ambient Air

April 16, 2024 9:00 am

04/17/2024

Volatile Organics, EPA TO15 Full List

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA TO15 PREP

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
630-20-6	* 1,1,1,2-Tetrachloroethane	ND		ug/m ³	0.60	0.876	EPA TO-15 Certifications:	04/19/2024 12:00	04/20/2024 00:17	YR
71-55-6	1,1,1-Trichloroethane	ND		ug/m ³	0.48	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
79-34-5	1,1,2,2-Tetrachloroethane	ND		ug/m ³	0.60	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	ND		ug/m ³	0.67	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
79-00-5	1,1,2-Trichloroethane	ND		ug/m ³	0.48	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
75-34-3	1,1-Dichloroethane	ND		ug/m ³	0.35	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
75-35-4	1,1-Dichloroethylene	ND		ug/m ³	0.087	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
120-82-1	1,2,4-Trichlorobenzene	ND	TO-CC V, TO-LC S-L	ug/m ³	0.65	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
95-63-6	1,2,4-Trimethylbenzene	0.95		ug/m ³	0.43	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
106-93-4	1,2-Dibromoethane	ND		ug/m ³	0.67	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
95-50-1	1,2-Dichlorobenzene	ND		ug/m ³	0.53	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
107-06-2	1,2-Dichloroethane	ND		ug/m ³	0.35	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
78-87-5	1,2-Dichloropropane	ND		ug/m ³	0.40	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
76-14-2	1,2-Dichlorotetrafluoroethane	ND		ug/m ³	0.61	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
108-67-8	1,3,5-Trimethylbenzene	ND		ug/m ³	0.43	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
106-99-0	1,3-Butadiene	ND		ug/m ³	0.58	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
541-73-1	1,3-Dichlorobenzene	ND		ug/m ³	0.53	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
142-28-9	* 1,3-Dichloropropane	ND		ug/m ³	0.40	0.876	EPA TO-15 Certifications:	04/19/2024 12:00	04/20/2024 00:17	YR
106-46-7	1,4-Dichlorobenzene	ND		ug/m ³	0.53	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR



Sample Information

Client Sample ID: IA-2

York Sample ID: 24D1066-02

York Project (SDG) No.
24D1066

Client Project ID
280-284 Starr Street

Matrix
Indoor Ambient Air

Collection Date/Time
April 16, 2024 9:00 am

Date Received
04/17/2024

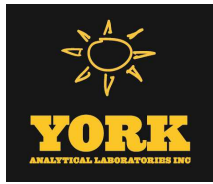
Volatile Organics, EPA TO15 Full List

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA TO15 PREP

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
123-91-1	1,4-Dioxane	ND		ug/m ³	0.63	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
78-93-3	2-Butanone	5.0		ug/m ³	0.26	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
591-78-6	* 2-Hexanone	2.1		ug/m ³	0.72	0.876	EPA TO-15 Certifications:	04/19/2024 12:00	04/20/2024 00:17	YR
107-05-1	3-Chloropropene	ND		ug/m ³	1.4	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
108-10-1	4-Methyl-2-pentanone	ND		ug/m ³	0.36	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
67-64-1	Acetone	60		ug/m ³	0.42	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
107-13-1	Acrylonitrile	0.21		ug/m ³	0.19	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
71-43-2	Benzene	0.62		ug/m ³	0.28	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
100-44-7	Benzyl chloride	ND	TO-CC V	ug/m ³	0.45	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
75-27-4	Bromodichloromethane	ND		ug/m ³	0.59	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
75-25-2	Bromoform	ND		ug/m ³	0.91	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
74-83-9	Bromomethane	ND		ug/m ³	0.34	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
75-15-0	Carbon disulfide	ND		ug/m ³	0.27	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
56-23-5	Carbon tetrachloride	0.50		ug/m ³	0.14	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
108-90-7	Chlorobenzene	ND		ug/m ³	0.40	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
75-00-3	Chloroethane	ND		ug/m ³	0.23	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
67-66-3	Chloroform	4.2		ug/m ³	0.43	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
74-87-3	Chloromethane	1.2		ug/m ³	0.18	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
156-59-2	cis-1,2-Dichloroethylene	0.42		ug/m ³	0.087	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
10061-01-5	cis-1,3-Dichloropropylene	ND		ug/m ³	0.40	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR



Sample Information

Client Sample ID: IA-2

York Sample ID: 24D1066-02

York Project (SDG) No.

Client Project ID

Matrix

Collection Date/Time

Date Received

24D1066

280-284 Starr Street

Indoor Ambient Air

April 16, 2024 9:00 am

04/17/2024

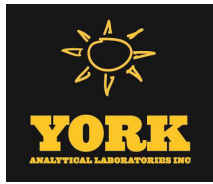
Volatile Organics, EPA TO15 Full List

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA TO15 PREP

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
110-82-7	Cyclohexane	48		ug/m ³	0.30	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
124-48-1	Dibromochloromethane	ND		ug/m ³	0.75	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
75-71-8	Dichlorodifluoromethane	3.2		ug/m ³	0.43	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
141-78-6	* Ethyl acetate	1.3		ug/m ³	0.63	0.876	EPA TO-15 Certifications:	04/19/2024 12:00	04/20/2024 00:17	YR
100-41-4	Ethyl Benzene	1.4		ug/m ³	0.38	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
87-68-3	Hexachlorobutadiene	ND		ug/m ³	0.93	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
67-63-0	Isopropanol	4.5	B	ug/m ³	1.1	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
80-62-6	Methyl Methacrylate	0.68		ug/m ³	0.36	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
1634-04-4	Methyl tert-butyl ether (MTBE)	ND		ug/m ³	0.32	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
75-09-2	Methylene chloride	0.76		ug/m ³	0.61	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
91-20-3	* Naphthalene	ND	TO-CC V	ug/m ³	0.92	0.876	EPA TO-15 Certifications: NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
142-82-5	n-Heptane	4.2		ug/m ³	0.36	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
110-54-3	n-Hexane	2.3		ug/m ³	0.31	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
95-47-6	o-Xylene	1.7		ug/m ³	0.38	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
179601-23-1	p- & m- Xylenes	5.2		ug/m ³	0.76	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
622-96-8	* p-Ethyltoluene	0.65		ug/m ³	0.43	0.876	EPA TO-15 Certifications:	04/19/2024 12:00	04/20/2024 00:17	YR
115-07-1	* Propylene	4.2		ug/m ³	0.15	0.876	EPA TO-15 Certifications:	04/19/2024 12:00	04/20/2024 00:17	YR
100-42-5	Styrene	0.52		ug/m ³	0.37	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
127-18-4	Tetrachloroethylene	1.7		ug/m ³	0.59	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
109-99-9	* Tetrahydrofuran	ND		ug/m ³	0.52	0.876	EPA TO-15 Certifications:	04/19/2024 12:00	04/20/2024 00:17	YR
108-88-3	Toluene	59		ug/m ³	0.33	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR



Sample Information

Client Sample ID: IA-2

York Sample ID: 24D1066-02

York Project (SDG) No.

24D1066

Client Project ID

280-284 Starr Street

Matrix

Indoor Ambient Air

Collection Date/Time

April 16, 2024 9:00 am

Date Received

04/17/2024

Volatile Organics, EPA TO15 Full List

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA TO15 PREP

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
156-60-5	trans-1,2-Dichloroethylene	0.35		ug/m ³	0.35	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
10061-02-6	trans-1,3-Dichloropropylene	ND		ug/m ³	0.40	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
79-01-6	Trichloroethylene	34		ug/m ³	0.12	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
75-69-4	Trichlorofluoromethane (Freon 11)	1.5		ug/m ³	0.49	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
108-05-4	Vinyl acetate	ND		ug/m ³	0.31	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
593-60-2	Vinyl bromide	ND		ug/m ³	0.38	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR
75-01-4	Vinyl Chloride	ND		ug/m ³	0.11	0.876	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 00:17	YR

Sample Information

Client Sample ID: IA-3

York Sample ID: 24D1066-03

York Project (SDG) No.

24D1066

Client Project ID

280-284 Starr Street

Matrix

Indoor Ambient Air

Collection Date/Time

April 16, 2024 9:05 am

Date Received

04/17/2024

VOA, TO15 Isooctane (2,2,4-TMP) Add On

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA TO15 PREP

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
540-84-1	* 2,2,4-Trimethylpentane	ND		ppbv	0.0437	0.874	EPA TO-15 Certifications:	04/19/2024 12:00	04/20/2024 01:02	YR

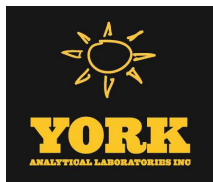
Volatile Organics, EPA TO15 Full List

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA TO15 PREP

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
630-20-6	* 1,1,1,2-Tetrachloroethane	ND		ug/m ³	0.60	0.874	EPA TO-15 Certifications:	04/19/2024 12:00	04/20/2024 01:02	YR
71-55-6	1,1,1-Trichloroethane	ND		ug/m ³	0.48	0.874	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 01:02	YR
79-34-5	1,1,2,2-Tetrachloroethane	ND		ug/m ³	0.60	0.874	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 01:02	YR



Sample Information

Client Sample ID: IA-3

York Sample ID: 24D1066-03

York Project (SDG) No.
24D1066

Client Project ID
280-284 Starr Street

Matrix
Indoor Ambient Air

Collection Date/Time
April 16, 2024 9:05 am

Date Received
04/17/2024

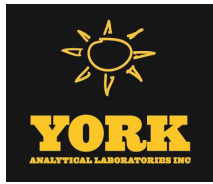
Volatile Organics, EPA TO15 Full List

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA TO15 PREP

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	ND		ug/m ³	0.67	0.874	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 01:02	YR
79-00-5	1,1,2-Trichloroethane	ND		ug/m ³	0.48	0.874	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 01:02	YR
75-34-3	1,1-Dichloroethane	ND		ug/m ³	0.35	0.874	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 01:02	YR
75-35-4	1,1-Dichloroethylene	ND		ug/m ³	0.087	0.874	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 01:02	YR
120-82-1	1,2,4-Trichlorobenzene	ND	TO-CC V, TO-LC S-L	ug/m ³	0.65	0.874	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 01:02	YR
95-63-6	1,2,4-Trimethylbenzene	0.86		ug/m ³	0.43	0.874	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 01:02	YR
106-93-4	1,2-Dibromoethane	ND		ug/m ³	0.67	0.874	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 01:02	YR
95-50-1	1,2-Dichlorobenzene	ND		ug/m ³	0.53	0.874	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 01:02	YR
107-06-2	1,2-Dichloroethane	ND		ug/m ³	0.35	0.874	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 01:02	YR
78-87-5	1,2-Dichloropropane	ND		ug/m ³	0.40	0.874	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 01:02	YR
76-14-2	1,2-Dichlorotetrafluoroethane	ND		ug/m ³	0.61	0.874	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 01:02	YR
108-67-8	1,3,5-Trimethylbenzene	ND		ug/m ³	0.43	0.874	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 01:02	YR
106-99-0	1,3-Butadiene	ND		ug/m ³	0.58	0.874	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 01:02	YR
541-73-1	1,3-Dichlorobenzene	ND		ug/m ³	0.53	0.874	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 01:02	YR
142-28-9	* 1,3-Dichloropropane	ND		ug/m ³	0.40	0.874	EPA TO-15 Certifications:	04/19/2024 12:00	04/20/2024 01:02	YR
106-46-7	1,4-Dichlorobenzene	ND		ug/m ³	0.53	0.874	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 01:02	YR
123-91-1	1,4-Dioxane	ND		ug/m ³	0.63	0.874	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 01:02	YR
78-93-3	2-Butanone	1.5		ug/m ³	0.26	0.874	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 01:02	YR



Sample Information

Client Sample ID: IA-3

York Sample ID: 24D1066-03

York Project (SDG) No.

24D1066

Client Project ID

280-284 Starr Street

Matrix

Indoor Ambient Air

Collection Date/Time

April 16, 2024 9:05 am

Date Received

04/17/2024

Volatile Organics, EPA TO15 Full List

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA TO15 PREP

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
591-78-6	* 2-Hexanone	ND		ug/m ³	0.72	0.874	EPA TO-15 Certifications:	04/19/2024 12:00	04/20/2024 01:02	YR
107-05-1	3-Chloropropene	ND		ug/m ³	1.4	0.874	EPA TO-15 Certifications:	04/19/2024 12:00	04/20/2024 01:02	YR
108-10-1	4-Methyl-2-pentanone	ND		ug/m ³	0.36	0.874	EPA TO-15 Certifications:	04/19/2024 12:00	04/20/2024 01:02	YR
67-64-1	Acetone	55		ug/m ³	0.42	0.874	EPA TO-15 Certifications:	04/19/2024 12:00	04/20/2024 01:02	YR
107-13-1	Acrylonitrile	ND		ug/m ³	0.19	0.874	EPA TO-15 Certifications:	04/19/2024 12:00	04/20/2024 01:02	YR
71-43-2	Benzene	0.70		ug/m ³	0.28	0.874	EPA TO-15 Certifications:	04/19/2024 12:00	04/20/2024 01:02	YR
100-44-7	Benzyl chloride	ND	TO-CC V	ug/m ³	0.45	0.874	EPA TO-15 Certifications:	04/19/2024 12:00	04/20/2024 01:02	YR
75-27-4	Bromodichloromethane	ND		ug/m ³	0.59	0.874	EPA TO-15 Certifications:	04/19/2024 12:00	04/20/2024 01:02	YR
75-25-2	Bromoform	ND		ug/m ³	0.90	0.874	EPA TO-15 Certifications:	04/19/2024 12:00	04/20/2024 01:02	YR
74-83-9	Bromomethane	ND		ug/m ³	0.34	0.874	EPA TO-15 Certifications:	04/19/2024 12:00	04/20/2024 01:02	YR
75-15-0	Carbon disulfide	ND		ug/m ³	0.27	0.874	EPA TO-15 Certifications:	04/19/2024 12:00	04/20/2024 01:02	YR
56-23-5	Carbon tetrachloride	0.49		ug/m ³	0.14	0.874	EPA TO-15 Certifications:	04/19/2024 12:00	04/20/2024 01:02	YR
108-90-7	Chlorobenzene	ND		ug/m ³	0.40	0.874	EPA TO-15 Certifications:	04/19/2024 12:00	04/20/2024 01:02	YR
75-00-3	Chloroethane	ND		ug/m ³	0.23	0.874	EPA TO-15 Certifications:	04/19/2024 12:00	04/20/2024 01:02	YR
67-66-3	Chloroform	0.47		ug/m ³	0.43	0.874	EPA TO-15 Certifications:	04/19/2024 12:00	04/20/2024 01:02	YR
74-87-3	Chloromethane	1.2		ug/m ³	0.18	0.874	EPA TO-15 Certifications:	04/19/2024 12:00	04/20/2024 01:02	YR
156-59-2	cis-1,2-Dichloroethylene	ND		ug/m ³	0.087	0.874	EPA TO-15 Certifications:	04/19/2024 12:00	04/20/2024 01:02	YR
10061-01-5	cis-1,3-Dichloropropylene	ND		ug/m ³	0.40	0.874	EPA TO-15 Certifications:	04/19/2024 12:00	04/20/2024 01:02	YR
110-82-7	Cyclohexane	28		ug/m ³	0.30	0.874	EPA TO-15 Certifications:	04/19/2024 12:00	04/20/2024 01:02	YR



Sample Information

Client Sample ID: IA-3

York Sample ID: 24D1066-03

York Project (SDG) No.
24D1066

Client Project ID
280-284 Starr Street

Matrix
Indoor Ambient Air

Collection Date/Time
April 16, 2024 9:05 am

Date Received
04/17/2024

Volatile Organics, EPA TO15 Full List

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA TO15 PREP

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
124-48-1	Dibromochloromethane	ND		ug/m ³	0.74	0.874	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 01:02	YR
75-71-8	Dichlorodifluoromethane	2.6		ug/m ³	0.43	0.874	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 01:02	YR
141-78-6	* Ethyl acetate	2.1		ug/m ³	0.63	0.874	EPA TO-15 Certifications:	04/19/2024 12:00	04/20/2024 01:02	YR
100-41-4	Ethyl Benzene	0.76		ug/m ³	0.38	0.874	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 01:02	YR
87-68-3	Hexachlorobutadiene	ND		ug/m ³	0.93	0.874	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 01:02	YR
67-63-0	Isopropanol	7.4	B	ug/m ³	1.1	0.874	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 01:02	YR
80-62-6	Methyl Methacrylate	0.47		ug/m ³	0.36	0.874	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 01:02	YR
1634-04-4	Methyl tert-butyl ether (MTBE)	ND		ug/m ³	0.32	0.874	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 01:02	YR
75-09-2	Methylene chloride	0.79		ug/m ³	0.61	0.874	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 01:02	YR
91-20-3	* Naphthalene	ND	TO-CC V	ug/m ³	0.92	0.874	EPA TO-15 Certifications: NJDEP-NY037	04/19/2024 12:00	04/20/2024 01:02	YR
142-82-5	n-Heptane	2.5		ug/m ³	0.36	0.874	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 01:02	YR
110-54-3	n-Hexane	1.7		ug/m ³	0.31	0.874	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 01:02	YR
95-47-6	o-Xylene	0.99		ug/m ³	0.38	0.874	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 01:02	YR
179601-23-1	p- & m- Xylenes	3.0		ug/m ³	0.76	0.874	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 01:02	YR
622-96-8	* p-Ethyltoluene	0.69		ug/m ³	0.43	0.874	EPA TO-15 Certifications:	04/19/2024 12:00	04/20/2024 01:02	YR
115-07-1	* Propylene	2.0		ug/m ³	0.15	0.874	EPA TO-15 Certifications:	04/19/2024 12:00	04/20/2024 01:02	YR
100-42-5	Styrene	ND		ug/m ³	0.37	0.874	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 01:02	YR
127-18-4	Tetrachloroethylene	ND		ug/m ³	0.59	0.874	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 01:02	YR
109-99-9	* Tetrahydrofuran	ND		ug/m ³	0.52	0.874	EPA TO-15 Certifications:	04/19/2024 12:00	04/20/2024 01:02	YR
108-88-3	Toluene	35		ug/m ³	0.33	0.874	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 01:02	YR



Sample Information

Client Sample ID: IA-3

York Sample ID: 24D1066-03

York Project (SDG) No.
24D1066

Client Project ID
280-284 Starr Street

Matrix
Indoor Ambient Air

Collection Date/Time
April 16, 2024 9:05 am

Date Received
04/17/2024

Volatile Organics, EPA TO15 Full List

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA TO15 PREP

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
156-60-5	trans-1,2-Dichloroethylene	ND		ug/m ³	0.35	0.874	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 01:02	YR
10061-02-6	trans-1,3-Dichloropropylene	ND		ug/m ³	0.40	0.874	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 01:02	YR
79-01-6	Trichloroethylene	2.4		ug/m ³	0.12	0.874	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 01:02	YR
75-69-4	Trichlorofluoromethane (Freon 11)	1.5		ug/m ³	0.49	0.874	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 01:02	YR
108-05-4	Vinyl acetate	ND		ug/m ³	0.31	0.874	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 01:02	YR
593-60-2	Vinyl bromide	ND		ug/m ³	0.38	0.874	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 01:02	YR
75-01-4	Vinyl Chloride	ND		ug/m ³	0.11	0.874	EPA TO-15 Certifications: NELAC-NY12058,NJDEP-NY037	04/19/2024 12:00	04/20/2024 01:02	YR





Sample and Data Qualifiers Relating to This Work Order

TO-LCS-L	The result reported for this compound may be biased low due to its behavior in the analysis batch LCS where it recovered less 70% of the expected value.
TO-CCV	The value reported is ESTIMATED for this compound due to its behavior during continuing calibration verification (>30% Difference from initial calibration).
B	Analyte is found in the associated analysis batch blank. For volatiles, methylene chloride and acetone are common lab contaminants.

Definitions and Other Explanations

*	Analyte is not certified or the state of the samples origination does not offer certification for the Analyte.
ND	NOT DETECTED - the analyte is not detected at the Reported to level (LOQ/RL or LOD/MDL)
RL	REPORTING LIMIT - the minimum reportable value based upon the lowest point in the analyte calibration curve.
LOQ	LIMIT OF QUANTITATION - the minimum concentration of a target analyte that can be reported within a specified degree of confidence. This is the lowest point in an analyte calibration curve that has been subjected to all steps of the processing/analysis and verified to meet defined criteria. This is based upon current NELAC/TNI Standards and applies to all analyses.
LOD	LIMIT OF DETECTION - a verified estimate of the minimum concentration of a substance in a given matrix that an analytical process can reliably detect. This is based upon NELAC 2009 Standards and applies to all analyses conducted under the auspices of EPA SW-846.
MDL	METHOD DETECTION LIMIT - a statistically derived estimate of the minimum amount of a substance an analytical system can reliably detect with a 99% confidence that the concentration of the substance is greater than zero. This is based upon 40 CFR Part 136 Appendix B and applies only to EPA 600 and 200 series methods.
Reported to	This indicates that the data for a particular analysis is reported to either the LOD/MDL, or the LOQ/RL. In cases where the "Reported to" is located above the LOD/MDL, any value between this and the LOQ represents an estimated value which is "J" flagged accordingly. This applies to volatile and semi-volatile target compounds only.
NR	Not reported
RPD	Relative Percent Difference
Wet	The data has been reported on an as-received (wet weight) basis
Low Bias	Low Bias flag indicates that the recovery of the flagged analyte is below the laboratory or regulatory lower control limit. The data user should take note that this analyte may be biased low but should evaluate multiple lines of evidence including the LCS and site-specific MS/MSD data to draw bias conclusions. In cases where no site-specific MS/MSD was requested, only the LCS data can be used to evaluate such bias.
High Bias	High Bias flag indicates that the recovery of the flagged analyte is above the laboratory or regulatory upper control limit. The data user should take note that this analyte may be biased high but should evaluate multiple lines of evidence including the LCS and site-specific MS/MSD data to draw bias conclusions. In cases where no site-specific MS/MSD was requested, only the LCS data can be used to evaluate such bias.
Non-Dir.	Non-dir. flag (Non-Directional Bias) indicates that the Relative Percent Difference (RPD) (a measure of precision) among the MS and MSD data is outside the laboratory or regulatory control limit. This alerts the data user where the MS and MSD are from site-specific samples that the RPD is high due to either non-homogeneous distribution of target analyte between the MS/MSD or indicates poor reproducibility for other reasons.

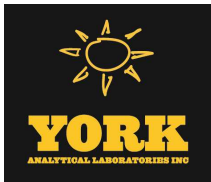
If EPA SW-846 method 8270 is included herein it is noted that the target compound N-nitrosodiphenylamine (NDPA) decomposes in the gas chromatographic inlet and cannot be separated from diphenylamine (DPA). These results could actually represent 100% DPA, 100% NDPA or some combination of the two. For this reason, York reports the combined result for n-nitrosodiphenylamine and diphenylamine for either of these compounds as a combined concentration as Diphenylamine.

If Total PCBs are detected and the target aroclors reported are "Not detected", the Total PCB value is reported due to the presence of either or both Aroclors 1262 and 1268 which are non-target aroclors for some regulatory lists.

2-chloroethylvinyl ether readily breaks down under acidic conditions. Samples that are acid preserved, including standards will exhibit breakdown. The data user should take note.

Certification for pH is no longer offered by NYDOH ELAP.

Semi-Volatile and Volatile analyses are reported down to the LOD/MDL, with values between the LOD/MDL and the LOQ being "J" flagged as estimated results.



For analyses by EPA SW-846-8270D, the Limit of Quantitation (LOQ) reported for benzidine is based upon the lowest standard used for calibration and is not a verified LOQ due to this compound's propensity for oxidative losses during extraction/concentration procedures and non-reproducible chromatographic performance.



Appendix B

Resumes of Key Personnel

Nicholas Krasnecky, PE

Principal Engineer

Nicholas Krasnecky, PE, has over 14 years of progressive experience in environmental consulting working on a variety of environmental characterization and remediation projects for municipal, commercial, industrial, and private clients. Mr. Krasnecky specializes in site characterization and the evaluation, design, and implementation of remedial alternatives, particularly in New York and New Jersey via application of state specific environmental guidance. He utilizes his extensive environmental consulting and remediation background to support regulatory site closure, property development, risk management, evaluation for New York State Brownfield Cleanup Program (BCP) applicability, and additional client specific project goals.

Mr. Krasnecky has extensive experience with remedial treatment system design, implementation, and operations and maintenance, including pump and treat, air sparge, soil vapor extraction, and dual-phase extraction systems. He has designed and implemented in-situ remediation technologies at numerous sites, including in-situ chemical oxidation, aerobic bioremediation, in-situ chemical reduction, permeable reactive barriers, and enhanced anaerobic bioremediation. He has expertise in the assessment of vapor intrusion and the design, construction, and commissioning of active and passive vapor intrusion mitigation systems.

Mr. Krasnecky has served as an engineer for various large-scale, complex remedial actions involving large work forces with multiple phases of work occurring simultaneously, including interaction with regulators, clients, and various stakeholders. His responsibilities include preparing proposals and cost estimates, producing engineering plans and specifications, collecting and analyzing field data, construction management and engineering oversight, health and safety, budget tracking, environmental and stormwater permitting, and technical report writing.

Project Experience

Elmwood Preserve - NYSDEC Brownfield Cleanup Program Site, White Plains, New York (2024 – Present)

Senior Remedial Engineer/Licensed Professional. Serves as the remedial engineer/licensed professional for the Elmwood Preserve Site (Site), a 106-acre former golf course property impacted by historically applied pesticides, proposed for single-family home redevelopment, and enrolled in the New York State Department of Environmental Conservation (NYSDEC) BCP. Reviewed and evaluated previously collected Remedial Investigation (RI) data, developed and implemented supplemental RI scopes, and prepared the associated RI report. Prepared the Remedial Action Work Plan (RAWP) presenting the remedial design and strategy to excavate, transport off-site, and dispose of over 100,000 cubic yards of soils. Provides project management, regulatory coordination, cost to closure estimates, and strategy support for the project.

The Bellwether District – Former Refinery, Philadelphia, Pennsylvania (2025 – Present)

Senior Remedial Engineer. Provides remedial investigation and design services for multiple sites at The Bellwether District, formerly the Philadelphia Energy Solutions Refinery, enrolled in the Pennsylvania Land Recycling Program (Act 2). Evaluated historical data related to light non-aqueous phase liquid (LNAPL) releases and developed and implemented additional investigations to identify separate releases, including high-res Ultraviolet Optical Screening Tooling, to prepare conceptual site models and Act 2 reporting. Develops remedial approaches for LNAPL management, recovery, and closure plans in accordance with Act 2. Serves as the Licensed Professional Engineer for the design of a passive vapor intrusion mitigation system (VIMS) for methane and VOCs at a 1.4 million square foot warehouse proposed to be constructed at the Site.

Education

BS in Environmental Engineering, Rensselaer Polytechnic Institute, 2011

Years of Experience

14

Joined Terraphase

2023

Professional History

Terraphase Engineering Inc., Principal Engineer, 2023 – present

ECC Horizon, Senior Environmental Engineer, 2018 – 2023

Kennedy/Jenks Consultants, Senior Staff Environmental Engineer, 2015 – 2017

ARCADIS, Environmental Engineer II, 2012 – 2015

Licenses/Registrations

*Professional Engineer, New York #100006
New Jersey #24GE05369900
Indiana #11900093
Connecticut #PEN.0038081
Massachusetts #59517
Pennsylvania #PE097611
Delaware #31286*

Certification/Training

*40-Hour OSHA HAZWOPER
OSHA 10-hour Construction Safety and Health
Silica Awareness*

401 Hunts Point - NYSDEC Brownfield Cleanup Program Site, Bronx, New York (2022 – present)

Senior Remedial Engineer/Licensed Professional. Serves as the licensed professional engineer for the 401 Hunts Point Site, a former sheet-metal manufacturing facility enrolled in the NYSDEC BCP. Prepared the BCP and RI Work Plan and oversaw the implementation of the RI. Evaluated remedial alternatives, designed the remedial action, and prepared and implemented an Interim Remedial Measures (IRM) Work Plan consisting of underground storage tank (UST) and soil removal via excavation, in-situ injections to treat petroleum hydrocarbon groundwater impacts, and the installation of an active sub-slab depressurization system to mitigate vapor intrusion concerns associated with chlorinated volatile organic compounds (cVOCs).

Former Gasoline Service Station Remediation/Redevelopment, Oakland, CA (2023 – present)

Associate Engineer. Provided technical and engineering support for the remediation and redevelopment of a former gasoline service station to multi-family residential housing. Prepared engineering cost estimates and subsequent bid package for the removal of 10,000 tons of lead- and petroleum-impacted soils. Prepared a passive vapor intrusion mitigation system design installed as part of redevelopment to mitigate potential remaining vapor intrusion impacts.

Marion County Community Justice Campus – Vapor Mitigation System, Indianapolis, Indiana, (2019 – 2021)

Senior Environmental Engineer. Engineer of Record for the design, installation oversight, and commissioning of active sub-slab vapor mitigation systems at four buildings at the City of Indianapolis's new Community Justice Campus, to mitigate potential vapor impacts from subsurface impacts associated with a Former Manufactured Gas Plant. Buildings ranged in size from 22,000 to 120,000 square feet and required active sub-slab systems consisting of a vapor barrier, sub-slab infrastructure, and electrically powered inline fans equipped with continuous monitoring via integrated alarms and controls into the overall building management systems.

Site Remediation and Redevelopment, Long Island City, New York, 39-26th Street LLC (2020 – present)

Senior Remedial Engineer/Licensed Professional. Serves as the licensed professional engineer for ongoing remediation and subsequent redevelopment of the Bridge Cleaners Site, a former commercial dry-cleaner property enrolled as a NYSDEC State Superfund Site. Designed and implemented work plans for an expansion to the existing Air Sparge/Soil Vapor Extraction (AS/SVE) system, decommissioning of the AS/SVE, redevelopment excavation and air monitoring for the redevelopment of the property to an 11-story residential building, and in-situ remedial injection of zero-valent iron and enhanced anaerobic biodegradation amendments to treat a cVOC groundwater plume.

Former Gasoline Station Petroleum Remediation, Sterling, Colorado, QBE Insurance Group Ltd. (2020 – 2023)

Senior Environmental Engineer. Served as the lead remedial engineer for the remediation of a petroleum hydrocarbon groundwater plume stemming from gas station USTs and a historical gasoline tanker spill. Evaluated the effectiveness of the ongoing AS/SVE remedial system and conducted additional investigation activities, including a Membrane Interface Hydraulic Profiling (MIHPT) investigation to develop an updated conceptual site model to evaluate remedial treatment alternatives. Designed an in-situ remedial approach utilizing a Vertebrae Well System® to deliver a chemical oxidation solution to the subsurface to treat the groundwater plume extending under a State Highway and parking lot.

Former Safer Textiles - Site Remediation, New Jersey, Confidential Client (2014 – 2017)

Senior Staff Environmental Engineer. Provided engineering design and remedial oversight for a cVOC soil and groundwater remediation project involving in-situ and ex-situ treatment and containment strategies in New Jersey. Provided engineering oversight of remediation contractor; design, operations, maintenance, and optimization of the remedial technologies implemented include dual-phase vacuum extraction of dissolved and free phase tetrachloroethylene and daughter products, vapor mitigation system installation oversight in an existing building and continued air monitoring, enhanced anaerobic bioremediation, in-situ pH buffering, sediment dredging and capping, and sheet pile containment followed by site restoration including wetlands mitigation.

Feasibility Studies, Montana, Confidential Client (2016 – 2017)

Senior Staff Environmental Engineer. Preparation of two Feasibility Study (FS) reports and Rough Order of Magnitude (ROM) costs to identify and evaluate remedial alternatives for two sites impacted by historical railway operations. The FS addresses alternatives for multiple contaminants impacting soil and groundwater at the sites and included an excavation cut/fill and capping evaluation with respect to environmental exposure pathways risk evaluation and management.

Alexander Strohl, PG

Senior Project Geologist

Mr. Strohl is a Licensed Professional Geologist with over 10 years of experience in the environmental consulting industry. As a Project Geologist, he is responsible for directing multi-media site characterization programs involving groundwater, soil, surface water, soil vapor, and sediment sample collection for a variety of target contaminants including, chlorinated hydrocarbons, petroleum hydrocarbons, per- and polyfluoroalkyl substances (PFAS), metals, Polychlorinated Biphenyls (PCBs) and others. He has supervised environmental investigation and remediation including soil excavation, in-situ groundwater remediation, petroleum and chemical storage tank decommissioning, and monitoring well installation and abandonment. Mr. Strohl is also responsible for preparing Work Plans, Phase I Environmental Site Assessments (ESAs), and investigation-related technical reports for clients and regulatory agencies. Mr. Strohl is experienced in utilizing groundwater contaminant plume models in addition to his experience in developing environmental conceptual site models.

Mr. Strohl's project experience includes complex remedial investigation projects, the Pennsylvania Voluntary Cleanup (Act 2) Program, PFAS sampling and reporting, Phase I and II ESAs, tank investigations/removal, desktop auditing of oil and gas waste disposal facilities, Spill Prevention, Control, and Countermeasure (SPCC) inspections of oil and gas facilities, regulatory reporting for landfills, and National Pollutant Discharge Elimination System (NPDES) sampling and reporting.

Project Experience

Former Philadelphia Refinery, Philadelphia, Pennsylvania, Philadelphia Energy Solutions Refining and Marketing (2021 – present)

Professional Geologist of Record. Developed investigation work plans and site characterization reports to assist with closure of a 1,400-acre, 150-year-old former petroleum refinery. The site is currently enrolled in the Pennsylvania Regulated Tank Corrective Actions Program and the Pennsylvania Voluntary Cleanup Program for multiple sources of contamination. Certified the closure reports as the Professional Geologist of record.

Jennersville Hospital, West Grove, Pennsylvania, Tower Health (2022 – present)

Project Manager. Planned and managed a complex site investigation for PFAS at a hospital property impacted by the discharge of laundry greywater. The investigation included a rigorous quality assurance program, which was executed to the satisfaction of the client and third-party consultant reviewers. The implemented protocols for prevention of cross contamination have proven to be effective; quality assurance blanks have not detected PFAS substances above laboratory detection limits. The site will be enrolled in Act 2.

Multiple Act 2 Project Sites, Pennsylvania (2021 – present)

Professional Geologist of Record. Developed and certified Final Reports as the Professional Geologist of record to receive release of liability through the Act 2 program. Sites have included a recently developed car dealership where improper reporting for former underground storage tanks (USTs) had previously failed to demonstrate attainment of the selected

Education

BS in Geosciences, with a minor in Spanish, The Pennsylvania State University, 2015

Years of Experience

10+

Joined Terraphase

2021

Professional History

Terraphase Engineering Inc., Senior Project Geologist, 2026 – present; Project Geologist, 2024 – 2025; Senior Staff Geologist, 2021 – 2023

Environmental Standards, Inc., Staff Geoscientist, 2015 – 2021

Licenses/Registrations

Pennsylvania Licensed Professional Geologist No. 5519, 2021

Delaware Licensed Professional Geologist No. S4-0011440, 2024

New Hampshire Licensed Professional Geologist No. 927, 2024

Maine Licensed Professional Geologist No. GE683, 2025

Certification/Training

Synergis Technologies' 32-Hour AutoCAD Essentials, 2015

OSHA HAZWOPER 29 CFR 1910.120 and 8-Hour Refresher, valid through 2026

First Aid/CPR/AED Trained, valid through 4/2027

SafeLand USA Trained

standard, and a former rail yard where multiple potential sources of contamination were investigated as part of the redevelopment of a property to a large residential apartment complex.

Lead in Water Testing Program Management, Philadelphia, PA, School District of Philadelphia (2022 – present)

Project Manager. Managed subcontracted plumbers and electricians to complete water fountain installations in nearly 300 District buildings to meet a compliance deadline. Communicated progress and schedule to District project managers. Managed sampling team schedules to complete lead in water testing in accordance with EPA “3 T’s” guidance. Consulted the technical database team as an internal user of database and dashboards which house and display sampling and work order data.

Superfund Sites, Maryland and Pennsylvania (2015 – present)

Task Manager and Field Team Leader. Planned and executed numerous successful investigations and routine field sampling events at Superfund Sites located in Maryland and Pennsylvania impacted by chlorinated hydrocarbons and PFAS. The sites included former disposal facilities with long term pump-and-treat remediation systems. Complex bedrock geology and difficult field conditions frequently necessitated problem solving and flexibility.

Pollock Park and Pottstown Plating Works, Pottstown, Pennsylvania, Montgomery County Redevelopment Authority (2017 – 2021)

Task Manager and Field Team Leader. Managed soil and groundwater sampling activities at chlorinated hydrocarbon-impacted sites. Neighboring properties were also heavily impacted with chlorinated hydrocarbons, making cooperation between multiple consulting firms, regulatory agencies, and clients a necessity. Developed work plans, proposals, conceptual site models, and groundwater contaminant plume models for environmental investigation and closure reports. The investigations and cleanups assisted in the efforts to rejuvenate a former industrial area to re-develop a community park in Pottstown.

Store Space, Philadelphia, Pennsylvania (2022 – 2023)

Project Manager. Developed work plans and managed the implementation of a remediation of concrete floors impacted with mercury and PCBs at a facility that was the former location of a thermometer manufacturer. A request for proposal was distributed to multiple remediation contractors. Contractors were evaluated and the bid was awarded based on their qualifications, price, and remediation methodology. The success of the remediation allowed for the sale of the property.

Lanchester Landfill, Narvon, Pennsylvania, Chester County Solid Waste Authority (2019 – 2021)

Project Manager and Field Team Leader. Performed regulatory reporting for a landfill facility in Pennsylvania. Developed sampling and analysis plans, executed a PFAS leachate sampling investigation, and assisted in streamlining the routine sampling process for the facility.

Triumph Accessory Services, Wellington, Kansas, RICOH (2021 – 2022)

Senior Staff Geologist. Assisted with the development and planning, and oversaw the field implementation of an in-situ remediation methodology designed to significantly reduce concentrations of chlorinated solvents in groundwater. The success of the remediation will allow the client to receive regulatory closure for the property within the framework of the Kansas Voluntary Cleanup Program.

The Poplar, Philadelphia, Pennsylvania, Post Brothers Apartments (2018 – 2021)

Task Manager and Field Team Leader. Managed complex site assessment and investigation reporting activities at a large-scale residential redevelopment site. The site is currently enrolled in a voluntary cleanup program for six separate historical sources of contamination, including a former dry-cleaner, on-site and off-site petroleum USTs, and historical fill.

Ellie Johnston, GIT

Senior Staff II Geologist

Ellie Johnston is a licensed Geologist in Training with over 5 years of experience in the environmental consulting industry and comes to Terraphase with an academic background in geoscience: earth systems, chemistry, and geography. Ms. Johnston's project experience includes the management and preparation of dozens of Phase I and II environmental site assessments (ESAs), Tier I & II vapor assessments, Housing and Urban Development (HUD) Part 50 and 58 environmental assessments (EAs), storage tank investigations, remedial investigation and remedial action work plans, technical reports for regulatory agencies, and various Quality Assurance/Quality Control (QA/QC) documents.

As a Senior Staff II Geologist, she is also responsible for overseeing and implementing multi-media site characterization programs involving soil, groundwater, surface water, soil vapor, and sediment sample collection for a variety of target contaminants, including chlorinated hydrocarbons, petroleum hydrocarbons, per- and poly-fluoroalkyl substances (PFAS), metals, polychlorinated biphenyls (PCBs), pesticides, herbicides, and others. Ms. Johnston has supervised environmental investigation and remediation including soil excavation, in-situ groundwater remediation, building materials sampling, petroleum storage tank decommissioning, and monitoring well installation and abandonment. Additional responsibilities include performing basic project management duties, such as subcontractor management, data evaluation, sample coordination, scheduling and billing, and junior staff training.

Project Experience

Former Philadelphia Refinery, Philadelphia, PA, Philadelphia Energy Solutions Refining and Marketing (2023 – present)

Staff Geologist. Executed investigation work plans and site characterization/ investigation to assist with closure of a 1,400-acre, 150-year-old former petroleum refinery. The site is currently enrolled in the Pennsylvania Regulated Tank Corrective Actions Program and the Pennsylvania Voluntary Cleanup Program (VCP) for multiple sources of contamination. Responsibilities to date include leading soil and groundwater sampling events, data evaluation, and preparation of technical memos and Act 2 reporting, including associated figures, tables, and appendices. Further responsibilities include assisting with the development of Quick Domenico models to evaluate contaminant fate and transport of multiple compounds at the site.

Spectron Superfund Site, Elkton, Maryland, Galaxy Spectron Remediation Group (2023 – present)

Staff Geologist. Implemented long-term monitoring and PFAS characterization sampling at the site. The work was conducted to fulfill the Environmental Protection Agency (EPA) requirements for the continued monitoring of surface water and bedrock groundwater quality and assess if emerging contaminants should be added as a site contaminant of concern. Responsibilities to date include assisting with long-term monitoring sampling plans. The emerging contaminants characterization included collection of groundwater samples from 18 conventional bedrock monitoring wells and 4 Westbay multi-port sampling systems (totaling 17 sampling ports). The long-term monitoring included collection of groundwater samples from 38 conventional bedrock monitoring wells and 6 Westbay multi-port sampling systems (totaling 27 ports). Additionally, the monitoring program included collecting samples from residential potable wells and surface water from the adjacent Little Elk Creek.

Education

BS in Geoscience: Earth Systems, minors in Chemistry and Geography, West Chester University of Pennsylvania

Years of Experience

5+

Joined Terraphase

2023

Professional History

Terraphase Engineering Inc., Staff II Scientist, 2023; Senior Staff I Geologist, 2024; Senior Staff II Scientist 2025 – present

React Environmental Professional Services Group REPSG, Inc., Environmental Scientist, 2020 – 2023

Pennsylvania, Department of Environmental Protection SERO, Scientific and Technical Engineering Intern, 2019

Certification/Training

Pennsylvania Geologist in Training (GIT)

Transportation Worker Identification Credential (TWIC)

OSHA 40-Hour HAZWOPER Training

OSHA 8-Hour HAZWOPER Supervisor Training

OSHA Silica Awareness Training for Construction

CPR/First Aid/AED Training

Store Space Facility, Philadelphia, Pennsylvania (2023 – present)

Staff Geologist. Executed work plans and assisted in overseeing the implementation of a remediation of concrete floors impacted with mercury and PCBs at a facility that was the former location of a thermometer manufacturer. Duties included the oversight and documentation of remedial activities, wipe sample management, data evaluation, preparation of a post-remediation confirmatory sample plan, and completion of technical reporting for the remediation. Completed Act 2 technical reporting to address additional contaminants for the facility which was previously enrolled in the Pennsylvania VCP to address chlorinated solvent contamination in groundwater. Created and managed the implementation of an operations and maintenance (O&M) plan for existing AULs at the facility.

Commodore Semiconductor Group Superfund Site, Audubon, PA (2024 – present)

Staff Geologist. Led field efforts to investigate the site which was recently identified as Operable Unit 3 (OU3) for the adjoining Commodore Semiconductor Group Superfund Site. Activities included a large-scale investigation of previously identified chlorinated solvent impacts to soil via the advancement of soil borings and collection of samples at multiple intervals throughout the soil column. Following field investigations, analytical results were used to plan a remedial excavation to remove heavily impacted soils during redevelopment of the site. The work was conducted to aid the Environmental Protection Agency (EPA) in investigating and remediating the site to support beneficial reuse of the site.

Elmwood Preserve, White Plains, New York (2025 – present)

Staff Geologist. Developed and implemented field sampling work plans for the investigation of soil, groundwater, soil vapor, surface water, and sediment at a 106-acre former golf course which was known to be impacted with multiple contaminants due to the historic application of pesticides to maintain the golf course. Interpreted sampling data to identify areas which required additional investigation and created follow up work plans to delineate and further characterize soils at the site upon identification of impacts during data analysis. Generated and interpreted site-specific data to create a conceptual site model (CSM) for the site and prepared regulatory documents in preparation for the removal of impacted soil from across the entire site.

Brass Estates, Fairfield, New Jersey (2025 – present)

Staff Geologist. Conducted a comprehensive source area and commingled plume evaluation for a former manufacturing site in Fairfield, New Jersey, which contained commingled plumes of degraded chlorinated ethanes and ethenes and 1,4-dioxane from multiple on-site and off-site sources. Evaluated groundwater data to determine if groundwater conditions were sufficient for anaerobic degradation of chlorinated constituents, and evaluated contaminant distribution in shallow, intermediate, and deep (bedrock) groundwater zones to inform contaminant migration pathways. Prepared contaminant isoconcentration figures, geologic cross sections, groundwater flow maps, and interpreted these deliverables to create and strengthen a CSM for the site. Developed and oversaw implementation of a Membrane Interface Probe Hydraulic Profiling Tool (MiHPT) investigation to identify contaminant mass in the subsurface and inform the development of a Remedial Action Plan to remediate groundwater at the site.

Former Jennersville Hospital, Jennersville, Pennsylvania, Tower Health (2023 – present)

Staff Geologist. Conducted site investigation activities at a former hospital which discharged graywater to an on-site drain field. PFAS compounds were previously identified in groundwater at the site during due diligence investigations. Activities included soil sampling, oversight of the installation of four overburden monitoring wells, and the subsequent sampling of groundwater to evaluate the validity and extent of previously identified contamination.

Phase I ESAs, Various Sites, Confidential Clients (2020 – 2025)

Staff Geologist. Completed historical research, interviews, site reconnaissance, reporting, and regulatory guidance for hundreds of Phase I ESAs throughout the United States. Assessed sites include residential apartment buildings, agricultural properties, industrial complexes, former heating oil distributors, oil refineries, auto repair shops, former machine shops, gasoline stations, dry-cleaners, paint manufacturers, cellular telecommunications tower compounds, yarn and hosiery mills, and manufactured gas plants.

Appendix C

Quality Assurance Project Plan

Quality Assurance Project Plan

276-284 Starr Street

NYSDEC BCP Site No. C224430

276-284 Starr Street, Brooklyn, Kings County, New York

Prepared for

Churches United For Fair Housing, Inc.

280 Starr Street

Brooklyn, New York 11237

Prepared by

Carson Voci Engineering and Geology, D.P.C.

an affiliate of Terraphase Engineering Inc.

1100 East Hector Street, Suite 400

Conshohocken, Pennsylvania 19428

July 23, 2026

Project Number CV05.001.003

carsonvociⁱ
engineering and geology dpc
an affiliate of Terraphase Engineering Inc.

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ACRONYMS AND ABBREVIATIONS

ASP	analytical services protocol
AWQS	ambient water quality standard
BBG	BBG Assessments, LLC
BCP	Brownfield Cleanup Program
Carson Voci	Carson Voci Engineering and Geology, D.P.C.
CLP	Contract Laboratory Protocol
COC	chain of custody
cVOC	chlorinated volatile organic compound
CUFFH	Churches United For Fair Housing, Inc.
DER	Division of Environmental Remediation
DER-10	<i>DER 10 / Technical Requirements for Site Investigation and Remediation</i>
DI	di-ionized
DQO	data quality objective
DUSR	data usability summary report
EDD	electronic data deliverable
ELAP	Environmental Laboratory Approval Program
EPA	United States Environmental Protection Agency
g	gram
GPS	Global Positioning System
HDPE	High Density Polyethylene
L	liter
LIMS	laboratory information management system
µg/kg	microgram per kilogram
mL	milliliter
MS/MSD	matrix spike and matrix spike duplicate
ng/L	nanogram per liter
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PCB	Polychlorinated Biphenyl
PFAS	per- and polyfluoroalkyl substance

PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFAS Guidance	<i>Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS)</i>
PID	photo-ionization detector
QAPP	Quality Assurance Project Plan
QA	quality assurance
QAQC	Quality Assurance/Quality Control
QC	quality control
RI	remedial investigation
RIWP	remedial investigation work plan
RPD	relative percent difference
SCO	soil criteria objective
SDS	Safety Data Sheet
the Site	276-284 Starr Street in Brooklyn, New York
SVI Guidance	<i>Guidance for Evaluating Soil Vapor Intrusion in the State of New York</i>
SV/IA	Soil Vapor/Indoor Air (Decision Matrix)
SVOC	semi-volatile organic compound
TAL	Target Analyte List
TCL	Target Compound List
TO-15	EPA Air Method, Toxic Organics - 15
TOGS	Technical and Operational Guidance Series
Terraphase	Terraphase Engineering Inc.
VOC	volatile organic compound

1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) is prepared on behalf of Churches United For Fair Housing, Inc. (CUFFH; “Applicant”; “Participant”) to support the remedial investigation (RI) activities for the New York State (NYS) Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP) Site No. C224430 identified as 276-284 Starr Street at 276-284 Starr Street in Brooklyn, New York (Site). The RI will be conducted in support of compliance with NYSDEC requirements related to the BCP.

This QAPP presents the analytical methods and procedures for the implementation of the RI field activities detailed in the *Remedial Investigation Work Plan (RIWP)* to assure that samples are representative of the actual environment of collection and are of sufficient quality and quantity to meet the project objectives.

1.1 Project Scope

The purpose of the RI is to delineate the nature and extent of contamination and allow for effective evaluation of multiple BCP cleanup track alternatives. Data collected during the RI will help determine the basis for future remedial actions for the Site.

All sampling activities will also be conducted in accordance with United States Environmental Protection Agency (EPA) regulations and NYSDEC guidance documents, including but not limited to:

- *DER-10, Technical Guidance for Site Investigation and Remediation*. New York State Department of Environmental Conservation. May 3, 2010 (DER-10).
- *Analytical Service Protocol*, New York State Department of Environmental Conservation. July 2005.
- *US EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations (EPA QA/R-5, March 2001)*.
- *Guidance for Quality Assurance Project Plans (EPA QA/G-5, December 2002)*.

1.2 Site Description and Conceptual Site Model Summary

The Site is owned by the Applicant, a Participant in the BCP. The approximately 0.18-acre Site consists of rectangular parcel identified as Block 3200, Lot 19 on the New York City Tax Map. The Site is improved with a 13,500 square-foot one- and two-story building which was constructed circa 1931. The structure is used as a periodic meeting space, until it can be converted to a full-time office and meeting space. The Applicant has not proposed any redevelopment plans at this time.

The Site is zoned as an M1-1 light manufacturing district and is in an urban area surrounded by other commercial and industrial properties. The surrounding properties consist of residences to

the northeast, commercial business and restaurants to the southeast, a commercial roller-skating rink to the southwest, and Starr Street to the northwest, followed by residences.

Based on the site reconnaissance conducted by Carson Voci and information reported in a Phase I Environmental Site Assessment (ESA) completed by BBG Assessments, LLC (BBG), the Site is relatively flat with a slight downward slope to the west-northwest. No outcrops of bedrock were noted at the Site. According to the United States Geological Survey's Brooklyn, New York, 7.5 Minute Series topographic map, the Site is approximately 35 feet above average mean sea level. No surface bodies of water or wetlands were observed at the Site, and the nearest surface body of water is Newtown Creek, approximately 2,500 feet to the west-northwest.

According to the Natural Resources Conservation Service Web Soil Survey website,¹ the dominant soil composition in the vicinity of the Site is classified as Urban Land, till substratum, with 3 to 8 percent slopes. Urban land is characterized by a non-homogenous distribution of soil and fill types. Based on information accessed via the USGS website,² the Site is underlain by the Raritan Formation, which consists of unconsolidated, coarse detrital clay, sand, and gravel.

Site specific soil and groundwater information was not available for review at the time of this RIWP. Additional information on the geology and hydrogeology at the Site will be added to the conceptual site model following the RI.

1.3 Field Sampling Plan Design

In accordance with the aforementioned regulations and guidance documents, Carson Voci prepared the RI scope of work to determine the nature and extent of soil, groundwater, and soil vapor/indoor air contamination at the Site and to determine if an onsite contaminant source is present.

The RI program will include:

- Groundwater monitoring well installations
- Groundwater gauging
- Groundwater analytical sampling
- Soil borings
- Soil field screening and logging
- Soil analytical sampling
- Soil vapor pin installation
- Soil vapor analytical sampling
- Indoor air analytical sampling

The location of the proposed field samples and a detailed summary of the samples to be collected are provided within Appendix A.

¹ <http://websoilsurvey.nrcs.usda.gov/app/>

² <https://mrdata.usgs.gov/general/map-us.html>

2.0 DATA EVALUATION

2.1 Data Quality Objectives

Data quality objectives (DQOs) are qualitative specifications designed to ensure that data of known quality are obtained during investigative activities to support decisions regarding the selection of an appropriate remedial action. The overall DQOs for all samples collected through the work encompassed by this QAPP will be to ensure that collection techniques and analyses generate results that are accurate, precise and representative of Site conditions, and sufficiently sensitive to meet the most stringent standards and other applicable criteria (see Section 2.1.1). To further this objective, Terraphase will use the sampling methods and procedures in DER-10 and applicable Field Sampling Procedures Manual(s). Additionally, the selected NY-accredited laboratory (see Section 3.0) will perform all analyses in conformance with the Environmental Laboratory Approval Program (ELAP), Contract Laboratory Protocol (CLP), NYSDEC July 2005 analytical services protocol (ASP), and other applicable industry standards. As such, general DQO information is provided below but does not include all information related to the data quality assessment.

DQOs for this project are established in the subsections below.:

2.1.1 Sensitivity DQOs and Data Evaluation

These DQOs relate to the standards and criteria to which the RI analytical results will be evaluated. In this regard, the laboratory will be informed of the specific objectives so that the detection and reporting limits will be less than these standards and criteria to the extent feasible, and where such levels cannot be achieved, the basis for that non-conformance will be documented.

Analytical results generated during the RI activities addressed herein will be evaluated relative to NYSDEC standards, screening levels and other appropriate criteria applicable to each specific environmental medium, as indicated below.

Soil

- Soil analytical results will be evaluated relative to NYSDEC Standards, Criteria, and Guidance Soil Cleanup Objectives (SCOs), published in 6 NYCCR 375-6.8

Groundwater

- Groundwater analytical results will be compared to Technical Operations and Guidance Memorandum 1.1.1 (TOGS 1.1.1) Ambient Water Quality Standards (AWQS)

Soil Vapor and Indoor Air

- Soil vapor and indoor air analytical results will be compared to the NYS Department of Health (NYSDOH) "Soil Vapor/Indoor Air (SV/IA) Decision Matrices" from the Guidance for Evaluating Soil Vapor Intrusion in the State of New York.

2.1.2 Accuracy DQOs

Accuracy is the degree of difference between measured and calculated or true values. In laboratory conditions, accuracy is measured in terms of blank results, the average percent recovery of surrogate compounds or spiked compounds (matrix spike/matrix spike duplicates), and/or laboratory control samples. The acceptable level of accuracy for this project will be based on the acceptable percent recovery/difference of laboratory control spikes for each method. The laboratory will evaluate this DQO for its own laboratory data.

2.1.3 Precision DQOs

Precision expresses the closeness of agreement between data as a measure of the reproducibility of sample results. Precision DQOs are established by defining acceptance criteria for precision between duplicate results for both field duplicates and laboratory duplicates. In general, solid matrices have a greater amount of heterogeneity than liquid and gas matrices. When the relative percent difference (RPD) for detected constituents is greater than or equal to 50 percent for non-aqueous matrices, greater than or equal to 30 percent for aqueous matrices, or greater than or equal to 25 percent for gaseous matrices the representativeness of the sample results will be evaluated to assess the acceptability and usability of the analytical results.

2.1.4 Representativeness DQOs

These DQOs are established through definition of the field sampling plan, and related procedures for the collection, preservation and transport of samples, as well as through definition of appropriate analytical methodologies. The procedures that will be used to obtain representative samples are documented in Section 6.0 of this QAPP. The field sampling plan is presented in the RIWP.

2.1.5 Completeness DQOs

These DQOs are those used to determine the quantity of data needed for project decisions as well as the degree to which the data are appropriate for use based on the data quality assessment. For this project, the specific quantity of sampling to be conducted at the Site will include the generation of soil, groundwater, sub slab soil vapor, indoor air, and ambient air needed to fully characterize and delineate site contamination for purposes of designing any appropriate remedial actions. The completeness of the analytical results will be assessed on an ongoing basis until the NYSDEC concludes that the standards of characterization, delineation and data quality have been met.

2.1.6 Comparability

Comparability is the degree to which one set of data can be accurately compared to another set of data that were collected by a different means or analyzed by a different entity. The objectives of the analytical laboratory for comparability are to:

1. Demonstrate traceability of standards to EPA or NYSDEC-approved sources;
2. Use standard methodology;
3. Report results from similar matrices in standard units;
4. Apply appropriate levels of quality control within the context of the laboratory quality assurance (QA) program, (Level III, USEPA Data Objectives for Remedial Response Activities, 1987, or equivalent); and
5. Participate in inter-laboratory studies to document laboratory performance.

3.0 LABORATORY

The laboratory to be retained for sample analysis include the following:

Pace Analytical Services
8 Walkup Drive
Westborough, MA 01581

AND

320 Forbes Boulevard
Mansfield, MA 02048

Contact: Cynthia Pagut, or Nadine Yakes, Project Managers and Chris Anderson, Air Project Manager

It is possible that additional laboratories may be retained as subcontractors by the above. Information regarding contract laboratories, if used, will be provided in the laboratory data deliverables generated for the analytical work.

4.0 SITE CONTACTS

The following individuals will be responsible for work conducted at this property, including overall project management and coordination, sampling activities, and laboratory activities:

Professional Engineer: Nick Krasnecky, PE
Principal Engineer
Carson Voci Engineering and Geology, D.P.C.
an affiliate of Terraphase Engineering Inc.
222 International Drive, Suite 150
Portsmouth, NH 03801
201-552-0224
nicholas.krasnecky@terraphase.com

Project Manager: Nick Krasnecky, PE
Principal Engineer
Carson Voci Engineering and Geology, D.P.C.
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Quality Assurance Officer: Alexander Strohl
Senior Project Geologist
Terraphase Engineering Inc.
1100 East Hector Street, Suite 400
Conshohocken, PA 19428570-447-0558
alexander.strohl@terraphase.com

Health and Safety: Daren Roth
Associate Health and Safety Director
Terraphase Engineering Inc.
7901 Stoneridge Drive, Suite 528
Pleasanton, CA 94588
925-719-5496
daren.roth@terraphase.com

On-site compliance with the required health and safety protocols to be determined based on determination on field sampler(s)

Laboratory Project Manager: Cynthia Pagut
Project Manager
Pace Analytical Services
508-898-9220
Cynthia.Pagut@pacelabs.com

Alternative Laboratory Project Manager: Nadine Yakes
Project Manager
Pace Analytical Services
201-812-9037
Nadine.Yakes@pacelabs.com

Laboratory Air Project Manager: Chris Anderson
Project Manager
Pace Analytical Services
508-844-4122
Christopher.Anderson@pacelabs.com

Third Party Data Validator: Pei Geng
Senior Chemist/Project Manager
Laboratory Data Consultants, Inc.
706-827-1100, ex. 141
Pgeng@lab-data.com

Changes to the project team, if any, will be annotated to this QAPP.

Resumes of the pertinent project participants are included in Appendix B.

5.0 FIELD AND ANALYTICAL METHODS/QUALITY ASSURANCE

5.1 Quality Assurance/Quality Control Sampling

Quality Assurance/Quality Control (QAQC) samples will be collected in accordance with the ASP and DER-10, as shown in Table 1. The procedures to collect the field QAQC samples are discussed below. All samples will be properly labeled, immediately placed in a cooler with ice, and submitted to the laboratory within 48 hours using standard chain-of-custody procedures. Encore soil samples will be received by the laboratory and preserved within 48 hours of collection.

Table 1: QAQC Sampling Frequency	
Sample Type	Frequency
Duplicate	One per 20 samples, per matrix
Matrix Spike/Matrix Spike Duplicate (MS/MSD)	One per 20 samples, per matrix (soil and groundwater only)
Trip Blank	One per cooler when VOC samples are submitted
Equipment Blank	Once per day for aqueous matrix; 5% of the total number of samples for non-aqueous matrix, not applicable for gaseous matrix

5.1.1 Duplicate Samples

To provide an indication of analytical precision and accuracy, a minimum of 5 percent of all samples, or at least one sample of every 20 samples collected, are to be collected in duplicate. Duplicate samples will be analyzed for the same parameters as the samples. The duplicate samples will receive a sample identification number different from the actual sample location. The Chain-of-Custody Record will note the unique number and describe the sample as "duplicate", without revealing the actual sampling location.

Duplicate soil samples will be collected by dividing sampled material before placing in duplicate sample containers. Duplicate groundwater, sub-slab, and indoor air samples will be sent for laboratory analysis to evaluate the reproducibility of the sampling technique used.

5.1.2 Matrix Spike and Matrix Spike Duplicate Samples

To provide an indication of analytical precision and accuracy, a minimum of 5 percent of all samples, or at least one sample of every 20 samples collected, are to be collected in triplicate for a matrix spike and matrix spike duplicate (MS/MSD) analysis. The site-specific MS/MSD

samples will be prepared and analyzed by the analytical laboratory by spiking an aliquot of the submitted sample volume with analytes of interest. The MS/MSD samples will be labeled with the sample ID with a -MS or -MSD added on to the end of the sample.

MS/MSD soil samples will be collected by dividing sampled material before placing in duplicate sample containers. MS/MSD groundwater samples will be collected by filling one sample jar after the other for each analysis until samples in triplicate are obtained, and then move on to the next sample jar/analysis and repeat. MS/MSD samples are only required for soil and groundwater samples.

5.1.3 Trip Blanks

Trip blanks will be used to assess whether site samples have been exposed to non-site-related volatile constituents during storage and transport. Trip blanks will be included at a frequency of once per cooler containing aqueous samples to be analyzed for volatile organic constituents. A trip blank will consist of a container filled with analyte-free water (supplied by the laboratory) which remains unopened with field samples throughout the sampling event.

Trip blanks will be analyzed for VOCs only to evaluate the potential occurrence of contamination of samples during sample shipment or as a result of laboratory handling. Trip blanks will be prepared for aqueous samples preserved with hydrochloric acid at a rate of one per sample shipment (not to exceed 2 consecutive field days). These samples consist of laboratory-prepared glass bottles (40 milliliters [mL]) with an open-top screw cap and a Teflon septa or other similar sample container. The trip blanks will accompany sample containers to the field and back to the laboratory with the collected samples for analysis, remaining sealed until this time, thus ensuring similar exposure as the collected samples. No trip blanks are required for the sub-slab vapor sampling or the indoor air sampling.

5.1.4 Equipment Blanks

Equipment blanks are used to monitor the cleanliness of the sampling equipment and the effectiveness of the cleaning procedures. Equipment blanks will be prepared and submitted for analysis at a frequency of one per day (when sample equipment decontamination occurs) or once for every 20 samples collected, whichever is more. Equipment blanks will be prepared by filling sample containers with laboratory-supplied deionized water specifically per- and polyfluoroalkyl substances (PFAS)-free water if a PFAS sample is to be collected, which has been routed through a cleaned sampling device. It is anticipated that some of the sampling devices and all sample containers used at the Site will be dedicated, including dedicated sample tubing. When dedicated sampling devices are used, equipment blanks will not be necessary.

Equipment blanks will be prepared by pouring analyte-free water, specifically PFAS free water if a PFAS sample and equipment blank is to be collected with that equipment, over decontaminated sampling equipment as a check that the decontamination procedure has been adequately performed and that cross contamination of samples will not occur due to the

equipment. One equipment blank will be collected for each type of equipment used each day a decontamination event occurs. Equipment blanks will be performed on sampling equipment and other equipment such as water level sensors during groundwater monitoring. The same aliquot of field water may be used on all equipment coming in contact with a particular matrix for analysis for inorganic constituents. A separate equipment blank must be collected for each piece of decontaminated equipment used for a particular sample matrix. Equipment blanks will be collected at the beginning of the day before the sampling event and must accompany the samples collected that day. No equipment blanks are required for the sub-slab vapor sampling or the indoor air sampling.

All equipment blanks and trip blanks will be shipped to the laboratory with the sample containers. Blanks and the associated samples will be held onsite in sample coolers with ice (water and/or reusable ice packs) and delivered to the laboratory daily (via laboratory courier pickup at the site) within one day of shipment from the field. All blanks and samples will be maintained at 4 degrees Centigrade while stored onsite and during shipment. Sample bottles and blanks will be handled in the same manner prior to their return to the laboratory.

5.2 Analytical Methods

An Analytical Methods/Quality Assurance Summary Table is included below as per DER-10-2.4(a)2.v. This table includes for each proposed analysis/matrix the analytical method, required sample volume, sample container size and preservative (if any), and analytical holding time. Further, the table provides anticipated sample quantities per analysis and matrix, as well as associated number and frequency of field and trip blanks, as well as for duplicate samples.

Table 2a: Soil Methods					
Analysis	Mass Required (g)	Bottleware	Laboratory Method (EPA)	Preservation Required	Hold Time
TCL VOCs	15	Three EnCore samplers / TerraCore Vials	8260C/D by 5035	EnCore / TerraCore	48 hours for lab to prep. 14 days for analysis
TCL SVOCs + 1,4-Dioxane	100	8 oz glass	8270D/8270D SIM	None	14 days to extract, 40 days for analysis from extraction
Total Solids Analysis	50	8 oz glass	SM2540G	None	7 days to extract, 40 days for analysis from extraction
TCL Pesticides/Herbicides	100	8 oz glass	8081B/8151A	None	14 days to extract, 40 days for analysis from extraction

Table 2a: Soil Methods					
Analysis	Mass Required (g)	Bottleware	Laboratory Method (EPA)	Preservation Required	Hold Time
TAL Metals	25	8 oz glass	6010C/7471B	None	Mercury 26 days, other elements 180 days
TCL PCBs	100	8 oz glass	8082A	None	7 days to extract, 40 days for analysis from extraction
PFAS	100	8 oz HDPE	1633A	None	14 days to extract, 40 days for analysis from extraction

Table 2b: Aqueous Methods					
Analysis	Volume Required (mL)	Bottleware	Laboratory Method (EPA)	Preservation Required	Hold Time
TCL VOCs	120	Three 40 mL Vials	8260C/D	HCL < 2	48 hours for lab to prep. 14 days for analysis
TCL SVOCs + 1,4-Dioxane	2,000	Two 1 L Amber Glass	8270E/8270E SIM	None	7 days to extract, 40 days for analysis from extraction
TCL Pesticides/Herbicides	2,000	Two 1 L Amber Glass	8081B/8151A	None	7 days to extract, 40 days for analysis from extraction
TAL Total/Dissolved Metals	500	One 500 mL Amber Glass	200.7/7470A	HNO ₃ < 2	Mercury 26 days, other elements 180 days
TCL PCBs	300	Two 300 mL Amber Glass	8082A	None	7 days to extract, 40 days for analysis from extraction
PFAS	500	HDPE – 500 mL	1633A	None	14 days to extract, 40 days for analysis from extraction

Table 2c: Gaseous Methods					
Analysis	Volume Required (L)	Bottleware	Laboratory Method	Preservation Required	Hold Time
Toxic Organics in Air - 15	6	Batch Certified Clean Summa Canisters, laboratory calibrated 8-hour flow controllers	USEPA Method TO-15	None	Analyzed within 14 days of collection

The project compounds summary, pursuant to DER-10, is included in Table 3 below.

Table 3: Project Compounds Summary		
Matrix	Project Action Limits / Project Quantitative Limits	Applicable Analytical Parameters
Soil	New York State Department of Environmental Conservation Standards, Criteria, and Guidance Soil Cleanup Objectives (SCOs), published in 6 NYCCR Part 375-6.8	VOCs; SVOCs; PCBs; Herbicides/Pesticides; Metals; Total Solids
	NYSDEC Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS). April 2023	PFAS; 1,4-Dioxane
Groundwater	NYSDEC, Division of Water, Technical and Operational Guidance Series (TOGS) Memorandum 1.1.1, "Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations"	VOCs; SVOCs; PCBs; Herbicides/Pesticides; Total/Dissolved Metals:
	NYSDEC Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS). April 2023	PFAS; 1,4-Dioxane
Air	New York State Department of Health May 2017 Updates to Soil Vapor/Indoor Air Decision Matrices	VOCs
Abbreviations: VOC -- Volatile Organic Compound SVOC -- Semi-Volatile Organic Compound. PCB -- Polychlorinated Biphenyls. PFAS -- Per- and polyfluoroalkyl substances TAL -- Target Analyte List TCL -- Target Compound List		

5.2.1 PFAS Specific Analytical Methods and Information

Environmental samples collected during the RI to be analyzed for PFAS, will be analyzed via EPA Method 1633. Reporting limits for Perfluorooctanoic acid (PFOA) and Perfluorooctanesulfonic acid (PFOS) in aqueous samples should not exceed 2 nanograms per liter (ng/L). Reporting limits for PFOA and PFOS in solid samples should not exceed 0.5 micrograms per kilogram (µg/kg). Reporting limits for all other PFAS in aqueous and solid media should be as close to these limits as possible. If laboratories indicate that they are not able to achieve these reporting limits for the entire PFAS Analyte List, site-specific decisions regarding acceptance of elevated reporting limits for specific PFAS can be made by the DER project manager in consultation with the DER chemist. A comprehensive list of the 40 PFAS compounds to be analysed via EPA Method 1633 is provided in Table 4 below.

Table 4: PFAS Analyte List – EPA Method 1633

Group	Chemical Name	Abbreviation	CAS Number
Perfluoroalkyl sulfonic acids	Perfluorobutanesulfonic acid	PFBS	375-73-5
	Perfluoropentanesulfonic acid	PFPeS	2706-91-4
	Perfluorohexanesulfonic acid	PFHxS	355-46-4
	Perfluoroheptanesulfonic acid	PFHpS	375-92-8
	Perfluorooctanesulfonic acid	PFOS	1763-23-1
Perfluoroalkyl sulfonic acids	Perfluorononanesulfonic acid	PFNS	68259-12-1
	Perfluorodecanesulfonic acid	PFDS	335-77-3
	Perfluorododecanesulfonic acid	PFDoS	79780-39-5
Perfluoroalkyl carboxylic acids	Perfluorobutanoic acid	PFBA	375-22-4
	Perfluoropentanoic acid	PFPeA	2706-90-3
	Perfluorohexanoic acid	PFHxA	307-24-4
	Perfluoroheptanoic acid	PFHpA	375-85-9
	Perfluorooctanoic acid	PFOA	335-67-1
	Perfluorononanoic acid	PFNA	375-95-1
	Perfluorodecanoic acid	PFDA	335-76-2
	Perfluoroundecanoic acid	PFUnA	2058-94-8
	Perfluorododecanoic acid	PFDoA	307-55-1
	Perfluorotridecanoic acid	PFTTrDA	72629-94-8
	Perfluorotetradecanoic acid	PFTeDA	376-06-7
Per- and Polyfluoroether carboxylic acids	Hexafluoropropylene oxide dimer acid	HFPO-DA	13252-13-6
	4,8-Dioxa-3H-perfluorononanoic acid	ADONA	919005-14-4
	Perfluoro-3-methoxypropanoic acid	PFMPA	377-73-1
	Perfluoro-4-methoxybutanoic acid	PFMBA	863090-89-5
	Nonafluoro-3,6-dioxaheptanoic acid	NFDHA	151772-58-6

Group	Chemical Name	Abbreviation	CAS Number
Fluorotelomer sulfonic acids	4:2 Fluorotelomer sulfonic acid	4:2-FTS	757124-72-4
	6:2 Fluorotelomer sulfonic acid	6:2-FTS	27619-97-2
	8:2 Fluorotelomer sulfonic acid	8:2-FTS	39108-34-4
Fluorotelomer carboxylic acids	3:3 Fluorotelomer carboxylic acid	3:3 FTCA	356-02-5
	5:3 Fluorotelomer carboxylic acid	5:3 FTCA	914637-49-3
	7:3 Fluorotelomer carboxylic acid	7:3 FTCA	812-70-4
Perfluorooctane sulfonamides	Perfluorooctane sulfonamide	PFOSA	754-91-6
	N-methylperfluorooctane sulfonamide	NMeFOSA	31506-32-8
	N-ethylperfluorooctane sulfonamide	NEtFOSA	4151-50-2
Perfluorooctane sulfonamidoacetic acids	N-methylperfluorooctane sulfonamidoacetic acid	N-MeFOSAA	2355-31-9
	N-ethylperfluorooctane sulfonamidoacetic acid	N-EtFOSAA	2991-50-6
Perfluorooctane sulfonamide ethanols	N-methylperfluorooctane sulfonamidoethanol	MeFOSE	24448-09-7
	N-ethylperfluorooctane sulfonamidoethanol	EtFOSE	1691-99-2
Ether sulfonic acids	9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (F-53B Major)	9Cl-PF3ONS	756426-58-1
	11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (F-53B Minor)	11Cl-PF3OUdS	763051-92-9
	Perfluoro(2-ethoxyethane) sulfonic acid	PFEESA	113507-82-7

6.0 FIELD SAMPLING METHODS

Clean sample containers will be obtained from the laboratory performing the analyses. The container type and cleaning procedure will depend upon the sample matrix, potential contaminants to be encountered, analytical methods requested, and the laboratory's quality assurance protocols. In selecting the proper container, the following will also be considered: (a) reactivity of container material with sample; (b) volume of container; (c) color of container, and (d) container closure.

An adhesive label will be attached to each bottle. Each label will have the following information written with a waterproof, non-volatile marker: (a) date of sample; (b) time of sample; (c) sample identification; (d) sampler initials; and (e) analytical parameters.

6.1 Decontamination of Sampling Equipment

6.1.1 Decontamination - General Sample Collection

To avoid cross contamination, all sampling equipment shall be clean and free from the residue of any previous samples. The use of new, dedicated sampling equipment and materials is preferred whenever possible. If equipment or materials are re-used, they should be decontaminated using, at a minimum, the following procedure:

- Clean equipment initially and following use with low phosphate detergent;
- Rinse with tap water;
- Rinse with de-ionized (DI) water; and
- Air dry

Decontamination water will be captured and collected in containers for proper off-site disposal pursuant to local and federal regulations. Heavily contaminated materials may require multiple washes and rinses, as well as rinsing in dilute hydrochloric acid.

Field instruments shall be cleaned as per the manufacturer's instructions. Avoid bringing field instruments into contact with heavily contaminated media.

6.1.2 Decontamination - PFAS Sample Collection

In addition to the general decontamination procedures outlined in Section 6.1.1, the following PFAS specific sample non-dedicated equipment decontamination procedures are to be conducted prior to the collection of a PFAS sample:

- Non-dedicated sampling equipment to be cleaned with low phosphate detergent solution consisting of Alconox or Liquinox and DI water.
- The equipment will then be rinsed once with DI water.
- A final rinse will be conducted with laboratory verified PFAS-free water.

- Powderless nitrile (non-latex) gloves will be donned during the handling and decontamination procedures.
- The Safety Data Sheet (SDS) of detergents used in decontamination will be reviewed to ensure fluoro-surfactants are not listed as ingredients.

6.2 Sampling Methods

All procedures and sampling techniques will be conducted in accordance with the protocols outlined in the RIWP, applicable guidance documents, in accordance with industry practices in effect at the time the sampling is completed, and site conditions. General information pertaining to the field methods to be used is provided in the below subsections.

6.2.1 Soil Sampling

Subsurface soil samplings will be collected using the Geoprobe® direct push drilling method operated by Coastal Environmental Solutions, Inc. (Coastal) of Holbrook, New York. The depth, location, and number of soil borings are specified in the RIWP, and samples will be collected and submitted for laboratory analysis in accordance with the RIWP and this QAPP.

Samples for PFAS will be collected in accordance with the *April 2023 Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS)* NYSDEC guidance provided as Appendix C and per Section 6.2.5.

The soil samples will be transferred to the sample containers with a minimum of handling. Following sample collection, the soil borings will be abandoned by backfilling with soil cuttings and bentonite to within 3 inches of the ground surface. The surface will be completed with material to match existing surface conditions.

6.2.2 Monitoring Well Installation

Monitoring well installation activities will be completed by Coastal Environmental Solutions, Inc., a New York-licensed well-driller. The permanent monitoring wells will be installed in accordance with the RIWP, and construction details will be logged during and upon completion of the well installations.

6.2.3 Groundwater Sampling

Groundwater samples will be collected from the wells no sooner than 7 days after installation to allow the groundwater to equilibrate. The wells will be sampled following EPA low-flow sampling techniques,³ and in accordance with the procedure outlined in the RIWP.

Samples will be collected and placed in laboratory provided bottles, preserved as appropriate, and sent to the laboratory under proper chain of custody procedures. Purged groundwater will be containerized, characterized, and properly disposed. Field log entries including ground water

³ The EPA low-flow sampling techniques can be access at:
<https://www.epa.gov/sites/default/files/2017-10/documents/eqasop-gw4.pdf>

equivalent heads, well depths, field water quality parameters, samples collected, the time of sample collection, odors, water color and clarity or other pertinent information will be recorded at the time of sampling.

Samples for PFAS will be collected separately in accordance with the *April 2023 Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) NYSDEC* guidance provided as Appendix C and per Section 6.2.5.

6.2.4 Air Sampling

Sub-slab soil vapor, indoor air, and outdoor/ambient air samples will be collected and submitted for laboratory analysis in general accordance with the RIWP and the *Guidance for Evaluating Soil Vapor Intrusion in the State of New York*.

6.2.5 PFAS and Emerging Contaminant Sampling

Soil and groundwater samples collected for analysis of PFAS and 1,4-dioxane will be collected in accordance with the *April 2023 Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) NYSDEC* guidance provided as Appendix C. Soil and groundwater samples collected from select sample locations will be analyzed for 1,4-dioxane by EPA Method 8270 SIM and for PFAS by EPA Method 1633.

The following general special considerations apply to the collection of samples for PFAS analysis:

- Food and beverages are prohibited near sampling equipment;
- No cosmetics, moisturizers, hand cream, sun screen, or clothing materials containing Gore-Tex or Tyvek to be worn during sampling;
- Gloves to be nitrile (i.e. not latex);
- Field equipment will not contain Teflon®;
- All sampling material will be made from stainless steel, High Density Polyethylene (HDPE), acetate, silicon, or polypropylene;
- No waterproof field books;
- No plastic clipboards, binders, or spiral hard cover notebooks;
- No adhesives;
- No sharpies or permanent markers; ball point pens are acceptable;
- No aluminum;
- PFAS samples will be kept in a separate cooler from other sampling containers; and
- Coolers will be filled only with regular ice (No "Blue Ice").

Soil samples will be homogenized in acetate and/or stainless steel bowls and placed into laboratory provided glass jars via unused acetate spoons and/or decontaminated stainless steel spoons.

Groundwater samples will be collected using a peristaltic pump or submersible stainless steel pump fitted with dedicated, non-Teflon HDPE tubing. Groundwater samples collected for PFAS will be conducted during a separate “event” at least 24 hours prior to the sampling of the monitoring well for additional analytical parameters.

6.3 Sample Labeling

The analytical laboratory will supply appropriate, pre-cleaned sample containers and preservatives, as necessary. A coding system is to be used to identify each sample taken during the sampling program. This coding system will allow for retrieval of information about a particular sample and assure that each sample is uniquely identified.

For soil samples, each sample identification number is to be composed of the soil boring location, as designated in sampling plans, as well as an additional unique field denoting the sampling interval. For groundwater, each sample identification includes a four-character location designation (e.g., MW-01) and an eight-digit date designation. Proposed sample IDs are included in Appendix A. For sub-slab soil vapor sampling, each sample identification number is to be composed of the sub-slab soil vapor sample location followed by the date of the sampling (e.g., SSSV01-YYMMDD). For indoor/outdoor ambient air sampling, the samples will be named by their ambient air sampling location followed by the date (e.g., IA01-YYMMDD).

6.4 Sample Handling

One member of the field sampling crew will be designated as sample manager. It will be the responsibility of this person to perform sample labeling, packaging, and shipping. The sample manager will also be responsible for ensuring that samples are handled and preserved in the proper manner.

Sample containers will be separated from any potential outside source of contamination between the time they are received from the laboratory, and the time the samples are delivered to the laboratory for analysis. Sample handling will be performed so as to guard against outside contamination being introduced to the sample containers before and after sample collection. If the containers are not used immediately, they will be stored in a suitable area, and kept cool. Following sample collection, the outer surfaces of the containers will undergo any necessary non-submersive decontamination. The samples will then be preserved on ice until they are shipped to the laboratory.

6.5 Sample Packaging

Samples that will be collected as part of this project are anticipated to be "low hazard" samples, based on a review of the analytical results for samples already collected. Therefore, no special packaging requirements are anticipated to be necessary. The samples will be packaged in coolers and appropriately cushioned during transport. The samples will be cooled to approximately 4 degrees Centigrade, using bagged ice.

6.6 Field Analytical Equipment and Associated Calibration and Maintenance Procedures

Field monitoring equipment being used by personnel during the RI will include a MiniRAE 3000 photo-ionization detector (PID), or equivalent instrumentation, both to assess the presence of any zones of potential soil contamination, as identified through readings materially above background, and in accordance with the Health & Safety Plan for the site work. Terraphase will also use a Solinst depth to water meter (or equivalent instrumentation) to determine the depth to groundwater at wells being installed. Groundwater indicator parameters will be collected using a property calibrated Horiba U-52 water quality meter equipped with a flow-through cell or equivalent instrumentation. The use of other monitoring equipment is not anticipated.

Field sampling equipment will be procured for rent as needed from Pine Environmental, Inc. of Windsor, New Jersey (or similar company). Each piece of equipment will be calibrated prior to delivery. When a PID will be on-site for more than one day, it will be calibrated by daily according to instrument instructions. Records of the time, results, and ambient conditions (i.e., weather, temperature) of calibration will be kept in the project field notebook by the sampling personnel for each instrument. Calibration of the water level meter is not required.

Monitoring equipment is generally delicate and if there are any concerns identified during use of equipment as to the accuracy of the readings being collected, use of that equipment will cease and a maintenance request made with the rental provider. On-site maintenance of field monitoring equipment will not be conducted.

6.7 Duplicate Sample Collection

Duplicate samples collected for soil and groundwater will be obtained by alternately filling sample containers from the same sampling device. Sub-slab soil vapor sample duplicates will be taken by using a "T-Splitter" and filling the sample and duplicate sample at the same time. Ambient air duplicate canisters will be opened and closed at the same time over a 8-hour period.

7.0 DOCUMENTATION

Proper documentation of all site activities will be maintained to trace the possession and handling of samples from the time of collection through analysis and disposition. The following procedures will be used for documentation purpose.

7.1 Field Log Books

Rainproof field logbooks or electronic field note applications (i.e. QNOPY) will be used to record all pertinent information regarding the Site and sampling procedures. Information recorded in the log books will include, but is not limited to: name and exact location of Site; date and time of arrival and departure; name of person keeping log; names of all persons on Site; all available information on site; composition and concentration of substance; description of sampling plan; field instrument calibration information; location of sampling points; number of samples taken; volume of samples taken; date, time and methods of sample collection and any factors that may affect its quality; name of collector; all sample identification numbers; and weather conditions on the day of sampling. Summary worksheets may also be used to confirm that all pertinent information is recorded.

7.2 Sampling Locations

Sampling points will be documented as to their exact location using Global Positioning System (GPS) and field measurements. All groundwater wells will be surveyed by a licensed professional surveyor.

7.3 Chain of Custody

The custody record for each sample will be documented using a Chain of Custody Form ("COC"). This form will accompany the sample containers to the Site and will remain with the samples at all times, including during sample collection, transport, and analysis. The COC bears the name of the person(s) assuming responsibility for the samples and the person who collected the sample. The COC will also specify the following information: project name; project client; laboratory conducting analyses; sample matrix; sample identification number; sample time and date; number of containers; analyses to be performed; sampler's name; dates, name, and signatures, printed names and times of personnel relinquishing samples; signature, printed name, date, and time of personnel receiving samples.

When collecting a sample, if applicable, personnel will record the seal number associated with each sample cooler and record whether the seal was intact upon arrival in the field. This assures that the sample containers were not tampered with in the time between their preparation and their arrival on-site. After sample collection, the bottles will again be placed in the cooler. The cooler will be sealed on-site (if such seal is provided by the laboratory) and the number will be recorded in the field book.

7.4 Document Management and Archive Procedures

All field documentation discussed herein, all laboratory deliverables and any other documentation regarding the sampling programs encompassed by this QAPP will be maintained in the original electronic and paper (e.g., field notebooks) formats. Electronic files will be maintained on Carson Voci's network servers, with backup files stored at a secure off-site location.

8.0 LABORATORY SAMPLE STORAGE PROCEDURES

Sample containers will be laboratory-cleaned and provided by the laboratory performing the analysis. Samples will be collected directly into the bottles supplied by the laboratory. Samples will be stored in the laboratory in a manner consistent with the required preservation requirements for each sample matrix and analytical methodology. The laboratory selected to perform analyses of the samples will be NYSDEC-certified and thereafter is expected to follow EPA and NYSDEC sample storage requirements.

9.0 ANALYTICAL AND OTHER DATA REQUIREMENTS

The analytical and sampling and analysis requirements for the Site are presented in the RIWP and provided in more detail in the following sections.

9.1 Laboratory Deliverables

The laboratory will provide all soil analytical results in electronic, Category B deliverable format unless otherwise requested. The analytical data package will be accompanied by an electronic data deliverable (EDD). Data for this site will be evaluated and qualified in accordance with the USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review, EPA-540-R-07-003, July 2007 and EPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, EPA-540-R-04-004, October 2004, as appropriate for the analytical methods employed.

Data generated will be uploaded to the NYSDEC's Environmental Information Management System in accordance with the NYSDEC Electronic Data Deliverable Manual, V. 4 (NYSDEC, 2018). The EDD format required is current format Earthsoft EQUIS® Environmental Data Management Software. Each EDD must be formatted and copied using an MS-DOS operating system. To avoid transcription errors, data will be loaded directly into the ASCII format from the laboratory information management system (LIMS). The laboratory will perform a quality control (QC) check on the EDD before delivery. The original data, tabulations, and electronic media must be stored in a secure and retrievable fashion.

9.2 Data Records Management

All field information will be recorded in bound field books using permanent ink or collected via electronic notetaking applications (such as QNOPY) and recorded in electronic format on the corporate server. Paper or electronic records will be archived at the Site Team's office location.

For paper notes, errors discovered in records will be corrected by entering a single line through the error and writing the corrected information above the error. The person correcting a record will initial the correction and place the date of correction next to the initial. If the person correcting the record is not the person who made the initial record, then the correcting person shall explain the correction in a permanent memo in the project file. For errors discovered in electronic field notes, the field notes will be corrected in the note taking application. A record of modifications can be made available to be kept in the project file.

9.3 Data Verification and Validation

Field records and data will be provided to a Project Team member for review as soon as possible after collection or generation. The Project Team member will review field records and data deliverables for legibility, usability, and completeness within 1 week of receipt. Any noted deficiencies will be corrected as soon as possible thereafter.

Field records will conform to the specifications and requirements of the QAPP and referenced documents herein. Data will be compared to the DQOs to evaluate data usability.

An independent third-party quality assurance chemist will review the laboratory data package and prepare a data usability summary report (DUSR). The validation will conform to the USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review, EPA-540-R-07-003, July 2007 and EPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, EPA-540-R-04-004, October 2004, as appropriate for the analytical methods employed.

The DUSR will present the results of data validation, including a summary assessment of laboratory data packages, sample preservation, and a summary assessment of precision, accuracy, representativeness, comparability, and completeness for each analytical method. A detailed assessment of each sample delivery group will be presented in the data validation report. At least 10% of the data in a data set should receive a full validation.

The validated analytical results reported by the laboratory and validated by the third-party validator will be assigned one of the following EPA-defined data usability qualifiers:

- U – Not detected at given value
- UJ – Estimated not detected at given value (applied by third party validator)
- J – Estimated value
- N – Presumptive evidence at the value given (applied by third party validator)
- R – Result not useable (applied by third party validator)
- No Flag – Result accepted without qualification

9.4 Data Usability Summary Report

The analytical data review will be summarized by a third-party validator in a DUSR, which will include a review and evaluation of all the analytical results. The following parameters will be reviewed to ensure compliance with the analytical method protocols:

- Initial and continuing calibrations
- Blanks
- Laboratory control standards and matrix spikes
- Surrogate recoveries
- Matrix interference checks
- Field and laboratory duplicates
- Sample data
- Chain-of-custody forms
- Holding times

The report will describe the samples and parameters reviewed. Any deficiencies identified during the review will be noted and the effect on the generated data will be discussed. If warranted, the report will include recommendations for re-sampling or re-analysis.

9.5 Data Precision and Assessment Procedures

9.5.1 Field Precision

Field precision is difficult to measure because of temporal variations in field parameters. However, precision will be controlled through the use of experienced field personnel, properly calibrated meters, and duplicate field measurements. Field duplicates will be used to assess precision for the measurement system.

9.5.2 Laboratory Precision

Laboratory data precision for organic analyses will be monitored through the use of surrogate spikes and laboratory duplicates. The precision of data will be measured by calculating the RPD by the following equation:

$$RPD = 100 \times \frac{(A - B)}{(A + B)/2}$$

Where:

A = Analytical result from one of two duplicate measurements

B = Analytical result from the second measurement

Precision objectives for laboratory duplicate analyses are identified in the NYSDEC ASP Revision 2016.

9.5.3 Data Accuracy Assessment Procedures

Experienced field personnel, properly calibrated field meters, and adherence to established protocols will control the accuracy of field measurements. The accuracy of field meters will be assessed by review of calibration and maintenance logs.

Laboratory accuracy will be assessed via the use of surrogate spikes, internal standards, and reference standards. Where available and appropriate, quality assurance performance standards will be analyzed periodically to assess laboratory accuracy.

Accuracy will be calculated in terms of percent recovery as follows:

$$\% Recovery = 100 \times \frac{(A - X)}{B}$$

Where:

A = Value measured in spiked sample or standard

X = Value measured in original sample

B = True value of amount added to sample or true value of standard

This formula is derived under the assumption of constant accuracy over the original and spiked measurements. If any accuracy calculated by this formula is outside of the acceptable levels, data will be evaluated to determine whether the deviation represents unacceptable accuracy, or variable, but acceptable accuracy. Accuracy objectives for surrogate recovery objectives are identified in the NYSDEC ASP 2016 Revision.

9.5.4 Data Completeness Assessment Procedures

The laboratory will calculate the completeness of laboratory data sets by comparing the number of valid sample results generated to the total number of results generated.

$$\text{Completeness} = 100 \times \frac{\text{Number of Valid Results}}{\text{Total Number of Results Generated}}$$

As a general guideline, overall project completeness is expected to be at least 90%.

9.6 Corrective Actions

The corrective actions typically taken by the laboratory are described below. If the calibration, instrument performance, or blank criteria are not met, the cause of the problem will be investigated and corrected. The analytical system then will be recalibrated. As part of the laboratory's operating protocol, sample analysis does not begin until calibration, instrument performance, and blank criteria are met. If matrix spike, reference standard, or duplicate analyses are found to be out of acceptable limits, the cause of the issue must be researched. Then, depending on the results of the overall QC program for the sample set, the data may be accepted, accepted with qualification, or determined to be unusable. If deemed unusable, the samples either must be reanalyzed, or a new set of samples collected and analyzed.

Deviations from the QAPP will be identified by the QA Coordinator and corrected, to the extent practicable. If the QAPP requires amending, a QAPP amendment will be attached and distributed to affected persons.

9.7 Distribution

A copy of this QAPP and any amendments will be provided to all Team Members and field personnel.

10.0 REFERENCES

New York State Department of Environmental Conservation (NYSDEC). 2005. *Analytical Service Protocol*. July 2005

———. 2018. NYSDEC Electronic Data Deliverable Manual. November.

<https://www.dec.ny.gov/chemical/62440.html>.

———. 2023. *Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS)*. April.

https://www.dec.ny.gov/docs/remediation_hudson_pdf/pfassampanaly.pdf.

NYSDEC, Division of Water. 2023. “Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations.” *Technical and Operational Guidance Series (TOGS) Memorandum 1.1.1 in State Pollutant Discharge Elimination Standards Permit Program*. February 2023 Addendum to the June 1998 Edition.

https://www.dec.ny.gov/docs/water_pdf/togs111.pdf.

NYSDEC, Division of Environmental Remediation (DER). 2010. *DER-10 / Technical Guidance for Site Investigation and Remediation (DER-10)*. May 3. <https://www.dec.ny.gov/regulations/67386.html>.

New York State Department of Health (NYSDOH). 2006. *Guidance for Evaluating Soil Vapor Intrusion in the State of New York*. October 26; updated May 2017.

https://www.health.ny.gov/environmental/investigations/soil_gas/svi_guidance/docs/svig_final2006_complete.pdf

United States Environmental Protection Agency (EPA). 2001. *EPA Requirements for Quality Assurance Project Plans*.

https://www.epa.gov/sites/default/files/2016-06/documents/r5-final_0.pdf. March.

———. 2002. *Guidance for Quality Assurance Project Plans*.

<https://19january2017snapshot.epa.gov/sites/production/files/2015-06/documents/g5-final.pdf>. December

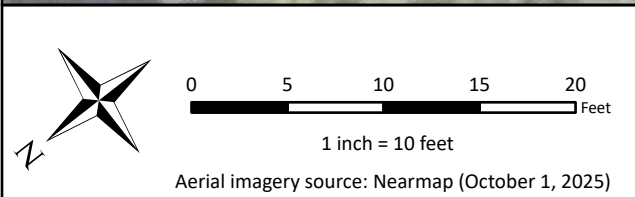
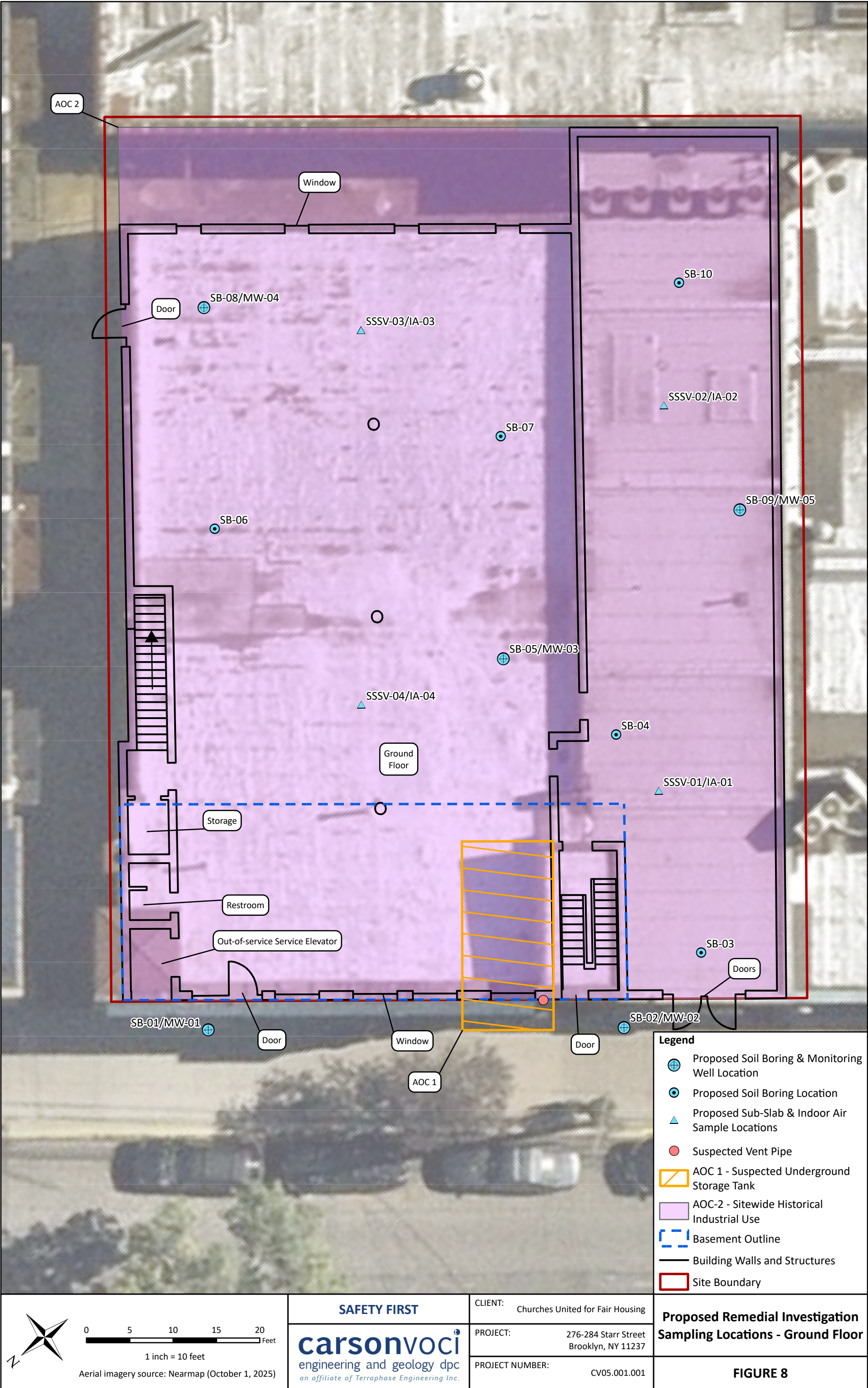
———. 2022. *Standard Operating Procedure for Low-Stress (Low Flow) / Minimal Drawdown Ground-Water Sample Collection*. <https://www.epa.gov/sites/default/files/2015-06/documents/finalsopls1217.pdf>.

November 22.

APPENDIX A

PROPOSED SAMPLE LOCATION FIGURES AND SAMPLE SUMMARY TABLES

File: Z:\Projects\CV05 - Churches United for Fair Housing\001\Pro Project\20260206-ChurchesUnited-BaseMap.aprx - Figure 8 - Proposed Remedial Investigation Sampling Locations - Ground Floor - 7/22/2026 Created by: sean.iowe Coordinate System: NAD 1983 StatePlane New York Long Island FIPS 3104 Feet



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an affiliate of Terraphase Engineering Inc.

CLIENT:	Churches United for Fair Housing
PROJECT:	276-284 Starr Street Brooklyn, NY 11237
PROJECT NUMBER:	CV05.001.001

Proposed Remedial Investigation Sampling Locations - Ground Floor
FIGURE 8

File: Z:\Projects\CV05 - Churches United for Fair Housing\001\Pro Project\20260206-ChurchesUnited-BaseMap.aprx - Figure 9 - Proposed Remedial Investigation Sampling Locations - Basement - 7/22/2026 Created by: sean.iowe Coordinate System: NAD 1983 StatePlane New York Long Island FIPS 3104 Feet

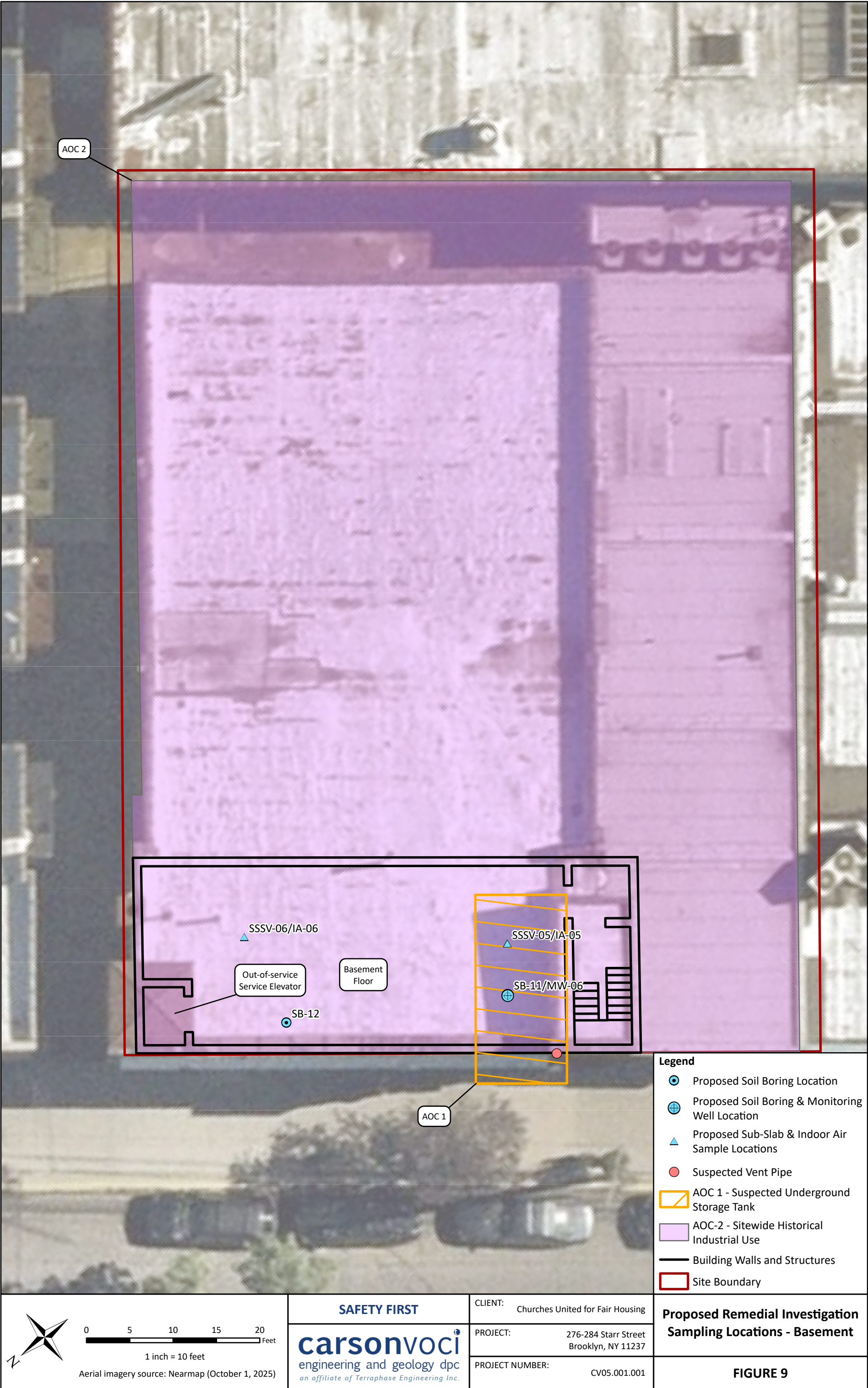


Table 1
Soil Sampling Plan
Remedial Investigation Work Plan
276-284 Starr Street - NYSDEC BCP Site No. C224430
276-284 Starr Street, Brooklyn, New York

Area	Soil Boring	Soil Sample IDs	Total Depth (feet bgs)	Sample Depth (feet bgs)	TCL VOCs	TCL SVOCs ¹	TAL Metals ⁴	TCL PCBs	TCL Pest/Herb	PFAS	Sample Rationale
					EPA Method 8260	EPA Method 8270	EPA Method 6010	EPA Method 8082A	EPA Method 8081B/8151A	EPA Method 1633	
					<i>Terracores</i>	<i>1 - 8 oz. Glass Jar</i>				<i>1 - 8 oz. Glass Jar</i>	
Sidewalk (Off-site)	SB-01	SB-01-##-##	TBD ⁵	TBD ⁵	H	H	H	H	H	H	Sample may be collected if impacts are identified
	SB-02	SB-02-##-##	TBD ⁵	TBD ⁵	H	H	H	H	H	H	Sample may be collected if impacts are identified
Ground Floor	SB-03	SB-03-##-##	TBD ²	TBD ² within 0-2	X	X	X	X	X	X	Delineate nature and extent of potential impacts in soil
		SB-03-##-##		TBD ³ below 2	X	X	X	X	X	X	Delineate nature and extent of potential impacts in soil
	SB-04	SB-04-##-##	TBD ²	TBD ² within 0-2	X	X	X	X	X	X	Delineate nature and extent of potential impacts in soil
		SB-04-##-##		TBD ³ below 2	X	X	X	X	X	X	Delineate nature and extent of potential impacts in soil
	SB-05	SB-05-##-##	TBD ²	TBD ² within 0-2	X	X	X	X	X	X	Delineate nature and extent of potential impacts in soil
		SB-05-##-##		TBD ³ below 2	X	X	X	X	X	X	Delineate nature and extent of potential impacts in soil
	SB-06	SB-06-##-##	TBD ²	TBD ² within 0-2	X	X	X	X	X	X	Delineate nature and extent of potential impacts in soil
		SB-06-##-##		TBD ³ below 2	X	X	X	X	X	X	Delineate nature and extent of potential impacts in soil
	SB-07	SB-07-##-##	TBD ²	TBD ² within 0-2	X	X	X	X	X	X	Delineate nature and extent of potential impacts in soil
		SB-07-##-##		TBD ³ below 2	X	X	X	X	X	X	Delineate nature and extent of potential impacts in soil
	SB-08	SB-08-##-##	TBD ²	TBD ² within 0-2	X	X	X	X	X	X	Delineate nature and extent of potential impacts in soil
		SB-08-##-##		TBD ³ below 2	X	X	X	X	X	X	Delineate nature and extent of potential impacts in soil
	SB-09	SB-09-##-##	TBD ²	TBD ² within 0-2	X	X	X	X	X	X	Delineate nature and extent of potential impacts in soil
		SB-09-##-##		TBD ³ below 2	X	X	X	X	X	X	Delineate nature and extent of potential impacts in soil
	SB-10	SB-10-##-##	TBD ²	TBD ² within 0-2	X	X	X	X	X	X	Delineate nature and extent of potential impacts in soil
		SB-10-##-##		TBD ³ below 2	X	X	X	X	X	X	Delineate nature and extent of potential impacts in soil
Basement	SB-11	SB-11-##-##	TBD ²	TBD ² within 0-2	X	X	X	X	X	X	Delineate nature and extent of potential impacts in soil
		SB-11-##-##		TBD ³ below 2	X	X	X	X	X	X	Delineate nature and extent of potential impacts in soil
	SB-12	SB-12-##-##	TBD ²	TBD ² within 0-2	X	X	X	X	X	X	Delineate nature and extent of potential impacts in soil
		SB-12-##-##		TBD ³ below 2	X	X	X	X	X	X	Delineate nature and extent of potential impacts in soil
QAQC**	TBD	DUP-SO-01	TBD	TBD	X	X	X	X	X	X	Collected at a frequency of 1 per 20 samples
	TBD	MS/MSD	TBD	TBD	X	X	X	X	X	X	Collected at a frequency of 1 per 20 samples
	--	FB-SO-yymmdd	--	--	X	X	X	X	X	X	Collected once per day or 1 per 20 samples, whichever is more
Total No. of Samples					20	20	20	20	20	20	

Notes:

X = Sample to be collected for proposed analysis

H = Sample to be collected and held for proposed analysis

1. SVOCs analysis to include 1,4-Dioxane

2. Sample depth between 0 and 2 ft bgs to be determined based on PID readings and visual/olfactory observations.

3. Sample depth below 2 ft bgs to be determined based on PID readings and visual/olfactory observations. Additional sample(s) to be collected for vertical delineation if significant impacts are observed in sample collected based on field screening.

4. Metals analysis to include hexavalent and trivalent chromium and cyanide.

5. Soil borings will be advanced only for field screening. If impacts (PID readings and visual/olfactory observations) are identified, samples may be collected at the inferred soil/groundwater interface to be held at the lab.

* See QAPP for additional details on laboratory methods, sampling containers, and associated sampling requirements

** Quality Assurance and Quality Control samples to be collected in accordance with and at the frequency outlined the RIWP and QAPP

Acronyms

##-## = top and bottom in feet bgs of sample depth interval

bgs = below ground surface

EPA = United States Environmental Protection Agency

Herb = herbicides

PCBs = polychlorinated biphenyls

Pest = pesticides

PFAS = per- and polyfluoroalkyl substances

PID = photionization detector

SVOCs = semi-volatile organic compounds

TAL = target analyte list

TCL = target compound list

VOCs = volatile organic compounds

Table 2
Groundwater Sampling Plan
Remedial Investigation Work Plan
276-284 Starr Street - NYSDEC BCP Site No. C224430
276-284 Starr Street, Brooklyn, New York

Groundwater Well	Soil Sample IDs	TCL VOCs	TCL SVOCs ¹	TAL Metals (Total + Dissolved) ²	TCL PCBs	TCL Pest/Herb	PFAS	Sample Rationale
		EPA Method 8260	EPA Method 8270	EPA Method 6010B	EPA Method 8082A	EPA Method 8081B/8151A	EPA Method 1633	
MW-01	MW-01-yymmdd	X	X	X	X	X	X	Delineate nature and extent of potential impacts in groundwater
MW-02	MW-02-yymmdd	X	X	X	X	X	X	Delineate nature and extent of potential impacts in groundwater
MW-03	MW-03-yymmdd	X	X	X	X	X	X	Delineate nature and extent of potential impacts in groundwater
MW-04	MW-04-yymmdd	X	X	X	X	X	X	Delineate nature and extent of potential impacts in groundwater
MW-05	MW-05-yymmdd	X	X	X	X	X	X	Delineate nature and extent of potential impacts in groundwater
MW-06	MW-06-yymmdd	X	X	X	X	X	X	Delineate nature and extent of potential impacts in groundwater
QAQC	DUP-GW-01	X	X	X	X	X	X	Collected at a frequency of 1 per 20 samples
	MS/MSD	X	X	X	X	X	X	Collected at a frequency of 1 per 20 samples
	FB-GW-yymmdd	X	X	X	X	X	X	Collected once per day or 1 per 20 samples, whichever is more
	TB-yymmdd	X						Analyzed at a frequency of one per cooler containing aqueous samples for VOC analysis
Total No. of Samples		6	6	6	6	6	6	

Notes:

X = Sample to be collected for proposed analysis

1. SVOCs analysis to include 1,4-Dioxane

2. Metals analysis to include hexavalent and trivalent chromium and cyanide.

* See QAPP for additional details on laboratory methods, sampling containers, and associated sampling requirements

** Quality Assurance and Quality Control samples to be collected in accordance with the RIWP and QAPP

Acronyms

bgs = below ground surface
OCP = organochlorine pesticides including technical chlordane
Herb = herbicides
PCBs = polychlorinated biphenyls
Pest = pesticides
PFAS = per- and polyfluoroalkyl substances
SVOCs = semi-volatile organic compounds
TAL = target analyte list
TCL = target compound list
TPH-mo = total petroleum hydrocarbons as motor oil
VOCs = volatile organic compounds
yymmdd = year/month/day

Table 3**Sub-Slab Soil Vapor and Indoor Air Sampling Plan**

Remedial Investigation Work Plan

276-284 Starr Street - NYSDEC BCP Site No. C224430

276-284 Starr Street, Brooklyn, New York

Sub-Slab Soil Vapor/Indoor Air Sample Location	Soil Sample IDs	Sample Depth (feet)	EPA Air Method TO-15	Sample Rationale
SSSV-01	SSSV-01-yyymmdd	0.5 bgs	X	Delineate nature and extent of impacts in soil vapor
SSSV-02	SSSV-02-yyymmdd	0.5 bgs	X	Delineate nature and extent of impacts in soil vapor
SSSV-03	SSSV-03-yyymmdd	0.5 bgs	X	Delineate nature and extent of impacts in soil vapor
SSSV-04	SSSV-04-yyymmdd	0.5 bgs	X	Delineate nature and extent of impacts in soil vapor
SSSV-05	SSSV-05-yyymmdd	0.5 bgs	X	Delineate nature and extent of impacts in soil vapor
SSSV-06	SSSV-06-yyymmdd	0.5 bgs	X	Delineate nature and extent of impacts in soil vapor
IA-01	IA-01-yyymmdd	3-5 ags	X	Delineate nature and extent of impacts in indoor air
IA-02	IA-02-yyymmdd	3-5 ags	X	Delineate nature and extent of impacts in indoor air
IA-03	IA-03-yyymmdd	3-5 ags	X	Delineate nature and extent of impacts in indoor air
IA-04	IA-04-yyymmdd	3-5 ags	X	Delineate nature and extent of impacts in indoor air
IA-05	IA-05-yyymmdd	3-5 ags	X	Delineate nature and extent of impacts in indoor air
IA-06	IA-06-yyymmdd	3-5 ags	X	Delineate nature and extent of impacts in indoor air
OA-01	OA-01-yyymmdd	3-5 ags	X	Assess ambient/background conditions in outdoor air
TBD	DUP-SV-01	--	X	Collected at a frequency of 1 per 20 samples
Total No. of Samples			12	

Notes:

X = Sample to be collected for proposed analysis

* See QAPP for additional details on laboratory methods, sampling containers, and associated sampling requirements

** Quality Assurance and Quality Control samples (including outdoor air samples) to be collected in accordance with the RIWP and QAPP

Acronyms

ags = above ground surface

bgs = below ground surface

EPA = United States Environmental Protection Agency

TO-15 = toxic organics 15

APPENDIX B

RESUMES

Nicholas Krasnecky, PE

Principal Engineer

Nicholas Krasnecky, PE, has over 14 years of progressive experience in environmental consulting working on a variety of environmental characterization and remediation projects for municipal, commercial, industrial, and private clients. Mr. Krasnecky specializes in site characterization and the evaluation, design, and implementation of remedial alternatives, particularly in New York and New Jersey via application of state specific environmental guidance. He utilizes his extensive environmental consulting and remediation background to support regulatory site closure, property development, risk management, evaluation for New York State Brownfield Cleanup Program (BCP) applicability, and additional client specific project goals.

Mr. Krasnecky has extensive experience with remedial treatment system design, implementation, and operations and maintenance, including pump and treat, air sparge, soil vapor extraction, and dual-phase extraction systems. He has designed and implemented in-situ remediation technologies at numerous sites, including in-situ chemical oxidation, aerobic bioremediation, in-situ chemical reduction, permeable reactive barriers, and enhanced anaerobic bioremediation. He has expertise in the assessment of vapor intrusion and the design, construction, and commissioning of active and passive vapor intrusion mitigation systems.

Mr. Krasnecky has served as an engineer for various large-scale, complex remedial actions involving large work forces with multiple phases of work occurring simultaneously, including interaction with regulators, clients, and various stakeholders. His responsibilities include preparing proposals and cost estimates, producing engineering plans and specifications, collecting and analyzing field data, construction management and engineering oversight, health and safety, budget tracking, environmental and stormwater permitting, and technical report writing.

Project Experience

Elmwood Preserve - NYSDEC Brownfield Cleanup Program Site, White Plains, New York (2024 – Present)

Senior Remedial Engineer/Licensed Professional. Serves as the remedial engineer/licensed professional for the Elmwood Preserve Site (Site), a 106-acre former golf course property impacted by historically applied pesticides, proposed for single-family home redevelopment, and enrolled in the New York State Department of Environmental Conservation (NYSDEC) BCP. Reviewed and evaluated previously collected Remedial Investigation (RI) data, developed and implemented supplemental RI scopes, and prepared the associated RI report. Prepared the Remedial Action Work Plan (RAWP) presenting the remedial design and strategy to excavate, transport off-site, and dispose of over 100,000 cubic yards of soils. Provides project management, regulatory coordination, cost to closure estimates, and strategy support for the project.

The Bellwether District – Former Refinery, Philadelphia, Pennsylvania (2025 – Present)

Senior Remedial Engineer. Provides remedial investigation and design services for multiple sites at The Bellwether District, formerly the Philadelphia Energy Solutions Refinery, enrolled in the Pennsylvania Land Recycling Program (Act 2). Evaluated historical data related to light non-aqueous phase liquid (LNAPL) releases and developed and implemented additional investigations to identify separate releases, including high-res Ultraviolet Optical Screening Tooling, to prepare conceptual site models and Act 2 reporting. Develops remedial approaches for LNAPL management, recovery, and closure plans in accordance with Act 2. Serves as the Licensed Professional Engineer for the design of a passive vapor intrusion mitigation system (VIMS) for methane and VOCs at a 1.4 million square foot warehouse proposed to be constructed at the Site.

Education

BS in Environmental Engineering, Rensselaer Polytechnic Institute, 2011

Years of Experience

14

Joined Terraphase

2023

Professional History

Terraphase Engineering Inc., Principal Engineer, 2023 – present

ECC Horizon, Senior Environmental Engineer, 2018 – 2023

Kennedy/Jenks Consultants, Senior Staff Environmental Engineer, 2015 – 2017

ARCADIS, Environmental Engineer II, 2012 – 2015

Licenses/Registrations

*Professional Engineer, New York #100006
New Jersey #24GE05369900
Indiana #11900093
Connecticut #PEN.0038081
Massachusetts #59517
Pennsylvania #PE097611
Delaware #31286*

Certification/Training

*40-Hour OSHA HAZWOPER
OSHA 10-hour Construction Safety and Health
Silica Awareness*

401 Hunts Point - NYSDEC Brownfield Cleanup Program Site, Bronx, New York (2022 – present)

Senior Remedial Engineer/Licensed Professional. Serves as the licensed professional engineer for the 401 Hunts Point Site, a former sheet-metal manufacturing facility enrolled in the NYSDEC BCP. Prepared the BCP and RI Work Plan and oversaw the implementation of the RI. Evaluated remedial alternatives, designed the remedial action, and prepared and implemented an Interim Remedial Measures (IRM) Work Plan consisting of underground storage tank (UST) and soil removal via excavation, in-situ injections to treat petroleum hydrocarbon groundwater impacts, and the installation of an active sub-slab depressurization system to mitigate vapor intrusion concerns associated with chlorinated volatile organic compounds (cVOCs).

Former Gasoline Service Station Remediation/Redevelopment, Oakland, CA (2023 – present)

Associate Engineer. Provided technical and engineering support for the remediation and redevelopment of a former gasoline service station to multi-family residential housing. Prepared engineering cost estimates and subsequent bid package for the removal of 10,000 tons of lead- and petroleum-impacted soils. Prepared a passive vapor intrusion mitigation system design installed as part of redevelopment to mitigate potential remaining vapor intrusion impacts.

Marion County Community Justice Campus – Vapor Mitigation System, Indianapolis, Indiana, (2019 – 2021)

Senior Environmental Engineer. Engineer of Record for the design, installation oversight, and commissioning of active sub-slab vapor mitigation systems at four buildings at the City of Indianapolis's new Community Justice Campus, to mitigate potential vapor impacts from subsurface impacts associated with a Former Manufactured Gas Plant. Buildings ranged in size from 22,000 to 120,000 square feet and required active sub-slab systems consisting of a vapor barrier, sub-slab infrastructure, and electrically powered inline fans equipped with continuous monitoring via integrated alarms and controls into the overall building management systems.

Site Remediation and Redevelopment, Long Island City, New York, 39-26th Street LLC (2020 – present)

Senior Remedial Engineer/Licensed Professional. Serves as the licensed professional engineer for ongoing remediation and subsequent redevelopment of the Bridge Cleaners Site, a former commercial dry-cleaner property enrolled as a NYSDEC State Superfund Site. Designed and implemented work plans for an expansion to the existing Air Sparge/Soil Vapor Extraction (AS/SVE) system, decommissioning of the AS/SVE, redevelopment excavation and air monitoring for the redevelopment of the property to an 11-story residential building, and in-situ remedial injection of zero-valent iron and enhanced anaerobic biodegradation amendments to treat a cVOC groundwater plume.

Former Gasoline Station Petroleum Remediation, Sterling, Colorado, QBE Insurance Group Ltd. (2020 – 2023)

Senior Environmental Engineer. Served as the lead remedial engineer for the remediation of a petroleum hydrocarbon groundwater plume stemming from gas station USTs and a historical gasoline tanker spill. Evaluated the effectiveness of the ongoing AS/SVE remedial system and conducted additional investigation activities, including a Membrane Interface Hydraulic Profiling (MIHPT) investigation to develop an updated conceptual site model to evaluate remedial treatment alternatives. Designed an in-situ remedial approach utilizing a Vertebrae Well System® to deliver a chemical oxidation solution to the subsurface to treat the groundwater plume extending under a State Highway and parking lot.

Former Safer Textiles - Site Remediation, New Jersey, Confidential Client (2014 – 2017)

Senior Staff Environmental Engineer. Provided engineering design and remedial oversight for a cVOC soil and groundwater remediation project involving in-situ and ex-situ treatment and containment strategies in New Jersey. Provided engineering oversight of remediation contractor; design, operations, maintenance, and optimization of the remedial technologies implemented include dual-phase vacuum extraction of dissolved and free phase tetrachloroethylene and daughter products, vapor mitigation system installation oversight in an existing building and continued air monitoring, enhanced anaerobic bioremediation, in-situ pH buffering, sediment dredging and capping, and sheet pile containment followed by site restoration including wetlands mitigation.

Feasibility Studies, Montana, Confidential Client (2016 – 2017)

Senior Staff Environmental Engineer. Preparation of two Feasibility Study (FS) reports and Rough Order of Magnitude (ROM) costs to identify and evaluate remedial alternatives for two sites impacted by historical railway operations. The FS addresses alternatives for multiple contaminants impacting soil and groundwater at the sites and included an excavation cut/fill and capping evaluation with respect to environmental exposure pathways risk evaluation and management.

Alexander Strohl, PG

Senior Project Geologist

Mr. Strohl is a Licensed Professional Geologist with over 10 years of experience in the environmental consulting industry. As a Project Geologist, he is responsible for directing multi-media site characterization programs involving groundwater, soil, surface water, soil vapor, and sediment sample collection for a variety of target contaminants including, chlorinated hydrocarbons, petroleum hydrocarbons, per- and polyfluoroalkyl substances (PFAS), metals, Polychlorinated Biphenyls (PCBs) and others. He has supervised environmental investigation and remediation including soil excavation, in-situ groundwater remediation, petroleum and chemical storage tank decommissioning, and monitoring well installation and abandonment. Mr. Strohl is also responsible for preparing Work Plans, Phase I Environmental Site Assessments (ESAs), and investigation-related technical reports for clients and regulatory agencies. Mr. Strohl is experienced in utilizing groundwater contaminant plume models in addition to his experience in developing environmental conceptual site models.

Mr. Strohl's project experience includes complex remedial investigation projects, the Pennsylvania Voluntary Cleanup (Act 2) Program, PFAS sampling and reporting, Phase I and II ESAs, tank investigations/removal, desktop auditing of oil and gas waste disposal facilities, Spill Prevention, Control, and Countermeasure (SPCC) inspections of oil and gas facilities, regulatory reporting for landfills, and National Pollutant Discharge Elimination System (NPDES) sampling and reporting.

Project Experience

Former Philadelphia Refinery, Philadelphia, Pennsylvania, Philadelphia Energy Solutions Refining and Marketing (2021 – present)

Professional Geologist of Record. Developed investigation work plans and site characterization reports to assist with closure of a 1,400-acre, 150-year-old former petroleum refinery. The site is currently enrolled in the Pennsylvania Regulated Tank Corrective Actions Program and the Pennsylvania Voluntary Cleanup Program for multiple sources of contamination. Certified the closure reports as the Professional Geologist of record.

Jennersville Hospital, West Grove, Pennsylvania, Tower Health (2022 – present)

Project Manager. Planned and managed a complex site investigation for PFAS at a hospital property impacted by the discharge of laundry greywater. The investigation included a rigorous quality assurance program, which was executed to the satisfaction of the client and third-party consultant reviewers. The implemented protocols for prevention of cross contamination have proven to be effective; quality assurance blanks have not detected PFAS substances above laboratory detection limits. The site will be enrolled in Act 2.

Multiple Act 2 Project Sites, Pennsylvania (2021 – present)

Professional Geologist of Record. Developed and certified Final Reports as the Professional Geologist of record to receive release of liability through the Act 2 program. Sites have included a recently developed car dealership where improper reporting for former underground storage tanks (USTs) had previously failed to demonstrate attainment of the selected

Education

BS in Geosciences, with a minor in Spanish, The Pennsylvania State University, 2015

Years of Experience

10+

Joined Terraphase

2021

Professional History

Terraphase Engineering Inc., Senior Project Geologist, 2026 – present; Project Geologist, 2024 – 2025; Senior Staff Geologist, 2021 – 2023

Environmental Standards, Inc., Staff Geoscientist, 2015 – 2021

Licenses/Registrations

Pennsylvania Licensed Professional Geologist No. 5519, 2021

Delaware Licensed Professional Geologist No. S4-0011440, 2024

New Hampshire Licensed Professional Geologist No. 927, 2024

Maine Licensed Professional Geologist No. GE683, 2025

Certification/Training

Synergis Technologies' 32-Hour AutoCAD Essentials, 2015

OSHA HAZWOPER 29 CFR 1910.120 and 8-Hour Refresher, valid through 2026

First Aid/CPR/AED Trained, valid through 4/2027

SafeLand USA Trained

standard, and a former rail yard where multiple potential sources of contamination were investigated as part of the redevelopment of a property to a large residential apartment complex.

Lead in Water Testing Program Management, Philadelphia, PA, School District of Philadelphia (2022 – present)

Project Manager. Managed subcontracted plumbers and electricians to complete water fountain installations in nearly 300 District buildings to meet a compliance deadline. Communicated progress and schedule to District project managers. Managed sampling team schedules to complete lead in water testing in accordance with EPA “3 T’s” guidance. Consulted the technical database team as an internal user of database and dashboards which house and display sampling and work order data.

Superfund Sites, Maryland and Pennsylvania (2015 – present)

Task Manager and Field Team Leader. Planned and executed numerous successful investigations and routine field sampling events at Superfund Sites located in Maryland and Pennsylvania impacted by chlorinated hydrocarbons and PFAS. The sites included former disposal facilities with long term pump-and-treat remediation systems. Complex bedrock geology and difficult field conditions frequently necessitated problem solving and flexibility.

Pollock Park and Pottstown Plating Works, Pottstown, Pennsylvania, Montgomery County Redevelopment Authority (2017 – 2021)

Task Manager and Field Team Leader. Managed soil and groundwater sampling activities at chlorinated hydrocarbon-impacted sites. Neighboring properties were also heavily impacted with chlorinated hydrocarbons, making cooperation between multiple consulting firms, regulatory agencies, and clients a necessity. Developed work plans, proposals, conceptual site models, and groundwater contaminant plume models for environmental investigation and closure reports. The investigations and cleanups assisted in the efforts to rejuvenate a former industrial area to re-develop a community park in Pottstown.

Store Space, Philadelphia, Pennsylvania (2022 – 2023)

Project Manager. Developed work plans and managed the implementation of a remediation of concrete floors impacted with mercury and PCBs at a facility that was the former location of a thermometer manufacturer. A request for proposal was distributed to multiple remediation contractors. Contractors were evaluated and the bid was awarded based on their qualifications, price, and remediation methodology. The success of the remediation allowed for the sale of the property.

Lanchester Landfill, Narvon, Pennsylvania, Chester County Solid Waste Authority (2019 – 2021)

Project Manager and Field Team Leader. Performed regulatory reporting for a landfill facility in Pennsylvania. Developed sampling and analysis plans, executed a PFAS leachate sampling investigation, and assisted in streamlining the routine sampling process for the facility.

Triumph Accessory Services, Wellington, Kansas, RICOH (2021 – 2022)

Senior Staff Geologist. Assisted with the development and planning, and oversaw the field implementation of an in-situ remediation methodology designed to significantly reduce concentrations of chlorinated solvents in groundwater. The success of the remediation will allow the client to receive regulatory closure for the property within the framework of the Kansas Voluntary Cleanup Program.

The Poplar, Philadelphia, Pennsylvania, Post Brothers Apartments (2018 – 2021)

Task Manager and Field Team Leader. Managed complex site assessment and investigation reporting activities at a large-scale residential redevelopment site. The site is currently enrolled in a voluntary cleanup program for six separate historical sources of contamination, including a former dry-cleaner, on-site and off-site petroleum USTs, and historical fill.



RESUME
PEI GENG

EDUCATION

M.S. Organic Chemistry, 1989
Sam Houston State University

B.S. Environmental Chemistry, 1983
Nankai University

PROFESSIONAL HISTORY

Laboratory Data Consultants, Inc.
Senior Chemist
1997 to present

Ceimic Corporation
GC/MS and GC Chemist
1996 to 1997

PACE Analytical Service Inc.
GC/MS and GC Chemist
1990 to 1996

REPRESENTATIVE EXPERIENCE

Ms. Geng has over 34 years combined environmental laboratory and data validation experience. Her experience includes performance of data validation in the GC and GC/MS areas for major Federal projects. She has performed large validation projects under Boeing, Navy Southwest, Northwest and Pacific Division, EPA Region IX ESAT, USACE and AFCEE/AFCEC programs. Her laboratory experience includes hands-on CLP and EPA analysis of GC and GC/MS volatile organic compounds.

Specifically, Ms. Geng has over 27 years organic data validation experience using USEPA CLP (including Region III) functional guidelines and other applicable documents.

- As chemist with LDC, Ms. Geng specializes in the data validation and contract compliance screening of gas chromatography-mass spectrometry analyses as well as gas chromatography analyses. She has a thorough knowledge and understanding of gas chromatography and gas chromatography-mass spectrometry (GCMS) and high resolution GCMS methods referenced in EPA CLP, SW-846, EPA 500, 600 and 1600 series documents. She has performed large data validation under Boeing, Navy Southwest and Pacific Divisions and EPA Region IX ESAT, USACE and AFCEE/AFCEC projects.



Ms. Geng has over 7 years of experience in an environmental laboratory performing the analysis of organic parameters.

- As both a GC and GC/MS chemist at Ceimic Corporation, a full service environmental analytical chemistry facility, Ms. Geng performed GC and GC/MS volatile and semivolatile analyses.
- As both a GC and GC/MS chemist at PACE Analytical Service Inc., a full service environmental analytical chemistry facility, Ms. Geng performed GC and GC/MS volatile and semivolatile analyses as well as overseeing the final reporting of analytical data, and compliance with method requirements.

APPENDIX C

NYSDEC SAMPLING, ANALYSIS, AND ASSESSMENT OF PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS), APRIL 2023



Department of
Environmental
Conservation

SAMPLING, ANALYSIS, AND ASSESSMENT OF PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS)

Under NYSDEC's Part 375 Remedial Programs

April 2023



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ERRATA SHEET for

**SAMPLING, ANALYSIS, AND ASSESSMENT OF PER- AND POLYFLUOROALKYL SUBSTANCES
(PFAS) Under NYSDEC's Part 375 Remedial Programs Issued January 17, 2020**

Citation and Page Number	Current Text	Corrected Text	Date
Title of Appendix I, page 32	Appendix H	Appendix I	2/25/2020
Document Cover, page 1	Guidelines for Sampling and Analysis of PFAS	Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs	9/15/2020
Data Assessment and Application to Site Cleanup Page 3	Until such time as Ambient Water Quality Standards (AWQS) and Soil Cleanup Objectives (SCOs) for PFOA and PFOS are published	Until such time as Soil Cleanup Objectives (SCOs) for PFOA and PFOS are published	3/28/2023
Water Sample Results Page 3	PFOA and PFOS should be further assessed and considered as potential contaminants of concern in groundwater or surface water if PFOA or PFOS is detected in any water sample at or above 10 ng/L (ppt) and is determined to be attributable to the site, either by a comparison of upgradient and downgradient levels, or the presence of soil source areas, as defined below.	NYSDEC has adopted ambient water quality guidance values for PFOA and PFOS. Groundwater samples should be compared to the human health criteria of 6.7 ng/l (ppt) for PFOA and 2.7 ng/l (ppt) for PFOS. These guidance values also include criteria for surface water for PFOS applicable for aquatic life, which may be applicable at some sites. Drinking water sample results should be compared to the NYS maximum contaminant level (MCL) of 10 ng/l (ppt). Analysis to determine if PFOA and PFOS concentrations are attributable to the site should include a comparison between upgradient and downgradient levels, and the presence of soil source areas, as defined below.	3/28/2023
Soil Sample Results Page 3	Soil cleanup objectives for PFOA and PFOS have been proposed in an upcoming revision to 6 NYCRR Part 375-6. Until SCOs are in effect, the following are to be used as guidance values:	NYSDEC will delay adding soil cleanup objectives for PFOA and PFOS to 6 NYCRR Part 375-6 until the PFAS rural soil background study has been completed. Until SCOs are in effect, the following are to be used as guidance values:	3/28/2023
Protection of Groundwater Page 3	PFOA (ppb) 1.1 PFOS (ppb) 3.7	PFOA (ppb) 0.8 PFOS (ppb) 1.0	3/28/2023

Citation and Page Number	Current Text	Corrected Text	Date
Footnote 2 Page 3	The movement of PFAS in the environment is being aggressively researched at this time; that research will eventually result in more accurate models for the behaviors of these chemicals. In the meantime, DEC has calculated the guidance value for the protection of groundwater using the same procedure used for all other chemicals, as described in Section 7.7 of the Technical Support Document (http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf).	The Protection of Groundwater values are based on the above referenced ambient groundwater guidance values. Details on that calculation are available in the following document, prepared for the February 2022 proposed changes to Part 375 (https://www.dec.ny.gov/docs/remediation_hudson_pdf/part375techsupport.pdf). The movement of PFAS in the environment is being aggressively researched at this time; that research will eventually result in more accurate models for the behaviors of these chemicals. In the meantime, DEC has calculated the guidance value for the protection of groundwater using the same procedure used for all other chemicals, as described in Section 7.7 of the Technical Support Document (http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf).	3/28/2023
Testing for Imported Soil Page 4	If the concentrations of PFOA and PFOS in leachate are at or above 10 ppt (the Maximum Contaminant Levels established for drinking water by the New York State Department of Health), then the soil is not acceptable.	If the concentrations of PFOA and PFOS in leachate are at or above the ambient water quality guidance values for groundwater, then the soil is not acceptable.	3/28/2023
Routine Analysis, page 9	“However, laboratories analyzing environmental samples...PFOA and PFOS in drinking water by EPA Method 537, 537.1 or ISO 25101.”	“However, laboratories analyzing environmental samples...PFOA and PFOS in drinking water by EPA Method 537, 537.1, ISO 25101, or Method 533.”	9/15/2020
Additional Analysis, page 9, new paragraph regarding soil parameters	None	“In cases where site-specific cleanup objectives for PFOA and PFOS are to be assessed, soil parameters, such as Total Organic Carbon (EPA Method 9060), soil pH (EPA Method 9045), clay content (percent), and cation exchange capacity (EPA Method 9081), should be included in the analysis to help evaluate factors affecting the leachability of PFAS in site soils.”	9/15/2020

Citation and Page Number	Current Text	Corrected Text	Date
Data Assessment and Application to Site Cleanup Page 10	Until such time as Ambient Water Quality Standards (AWQS) and Soil Cleanup Objectives (SCOs) for PFAS are published, the extent of contaminated media potentially subject to remediation should be determined on a case-by-case basis using the procedures discussed below and the criteria in DER-10. Target levels for cleanup of PFAS in other media, including biota and sediment, have not yet been established by the DEC.	Until such time as Ambient Water Quality Standards (AWQS) and Soil Cleanup Objectives (SCOs) for PFOA and PFOS are published, the extent of contaminated media potentially subject to remediation should be determined on a case-by-case basis using the procedures discussed below and the criteria in DER-10. Preliminary target levels for cleanup of PFOA and PFOS in other media, including biota and sediment, have not yet been established by the DEC.	9/15/2020
Water Sample Results Page 10	PFAS should be further assessed and considered as a potential contaminant of concern in groundwater or surface water (...) If PFAS are identified as a contaminant of concern for a site, they should be assessed as part of the remedy selection process in accordance with Part 375 and DER-10.	PFOA and PFOS should be further assessed and considered as potential contaminants of concern in groundwater or surface water (...) If PFOA and/or PFOS are identified as contaminants of concern for a site, they should be assessed as part of the remedy selection process in accordance with Part 375 and DER-10.	9/15/2020

Citation and Page Number	Current Text	Corrected Text	Date
Soil Sample Results, page 10	“The extent of soil contamination for purposes of delineation and remedy selection should be determined by having certain soil samples tested by Synthetic Precipitation Leaching Procedure (SPLP) and the leachate analyzed for PFAS. Soil exhibiting SPLP results above 70 ppt for either PFOA or PFOS (individually or combined) are to be evaluated during the cleanup phase.”	“Soil cleanup objectives for PFOA and PFOS will be proposed in an upcoming revision to 6 NYCRR Part 375-6. Until SCOs are in effect, the following are to be used as guidance values. “ [Interim SCO Table] “PFOA and PFOS results for soil are to be compared against the guidance values listed above. These guidance values are to be used in determining whether PFOA and PFOS are contaminants of concern for the site and for determining remedial action objectives and cleanup requirements. Site-specific remedial objectives for protection of groundwater can also be presented for evaluation by DEC. Development of site-specific remedial objectives for protection of groundwater will require analysis of additional soil parameters relating to leachability. These additional analyses can include any or all the parameters listed above (soil pH, cation exchange capacity, etc.) and/or use of SPLP. As the understanding of PFAS transport improves, DEC welcomes proposals for site-specific remedial objectives for protection of groundwater. DEC will expect that those may be dependent on additional factors including soil pH, aqueous pH, % organic carbon, % Sand/Silt/Clay, soil cations: K, Ca, Mg, Na, Fe, Al, cation exchange capacity, and anion exchange capacity. Site-specific remedial objectives should also consider the dilution attenuation factor (DAF). The NJDEP publication on DAF can be used as a reference: https://www.nj.gov/dep/srp/guidance/rs/daf.pdf. ”	9/15/2020

Citation and Page Number	Current Text	Corrected Text	Date
Testing for Imported Soil Page 11	Soil imported to a site for use in a soil cap, soil cover, or as backfill is to be tested for PFAS in general conformance with DER-10, Section 5.4(e) for the PFAS Analyte List (Appendix F) using the analytical procedures discussed below and the criteria in DER-10 associated with SVOCs. If PFOA or PFOS is detected in any sample at or above 1 µg/kg, then soil should be tested by SPLP and the leachate analyzed for PFAS. If the SPLP results exceed 10 ppt for either PFOA or PFOS (individually) then the source of backfill should be rejected, unless a site-specific exemption is provided by DER. SPLP leachate criteria is based on the Maximum Contaminant Levels proposed for drinking water by New York State's Department of Health, this value may be updated based on future Federal or State promulgated regulatory standards. Remedial parties have the option of analyzing samples concurrently for both PFAS in soil and in the SPLP leachate to minimize project delays. Category B deliverables should be submitted for backfill samples, though a DUSR is not required.	Testing for PFAS should be included any time a full TAL/TCL analyte list is required. Results for PFOA and PFOS should be compared to the applicable guidance values. If PFOA or PFOS is detected in any sample at or above the guidance values then the source of backfill should be rejected, unless a site-specific exemption is provided by DER based on SPLP testing, for example. If the concentrations of PFOA and PFOS in leachate are at or above 10 ppt (the Maximum Contaminant Levels established for drinking water by the New York State Department of Health), then the soil is not acceptable. PFOA, PFOS and 1,4-dioxane are all considered semi-volatile compounds, so composite samples are appropriate for these compounds when sampling in accordance with DER-10, Table 5.4(e)10. Category B deliverables should be submitted for backfill samples, though a DUSR is not required.	9/15/2020

Citation and Page Number	Current Text	Corrected Text	Date
Footnotes	None	¹ TOP Assay analysis of highly contaminated samples, such as those from an AFFF (aqueous film-forming foam) site, can result in incomplete oxidation of the samples and an underestimation of the total perfluoroalkyl substances. ² The movement of PFAS in the environment is being aggressively researched at this time; that research will eventually result in more accurate models for the behaviors of these chemicals. In the meantime, DEC has calculated the soil cleanup objective for the protection of groundwater using the same procedure used for all other chemicals, as described in Section 7.7 of the Technical Support Document (http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf).	9/15/2020
Additional Analysis, page 9	In cases... soil parameters, such as Total Organic Carbon (EPA Method 9060), soil...	In cases... soil parameters, such as Total Organic Carbon (Lloyd Kahn), soil...	1/8/2021
Appendix A, General Guidelines, fourth bullet	List the ELAP-approved lab(s) to be used for analysis of samples	List the ELAP- certified lab(s) to be used for analysis of samples	1/8/2021
Appendix E, Laboratory Analysis and Containers	Drinking water samples collected using this protocol are intended to be analyzed for PFAS by ISO Method 25101.	Drinking water samples collected using this protocol are intended to be analyzed for PFAS by EPA Method 537, 537.1, 533, or ISO Method 25101	1/8/2021
Water Sample Results Page 9	“In addition, further assessment of water may be warranted if either of the following screening levels are met: a. any other individual PFAS (not PFOA or PFOS) is detected in water at or above 100 ng/L; or b. total concentration of PFAS (including PFOA and PFOS) is detected in water at or above 500 ng/L”	Deleted	6/15/2021

Citation and Page Number	Current Text	Corrected Text	Date
Routine Analysis, Page XX	Currently, New York State Department of Health's Environmental Laboratory Approval Program (ELAP)... criteria set forth in the DER's laboratory guidelines for PFAS in non-potable water and solids (Appendix H - Laboratory Guidelines for Analysis of PFAS in Non-Potable Water and Solids).	Deleted	5/31/2022
Analysis and Reporting, Page XX	As of October 2020, the United States Environmental Protection Agency (EPA) does not have a validated method for analysis of PFAS for media commonly analyzed under DER remedial programs (non-potable waters, solids). DER has developed the following guidelines to ensure consistency in analysis and reporting of PFAS.	Deleted	5/31/2022
Routine Analysis, Page XX	LC-MS/MS analysis for PFAS using methodologies based on EPA Method 537.1 is the procedure to use for environmental samples. Isotope dilution techniques should be utilized for the analysis of PFAS in all media.	EPA Method 1633 is the procedure to use for environmental samples.	
Soil Sample Results, Page XX	Soil cleanup objectives for PFOA and PFOS will be proposed in an upcoming revision to 6 NYCRR Part 375-6	Soil cleanup objectives for PFOA and PFOS have been proposed in an upcoming revision to 6 NYCRR Part 375-6	
Appendix A	"Include in the text... LC-MS/MS for PFAS using methodologies based on EPA Method 537.1"	"Include in the textEPA Method 1633"	
Appendix A	"Laboratory should have ELAP certification for PFOA and PFOS in drinking water by EPA Method 537, 537.1, EPA Method 533, or ISO 25101"	Deleted	
Appendix B	"Samples collected using this protocol are intended to be analyzed for PFAS using methodologies based on EPA Method 537.1"	"Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633"	

Citation and Page Number	Current Text	Corrected Text	Date
Appendix C	“Samples collected using this protocol are intended to be analyzed for PFAS using methodologies based on EPA Method 537.1”	“Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633”	
Appendix D	“Samples collected using this protocol are intended to be analyzed for PFAS using methodologies based on EPA Method 537.1”	“Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633”	
Appendix G		Updated to include all forty PFAS analytes in EPA Method 533	
Appendix H		Deleted	
Appendix I	Appendix I	Appendix H	
Appendix H	“These guidelines are intended to be used for the validation of PFAS analytical results for projects within the Division of Environmental Remediation (DER) as well as aid in the preparation of a data usability summary report.”	“These guidelines are intended to be used for the validation of PFAS using EPA Method 1633 for projects within the Division of Environmental Remediation (DER).”	
Appendix H	“The holding time is 14 days...”	“The holding time is 28 days...”	
Appendix H, Initial Calibration	“The initial calibration should contain a minimum of five standards for linear fit...”	“The initial calibration should contain a minimum of six standards for linear fit...”	
Appendix H, Initial Calibration	Linear fit calibration curves should have an R ² value greater than 0.990.	Deleted	
Appendix H, Initial Calibration Verification	Initial Calibration Verification Section	Deleted	
Appendix H	secondary Ion Monitoring Section	Deleted	
Appendix H	Branched and Linear Isomers Section	Deleted	

Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs

Objective

New York State Department of Environmental Conservation's Division of Environmental Remediation (DER) performs or oversees sampling of environmental media and subsequent analysis of PFAS as part of remedial programs implemented under 6 NYCRR Part 375. To ensure consistency in sampling, analysis, reporting, and assessment of PFAS, DER has developed this document which summarizes currently accepted procedures and updates previous DER technical guidance pertaining to PFAS.

Applicability

All work plans submitted to DEC pursuant to one of the remedial programs under Part 375 shall include PFAS sampling and analysis procedures that conform to the guidelines provided herein.

As part of a site investigation or remedial action compliance program, whenever samples of potentially affected media are collected and analyzed for the standard Target Analyte List/Target Compound List (TAL/TCL), PFAS analysis should also be performed. Potentially affected media can include soil, groundwater, surface water, and sediment. Based upon the potential for biota to be affected, biota sampling and analysis for PFAS may also be warranted as determined pursuant to a Fish and Wildlife Impact Analysis. Soil vapor sampling for PFAS is not required.

Field Sampling Procedures

DER-10 specifies technical guidance applicable to DER's remedial programs. Given the prevalence and use of PFAS, DER has developed "best management practices" specific to sampling for PFAS. As specified in DER-10 Chapter 2, quality assurance procedures are to be submitted with investigation work plans. Typically, these procedures are incorporated into a work plan, or submitted as a stand-alone document (e.g., a Quality Assurance Project Plan). Quality assurance guidelines for PFAS are listed in Appendix A - Quality Assurance Project Plan (QAPP) Guidelines for PFAS.

Field sampling for PFAS performed under DER remedial programs should follow the appropriate procedures outlined for soils, sediments, or other solids (Appendix B), non-potable groundwater (Appendix C), surface water (Appendix D), public or private water supply wells (Appendix E), and fish tissue (Appendix F).

QA/QC samples (e.g. duplicates, MS/MSD) should be collected as specified in DER-10, Section 2.3(c). For sampling equipment coming in contact with aqueous samples only, rinsate or equipment blanks should be collected. Equipment blanks should be collected at a minimum frequency of one per day per site or one per twenty samples, whichever is more frequent.

Analysis and Reporting

The investigation work plan should describe analysis and reporting procedures, including laboratory analytical procedures for the methods discussed below. As specified in DER-10 Section 2.2, laboratories should provide a full Category B deliverable. In addition, a Data Usability Summary Report (DUSR) should be prepared by an independent, third-party data validator. Electronic data submissions should meet the requirements provided at: <https://www.dec.ny.gov/chemical/62440.html>.

DER has developed a *PFAS Analyte List* (Appendix G) for remedial programs to understand the nature of contamination at sites. It is expected that reported results for PFAS will include, at a minimum, all the compounds listed. If lab and/or matrix specific issues are encountered for any analytes, the DER project manager, in consultation with the DER chemist, will make case-by-case decisions as to whether certain analytes may be temporarily or permanently discontinued from analysis at each site. As with other contaminants that are analyzed for at a site, the *PFAS Analyte List* may be refined for future sampling events based on investigative findings.

Routine Analysis

EPA Method 1633 is the procedure to use for environmental samples. Reporting limits for PFOA and PFOS in aqueous samples should not exceed 2 ng/L. Reporting limits for PFOA and PFOS in solid samples should not exceed 0.5 µg/kg. Reporting limits for all other PFAS in aqueous and solid media should be as close to these limits as possible. If laboratories indicate that they are not able to achieve these reporting limits for the entire *PFAS Analyte List*, site-specific decisions regarding acceptance of elevated reporting limits for specific PFAS can be made by the DER project manager in consultation with the DER chemist. Data review guidelines were developed by DER to ensure data comparability and usability (Appendix H - Data Review Guidelines for Analysis of PFAS in Non-Potable Water and Solids).

Additional Analysis

Additional laboratory methods for analysis of PFAS may be warranted at a site, such as the Synthetic Precipitation Leaching Procedure (SPLP) and Total Oxidizable Precursor Assay (TOP Assay).

In cases where site-specific cleanup objectives for PFOA and PFOS are to be assessed, soil parameters, such as Total Organic Carbon (Lloyd Kahn), soil pH (EPA Method 9045), clay content (percent), and cation exchange capacity (EPA Method 9081), should be included in the analysis to help evaluate factors affecting the leachability of PFAS in site soils.

SPLP is a technique used to determine the mobility of chemicals in liquids, soils and wastes, and may be useful in determining the need for addressing PFAS-containing material as part of the remedy. SPLP by EPA Method 1312 should be used unless otherwise specified by the DER project manager in consultation with the DER chemist.

Impacted materials can be made up of PFAS that are not analyzable by routine analytical methodology. A TOP Assay can be utilized to conceptualize the amount and type of oxidizable PFAS which could be liberated in the environment, which approximates the maximum concentration of perfluoroalkyl substances that could be generated if all polyfluoroalkyl substances were oxidized. For example, some polyfluoroalkyl substances may degrade or transform to form perfluoroalkyl substances (such as PFOA or PFOS), resulting in an increase in perfluoroalkyl substance concentrations as contaminated groundwater moves away from a source. The TOP Assay converts, through oxidation, polyfluoroalkyl substances (precursors) into perfluoroalkyl substances that can be detected by routine analytical methodology.¹

¹ TOP Assay analysis of highly contaminated samples, such as those from an AFFF (aqueous film-forming foam) site, can result in incomplete oxidation of the samples and an underestimation of the total perfluoroalkyl substances.

Commercial laboratories have adopted methods which allow for the quantification of targeted PFAS in air and biota. The EPA's Office of Research and Development (ORD) is currently developing methods which allow for air emissions characterization of PFAS, including both targeted and non-targeted analysis of PFAS. Consult with the DER project manager and the DER chemist for assistance on analyzing biota/tissue and air samples.

Data Assessment and Application to Site Cleanup

Until such time as Soil Cleanup Objectives (SCOs) for PFOA and PFOS are published, the extent of contaminated media potentially subject to remediation should be determined on a case-by-case basis using the procedures discussed below and the criteria in DER-10. Preliminary target levels for cleanup of PFOA and PFOS in other media, including biota and sediment, have not yet been established by the DEC.

Water Sample Results

NYSDEC has adopted ambient water quality guidance values for PFOA and PFOS. Groundwater samples should be compared to the human health criteria of 6.7 ng/l (ppt) for PFOA and 2.7 ng/l (ppt) for PFOS. These human health criteria should also be applied to surface water that is used as a water supply. This guidance also includes criteria for surface water for PFOS applicable for aquatic life, which may be applicable at some sites. Drinking water sample results should be compared to the NYS maximum contaminant level (MCL) of 10 ng/l (ppt). Analysis to determine if PFOA and PFOS concentrations are attributable to the site should include a comparison between upgradient and downgradient levels, and the presence of soil source areas, as defined below.

If PFOA and/or PFOS are identified as contaminants of concern for a site, they should be assessed as part of the remedy selection process in accordance with Part 375 and DER-10.

Soil Sample Results

NYSDEC will delay adding soil cleanup objectives for PFOA and PFOS to 6 NYCRR Part 375-6 until the PFAS rural soil background study has been completed. Until SCOs are in effect, the following are to be used as guidance values:

Guidance Values for Anticipated Site Use	PFOA (ppb)	PFOS (ppb)
Unrestricted	0.66	0.88
Residential	6.6	8.8
Restricted Residential	33	44
Commercial	500	440
Industrial	600	440
Protection of Groundwater ²	0.8	1.0

PFOA and PFOS results for soil are to be compared against the guidance values listed above. These guidance values are to be used in determining whether PFOA and PFOS are contaminants of concern for the site and for determining remedial action objectives and cleanup requirements. Site-specific remedial objectives for protection of groundwater can also be presented for evaluation by DEC. Development of site-specific remedial objectives for protection of groundwater will require analysis of additional soil parameters relating to leachability. These

² The Protection of Groundwater values are based on the above referenced ambient groundwater guidance values. Details on that calculation are available in the following document, prepared for the February 2022 proposed changes to Part 375 (https://www.dec.ny.gov/docs/remediation_hudson_pdf/part375techsupport.pdf). The movement of PFAS in the environment is being aggressively researched at this time; that research will eventually result in more accurate models for the behaviors of these chemicals. In the meantime, DEC has calculated the guidance value for the protection of groundwater using the same procedure used for all other chemicals, as described in Section 7.7 of the Technical Support Document (http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf).

additional analyses can include any or all the parameters listed above (soil pH, cation exchange capacity, etc.) and/or use of SPLP.

As the understanding of PFAS transport improves, DEC welcomes proposals for site-specific remedial objectives for protection of groundwater. DEC will expect that those may be dependent on additional factors including soil pH, aqueous pH, % organic carbon, % Sand/Silt/Clay, soil cations: K, Ca, Mg, Na, Fe, Al, cation exchange capacity, and anion exchange capacity. Site-specific remedial objectives should also consider the dilution attenuation factor (DAF). The NJDEP publication on DAF can be used as a reference:

<https://www.nj.gov/dep/srp/guidance/rs/daf.pdf>.

Testing for Imported Soil

Testing for PFAS should be included any time a full TAL/TCL analyte list is required. Results for PFOA and PFOS should be compared to the applicable guidance values. If PFOA or PFOS is detected in any sample at or above the guidance values then the source of backfill should be rejected, unless a site-specific exemption is provided by DER based on SPLP testing, for example. If the concentrations of PFOA and PFOS in leachate are at or above the ambient water quality guidance values for groundwater, then the soil is not acceptable.

PFOA, PFOS and 1,4-dioxane are all considered semi-volatile compounds, so composite samples are appropriate for these compounds when sampling in accordance with DER-10, Table 5.4(e)10. Category B deliverables should be submitted for backfill samples, though a DUSR is not required.

Appendix A - Quality Assurance Project Plan (QAPP) Guidelines for PFAS

The following guidelines (general and PFAS-specific) can be used to assist with the development of a QAPP for projects within DER involving sampling and analysis of PFAS.

General Guidelines in Accordance with DER-10

- Document/work plan section title – Quality Assurance Project Plan
- Summarize project scope, goals, and objectives
- Provide project organization including names and resumes of the project manager, Quality Assurance Officer (QAO), field staff, and Data Validator
 - The QAO should not have another position on the project, such as project or task manager, that involves project productivity or profitability as a job performance criterion
- List the ELAP certified lab(s) to be used for analysis of samples
- Include a site map showing sample locations
- Provide detailed sampling procedures for each matrix
- Include Data Quality Usability Objectives
- List equipment decontamination procedures
- Include an “Analytical Methods/Quality Assurance Summary Table” specifying:
 - Matrix type
 - Number or frequency of samples to be collected per matrix
 - Number of field and trip blanks per matrix
 - Analytical parameters to be measured per matrix
 - Analytical methods to be used per matrix with minimum reporting limits
 - Number and type of matrix spike and matrix spike duplicate samples to be collected
 - Number and type of duplicate samples to be collected
 - Sample preservation to be used per analytical method and sample matrix
 - Sample container volume and type to be used per analytical method and sample matrix
 - Sample holding time to be used per analytical method and sample matrix
- Specify Category B laboratory data deliverables and preparation of a DUSR

Specific Guidelines for PFAS

- Include in the text that sampling for PFAS will take place
- Include in the text that PFAS will be analyzed by EPA Method 1633
- Include the list of PFAS compounds to be analyzed (*PFAS Analyte List*)
- Include the laboratory SOP for PFAS analysis
- List the minimum method-achievable Reporting Limits for PFAS
 - Reporting Limits should be less than or equal to:
 - Aqueous – 2 ng/L (ppt)
 - Solids – 0.5 µg/kg (ppb)
- Include the laboratory Method Detection Limits for the PFAS compounds to be analyzed
-
- Include detailed sampling procedures
 - Precautions to be taken
 - Pump and equipment types
 - Decontamination procedures
 - Approved materials only to be used
- Specify that regular ice only will be used for sample shipment
- Specify that equipment blanks should be collected at a minimum frequency of 1 per day per site for each matrix

Appendix B - Sampling Protocols for PFAS in Soils, Sediments and Solids

General

The objective of this protocol is to give general guidelines for the collection of soil, sediment and other solid samples for PFAS analysis. The sampling procedure used should be consistent with Sampling Guidelines and Protocols – Technological Background and Quality Control/Quality Assurance for NYS DEC Spill Response Program – March 1991 (http://www.dec.ny.gov/docs/remediation_hudson_pdf/sgpsect5.pdf), with the following limitations.

Laboratory Analysis and Containers

Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633.

The preferred material for containers is high density polyethylene (HDPE). Pre-cleaned sample containers, coolers, sample labels, and a chain of custody form will be provided by the laboratory.

Equipment

Acceptable materials for sampling include stainless steel, HDPE, PVC, silicone, acetate, and polypropylene. Additional materials may be acceptable if pre-approved by New York State Department of Environmental Conservation's Division of Environmental Remediation.

No sampling equipment components or sample containers should come in to contact with aluminum foil, low density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials including sample bottle cap liners with a PTFE layer.

A list of acceptable equipment is provided below, but other equipment may be considered appropriate based on sampling conditions.

- stainless steel spoon
- stainless steel bowl
- steel hand auger or shovel without any coatings

Equipment Decontamination

Standard two step decontamination using detergent (Alconox is acceptable) and clean, PFAS-free water will be performed for sampling equipment. All sources of water used for equipment decontamination should be verified in advance to be PFAS-free through laboratory analysis or certification.

Sampling Techniques

Sampling is often conducted in areas where a vegetative turf has been established. In these cases, a pre-cleaned trowel or shovel should be used to carefully remove the turf so that it may be replaced at the conclusion of sampling. Surface soil samples (e.g. 0 to 6 inches below surface) should then be collected using a pre-cleaned, stainless steel spoon. Shallow subsurface soil samples (e.g. 6 to ~36 inches below surface) may be collected by digging a hole using a pre-cleaned hand auger or shovel. When the desired subsurface depth is reached, a pre-cleaned hand auger or spoon shall be used to obtain the sample.

When the sample is obtained, it should be deposited into a stainless steel bowl for mixing prior to filling the sample containers. The soil should be placed directly into the bowl and mixed thoroughly by rolling the material into the middle until the material is homogenized. At this point the material within the bowl can be placed into the laboratory provided container.

Sample Identification and Logging

A label shall be attached to each sample container with a unique identification. Each sample shall be included on the chain of custody (COC).

Quality Assurance/Quality Control

- Immediately place samples in a cooler maintained at $4 \pm 2^{\circ}$ Celsius using ice
- Collect one field duplicate for every sample batch, minimum 1 duplicate per 20 samples. The duplicate shall consist of an additional sample at a given location
- Collect one matrix spike / matrix spike duplicate (MS/MSD) for every sample batch, minimum 1 MS/MSD per 20 samples. The MS/MSD shall consist of an additional two samples at a given location and identified on the COC
- Request appropriate data deliverable (Category B) and an electronic data deliverable

Documentation

A soil log or sample log shall document the location of the sample/borehole, depth of the sample, sampling equipment, duplicate sample, visual description of the material, and any other observations or notes determined to be appropriate. Additionally, care should be performed to limit contact with PFAS containing materials (e.g. waterproof field books, food packaging) during the sampling process.

Personal Protection Equipment (PPE)

For most sampling Level D PPE is anticipated to be appropriate. The sampler should wear nitrile gloves while conducting field work and handling sample containers.

Field staff shall consider the clothing to be worn during sampling activities. Clothing that contains PTFE material (including GORE-TEX®) or that have been waterproofed with PFAS materials should be avoided. All clothing worn by sampling personnel should have been laundered multiple times.

Appropriate rain gear (PVC, polyurethane, or rubber rain gear are acceptable), bug spray, and sunscreen should be used that does not contain PFAS. Well washed cotton coveralls may be used as an alternative to bug spray and/or sunscreen.

PPE that contains PFAS is acceptable when site conditions warrant additional protection for the samplers and no other materials can be used to be protective. Documentation of such use should be provided in the field notes.

Appendix C - Sampling Protocols for PFAS in Monitoring Wells

General

The objective of this protocol is to give general guidelines for the collection of groundwater samples for PFAS analysis. The sampling procedure used should be consistent with Sampling Guidelines and Protocols – Technological Background and Quality Control/Quality Assurance for NYS DEC Spill Response Program – March 1991 (http://www.dec.ny.gov/docs/remediation_hudson_pdf/sgpsect5.pdf), with the following limitations.

Laboratory Analysis and Container

Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633.

The preferred material for containers is high density polyethylene (HDPE). Pre-cleaned sample containers, coolers, sample labels, and a chain of custody form will be provided by the laboratory.

Equipment

Acceptable materials for sampling include: stainless steel, HDPE, PVC, silicone, acetate, and polypropylene. Additional materials may be acceptable if pre-approved by New York State Department of Environmental Conservation's Division of Environmental Remediation.

No sampling equipment components or sample containers should come in contact with aluminum foil, low density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials including plumbers tape and sample bottle cap liners with a PTFE layer.

A list of acceptable equipment is provided below, but other equipment may be considered appropriate based on sampling conditions.

- stainless steel inertia pump with HDPE tubing
- peristaltic pump equipped with HDPE tubing and silicone tubing
- stainless steel bailer with stainless steel ball
- bladder pump (identified as PFAS-free) with HDPE tubing

Equipment Decontamination

Standard two step decontamination using detergent (Alconox is acceptable) and clean, PFAS-free water will be performed for sampling equipment. All sources of water used for equipment decontamination should be verified in advance to be PFAS-free through laboratory analysis or certification.

Sampling Techniques

Monitoring wells should be purged in accordance with the sampling procedure (standard/volume purge or low flow purge) identified in the site work plan, which will determine the appropriate time to collect the sample. If sampling using standard purge techniques, additional purging may be needed to reduce turbidity levels, so samples contain a limited amount of sediment within the sample containers. Sample containers that contain sediment may cause issues at the laboratory, which may result in elevated reporting limits and other issues during the sample preparation that can compromise data usability. Sampling personnel should don new nitrile gloves prior to sample collection due to the potential to contact PFAS containing items (not related to the sampling equipment) during the purging activities.

Sample Identification and Logging

A label shall be attached to each sample container with a unique identification. Each sample shall be included on the chain of custody (COC).

Quality Assurance/Quality Control

- Immediately place samples in a cooler maintained at $4 \pm 2^\circ$ Celsius using ice
- Collect one field duplicate for every sample batch, minimum 1 duplicate per 20 samples. The duplicate shall consist of an additional sample at a given location
- Collect one matrix spike / matrix spike duplicate (MS/MSD) for every sample batch, minimum 1 MS/MSD per 20 samples. The MS/MSD shall consist of an additional two samples at a given location and identified on the COC
- Collect one equipment blank per day per site and minimum 1 equipment blank per 20 samples. The equipment blank shall test the new and decontaminated sampling equipment utilized to obtain a sample for residual PFAS contamination. This sample is obtained by using laboratory provided PFAS-free water and passing the water over or through the sampling device and into laboratory provided sample containers
- Additional equipment blank samples may be collected to assess other equipment that is utilized at the monitoring well
- Request appropriate data deliverable (Category B) and an electronic data deliverable

Documentation

A purge log shall document the location of the sample, sampling equipment, groundwater parameters, duplicate sample, visual description of the material, and any other observations or notes determined to be appropriate. Additionally, care should be performed to limit contact with PFAS containing materials (e.g. waterproof field books, food packaging) during the sampling process.

Personal Protection Equipment (PPE)

For most sampling Level D PPE is anticipated to be appropriate. The sampler should wear nitrile gloves while conducting field work and handling sample containers.

Field staff shall consider the clothing to be worn during sampling activities. Clothing that contains PTFE material (including GORE-TEX®) or that have been waterproofed with PFAS materials should be avoided. All clothing worn by sampling personnel should have been laundered multiple times.

Appropriate rain gear (PVC, polyurethane, or rubber rain gear are acceptable), bug spray, and sunscreen should be used that does not contain PFAS. Well washed cotton coveralls may be used as an alternative to bug spray and/or sunscreen.

PPE that contains PFAS is acceptable when site conditions warrant additional protection for the samplers and no other materials can be used to be protective. Documentation of such use should be provided in the field notes.

Appendix D - Sampling Protocols for PFAS in Surface Water

General

The objective of this protocol is to give general guidelines for the collection of surface water samples for PFAS analysis. The sampling procedure used should be consistent with Sampling Guidelines and Protocols – Technological Background and Quality Control/Quality Assurance for NYS DEC Spill Response Program – March 1991 (http://www.dec.ny.gov/docs/remediation_hudson_pdf/sgpsect5.pdf), with the following limitations.

Laboratory Analysis and Container

Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633.

The preferred material for containers is high density polyethylene (HDPE). Pre-cleaned sample containers, coolers, sample labels, and a chain of custody form will be provided by the laboratory.

Equipment

Acceptable materials for sampling include: stainless steel, HDPE, PVC, silicone, acetate, and polypropylene. Additional materials may be acceptable if pre-approved by New York State Department of Environmental Conservation's Division of Environmental Remediation.

No sampling equipment components or sample containers should come in contact with aluminum foil, low density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials including sample bottle cap liners with a PTFE layer.

A list of acceptable equipment is provided below, but other equipment may be considered appropriate based on sampling conditions.

- stainless steel cup

Equipment Decontamination

Standard two step decontamination using detergent (Alconox is acceptable) and clean, PFAS-free water will be performed for sampling equipment. All sources of water used for equipment decontamination should be verified in advance to be PFAS-free through laboratory analysis or certification.

Sampling Techniques

Where conditions permit, (e.g. creek or pond) sampling devices (e.g. stainless steel cup) should be rinsed with site medium to be sampled prior to collection of the sample. At this point the sample can be collected and poured into the sample container.

If site conditions permit, samples can be collected directly into the laboratory container.

Sample Identification and Logging

A label shall be attached to each sample container with a unique identification. Each sample shall be included on the chain of custody (COC).

Quality Assurance/Quality Control

- Immediately place samples in a cooler maintained at $4 \pm 2^\circ$ Celsius using ice
- Collect one field duplicate for every sample batch, minimum 1 duplicate per 20 samples. The duplicate shall consist of an additional sample at a given location
- Collect one matrix spike / matrix spike duplicate (MS/MSD) for every sample batch, minimum 1 MS/MSD per 20 samples. The MS/MSD shall consist of an additional two samples at a given location and identified on the COC
- Collect one equipment blank per day per site and minimum 1 equipment blank per 20 samples. The equipment blank shall test the new and decontaminated sampling equipment utilized to obtain a sample for residual PFAS contamination. This sample is obtained by using laboratory provided PFAS-free water and passing the water over or through the sampling device and into laboratory provided sample containers
- Request appropriate data deliverable (Category B) and an electronic data deliverable

Documentation

A sample log shall document the location of the sample, sampling equipment, duplicate sample, visual description of the material, and any other observations or notes determined to be appropriate. Additionally, care should be performed to limit contact with PFAS containing materials (e.g. waterproof field books, food packaging) during the sampling process.

Personal Protection Equipment (PPE)

For most sampling Level D PPE is anticipated to be appropriate. The sampler should wear nitrile gloves while conducting field work and handling sample containers.

Field staff shall consider the clothing to be worn during sampling activities. Clothing that contains PTFE material (including GORE-TEX®) or that have been waterproofed with PFAS materials should be avoided. All clothing worn by sampling personnel should have been laundered multiple times.

Appropriate rain gear (PVC, polyurethane, or rubber rain gear are acceptable), bug spray, and sunscreen should be used that does not contain PFAS. Well washed cotton coveralls may be used as an alternative to bug spray and/or sunscreen.

PPE that contains PFAS is acceptable when site conditions warrant additional protection for the samplers and no other materials can be used to be protective. Documentation of such use should be provided in the field notes.

Appendix E - Sampling Protocols for PFAS in Private Water Supply Wells

General

The objective of this protocol is to give general guidelines for the collection of water samples from private water supply wells (with a functioning pump) for PFAS analysis. The sampling procedure used should be consistent with Sampling Guidelines and Protocols – Technological Background and Quality Control/Quality Assurance for NYS DEC Spill Response Program – March 1991 (http://www.dec.ny.gov/docs/remediation_hudson_pdf/sgpsect5.pdf), with the following limitations.

Laboratory Analysis and Container

Drinking water samples collected using this protocol are intended to be analyzed for PFAS by EPA Method 537, 537.1, 533, or ISO Method 25101. The preferred material for containers is high density polyethylene (HDPE). Pre-cleaned sample containers, coolers, sample labels, and a chain of custody form will be provided by the laboratory.

Equipment

Acceptable materials for sampling include stainless steel, HDPE, PVC, silicone, acetate, and polypropylene. Additional materials may be acceptable if pre-approved by New York State Department of Environmental Conservation's Division of Environmental Remediation.

No sampling equipment components or sample containers should come in contact with aluminum foil, low density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials (e.g. plumbers tape), including sample bottle cap liners with a PTFE layer.

Equipment Decontamination

Standard two step decontamination using detergent (Alconox is acceptable) and clean, PFAS-free water will be performed for sampling equipment. All sources of water used for equipment decontamination should be verified in advance to be PFAS-free through laboratory analysis or certification.

Sampling Techniques

Locate and assess the pressure tank and determine if any filter units are present within the building. Establish the sample location as close to the well pump as possible, which is typically the spigot at the pressure tank. Ensure sampling equipment is kept clean during sampling as access to the pressure tank spigot, which is likely located close to the ground, may be obstructed and may hinder sample collection.

Prior to sampling, a faucet downstream of the pressure tank (e.g., washroom sink) should be run until the well pump comes on and a decrease in water temperature is noted which indicates that the water is coming from the well. If the homeowner is amenable, staff should run the water longer to purge the well (15+ minutes) to provide a sample representative of the water in the formation rather than standing water in the well and piping system including the pressure tank. At this point a new pair of nitrile gloves should be donned and the sample can be collected from the sample point at the pressure tank.

Sample Identification and Logging

A label shall be attached to each sample container with a unique identification. Each sample shall be included on the chain of custody (COC).

Quality Assurance/Quality Control

- Immediately place samples in a cooler maintained at $4 \pm 2^\circ$ Celsius using ice
- Collect one field duplicate for every sample batch, minimum 1 duplicate per 20 samples. The duplicate shall consist of an additional sample at a given location
- Collect one matrix spike / matrix spike duplicate (MS/MSD) for every sample batch, minimum 1 MS/MSD per 20 samples. The MS/MSD shall consist of an additional two samples at a given location and identified on the COC
- If equipment was used, collect one equipment blank per day per site and a minimum 1 equipment blank per 20 samples. The equipment blank shall test the new and decontaminated sampling equipment utilized to obtain a sample for residual PFAS contamination. This sample is obtained by using laboratory provided PFAS-free water and passing the water over or through the sampling device and into laboratory provided sample containers.
- A field reagent blank (FRB) should be collected at a rate of one per 20 samples. The lab will provide a FRB bottle containing PFAS free water and one empty FRB bottle. In the field, pour the water from the one bottle into the empty FRB bottle and label appropriately.
- Request appropriate data deliverable (Category B) and an electronic data deliverable
- For sampling events where multiple private wells (homes or sites) are to be sampled per day, it is acceptable to collect QC samples at a rate of one per 20 across multiple sites or days.

Documentation

A sample log shall document the location of the private well, sample point location, owner contact information, sampling equipment, purge duration, duplicate sample, visual description of the material, and any other observations or notes determined to be appropriate and available (e.g. well construction, pump type and location, yield, installation date). Additionally, care should be performed to limit contact with PFAS containing materials (e.g. waterproof field books, food packaging) during the sampling process.

Personal Protection Equipment (PPE)

For most sampling Level D PPE is anticipated to be appropriate. The sampler should wear nitrile gloves while conducting field work and handling sample containers.

Field staff shall consider the clothing to be worn during sampling activities. Clothing that contains PTFE material (including GORE-TEX®) or that have been waterproofed with PFAS materials should be avoided. All clothing worn by sampling personnel should have been laundered multiple times.

Appendix F - Sampling Protocols for PFAS in Fish

This appendix contains a copy of the current SOP developed by the Division of Fish and Wildlife (DFW) entitled “General Fish Handling Procedures for Contaminant Analysis” (Ver. 8). This SOP should be followed when collecting fish for contaminant analysis. Note, however, that the Bureau of Ecosystem Health will not be supplying bags or tags. All supplies are the responsibility of the collector

Procedure Name: General Fish Handling Procedures for Contaminant Analysis

Number: FW-005

Purpose: This procedure describes data collection, fish processing and delivery of fish collected for contaminant monitoring. It contains the chain of custody and collection record forms that should be used for the collections.

Organization: Environmental Monitoring Section
Bureau of Ecosystem Health
Division of Fish and Wildlife (DFW)
New York State Department of Environmental Conservation (NYSDEC)
625 Broadway
Albany, New York 12233-4756

Version: 8

Previous Version Date: 21 March 2018

Summary of Changes to this Version: Updated bureau name to Bureau of Ecosystem Health. Added direction to list the names of all field crew on the collection record. Minor formatting changes on chain of custody and collection records.

Originator or Revised by: Wayne Richter, Jesse Becker

Date: 26 April 2019

Quality Assurance Officer and Approval Date: Jesse Becker, 26 April 2019

**NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION**

GENERAL FISH HANDLING PROCEDURES FOR CONTAMINANT ANALYSES

- A. Original copies of all continuity of evidence (i.e., Chain of Custody) and collection record forms must accompany delivery of fish to the lab. A copy shall be directed to the Project Leader or as appropriate, Wayne Richter. All necessary forms will be supplied by the Bureau of Ecosystem Health. Because some samples may be used in legal cases, it is critical that each section is filled out completely. Each Chain of Custody form has three main sections:
1. The top box is to be filled out **and signed** by the person responsible for the fish collection (e.g., crew leader, field biologist, researcher). This person is responsible for delivery of the samples to DEC facilities or personnel (e.g., regional office or biologist).
 2. The second section is to be filled out **and signed** by the person responsible for the collections while being stored at DEC, before delivery to the analytical lab. This may be the same person as in (1), but it is still required that they complete the section. Also important is the **range of identification numbers** (i.e., tag numbers) included in the sample batch.
 3. Finally, the bottom box is to record any transfers between DEC personnel and facilities. Each subsequent transfer should be **identified, signed, and dated**, until laboratory personnel take possession of the fish.
- B. The following data are required on each **Fish Collection Record** form:
1. Project and Site Name.
 2. DEC Region.
 3. All personnel (and affiliation) involved in the collection.
 4. Method of collection (gill net, hook and line, etc.)
 5. Preservation Method.
- C. The following data are to be taken on each fish collected and recorded on the **Fish Collection Record** form:
1. Tag number - Each specimen is to be individually jaw tagged at time of collection with a unique number. Make sure the tag is turned out so that the number can be read without opening the bag. Use tags in sequential order. For small fish or composite samples place the tag inside the bag with the samples. The Bureau of Ecosystem Health can supply the tags.
 2. Species identification (please be explicit enough to enable assigning genus and species). Group fish by species when processing.
 3. Date collected.
 4. Sample location (waterway and nearest prominent identifiable landmark).
 5. Total length (nearest mm or smallest sub-unit on measuring instrument) and weight (nearest g or

smallest sub-unit of weight on weighing instrument). Take all measures as soon as possible with calibrated, protected instruments (e.g. from wind and upsets) and prior to freezing.

6. Sex - fish may be cut enough to allow sexing or other internal investigation, but do not eviscerate. Make any incision on the right side of the belly flap or exactly down the midline so that a left-side fillet can be removed.

D. General data collection recommendations:

1. It is helpful to use an ID or tag number that will be unique. It is best to use metal striped bass or other uniquely numbered metal tags. If uniquely numbered tags are unavailable, values based on the region, water body and year are likely to be unique: for example, R7CAY11001 for Region 7, Cayuga Lake, 2011, fish 1. If the fish are just numbered 1 through 20, we have to give them new numbers for our database, making it more difficult to trace your fish to their analytical results and creating an additional possibility for errors.
 2. Process and record fish of the same species sequentially. Recording mistakes are less likely when all fish from a species are processed together. Starting with the bigger fish species helps avoid missing an individual.
 3. If using Bureau of Ecosystem Health supplied tags or other numbered tags, use tags in sequence so that fish are recorded with sequential Tag Numbers. This makes data entry and login at the lab and use of the data in the future easier and reduces keypunch errors.
 4. Record length and weight as soon as possible after collection and before freezing. Other data are recorded in the field upon collection. An age determination of each fish is optional, but if done, it is recorded in the appropriate "Age" column.
 5. For composite samples of small fish, record the number of fish in the composite in the Remarks column. Record the length and weight of each individual in a composite. All fish in a composite sample should be of the same species and members of a composite should be visually matched for size.
 6. Please submit photocopies of topographic maps or good quality navigation charts indicating sampling locations. GPS coordinates can be entered in the Location column of the collection record form in addition to or instead for providing a map. These records are of immense help to us (and hopefully you) in providing documented location records which are not dependent on memory and/or the same collection crew. In addition, they may be helpful for contaminant source trackdown and remediation/control efforts of the Department.
 7. When recording data on fish measurements, it will help to ensure correct data recording for the data recorder to call back the numbers to the person making the measurements.
- E. Each fish is to be placed in its own individual plastic bag. For small fish to be analyzed as a composite, put all of the fish for one composite in the same bag but use a separate bag for each composite. It is important to individually bag the fish to avoid difficulties or cross contamination when processing the fish for chemical analysis. Be sure to include the fish's tag number inside the bag, preferably attached to the fish with the tag number turned out so it can be read. Tie or otherwise secure the bag closed. **The Bureau of Ecosystem Health will supply the bags.** If necessary, food grade bags may be procured from a suitable vendor (e.g., grocery store). It is preferable to redundantly label each bag with a manila tag tied between the knot and the body of the bag. This tag should be labeled with the project name, collection location, tag number, collection date, and fish species. If scales are collected, the scale envelope should be labeled with

the same information.

- F. Groups of fish, by species, are to be placed in one large plastic bag per sampling location. **The Bureau of Ecosystem Health will supply the larger bags.** Tie or otherwise secure the bag closed. Label the site bag with a manila tag tied between the knot and the body of the bag. The tag should contain: project, collection location, collection date, species and **tag number ranges**. Having this information on the manila tag enables lab staff to know what is in the bag without opening it.
- G. Do not eviscerate, fillet or otherwise dissect the fish unless specifically asked to. If evisceration or dissection is specified, the fish must be cut along the exact midline or on the right side so that the left side fillet can be removed intact at the laboratory. If filleting is specified, the procedure for taking a standard fillet (SOP PREPLAB 4) must be followed, including removing scales.
- H. Special procedures for PFAS: Unlike legacy contaminants such as PCBs, which are rarely found in day to day life, PFAS are widely used and frequently encountered. Practices that avoid sample contamination are therefore necessary. While no standard practices have been established for fish, procedures for water quality sampling can provide guidance. The following practices should be used for collections when fish are to be analyzed for PFAS:
 - No materials containing Teflon.
 - No Post-it notes.
 - No ice packs; only water ice or dry ice.
 - Any gloves worn must be powder free nitrile.
 - No Gore-Tex or similar materials (Gore-Tex is a PFC with PFOA used in its manufacture).
 - No stain repellent or waterproof treated clothing; these are likely to contain PFCs.
 - Avoid plastic materials, other than HDPE, including clipboards and waterproof notebooks.
 - Wash hands after handling any food containers or packages as these may contain PFCs.
 - Keep pre-wrapped food containers and wrappers isolated from fish handling.
 - Wear clothing washed at least six times since purchase.
 - Wear clothing washed without fabric softener.
 - Staff should avoid cosmetics, moisturizers, hand creams and similar products on the day of sampling as many of these products contain PFCs (Fujii et al. 2013). Sunscreen or insect repellent should not contain ingredients with “fluor” in their name. Apply any sunscreen or insect repellent well downwind from all materials. Hands must be washed after touching any of these products.
- I. All fish must be kept at a temperature <45° F (<8° C) immediately following data processing. As soon as possible, freeze at -20° C ± 5° C. Due to occasional freezer failures, daily freezer temperature logs are required. The freezer should be locked or otherwise secured to maintain chain of custody.
- J. In most cases, samples should be delivered to the Analytical Services Unit at the Hale Creek field station. Coordinate delivery with field station staff and send copies of the collection records, continuity of evidence forms and freezer temperature logs to the field station. For samples to be analyzed elsewhere, non-routine collections or other questions, contact Wayne Richter, Bureau of Ecosystem Health, NYSDEC, 625 Broadway, Albany, New York 12233-4756, 518-402-8974, or the project leader about sample transfer. Samples will then be directed to the analytical facility and personnel noted on specific project descriptions.
- K. A recommended equipment list is at the end of this document.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF FISH AND WILDLIFE
FISH COLLECTION RECORD

page _____ of _____

Project and Site Name _____ DEC Region _____

Collections made by (include all crew) _____

Sampling Method: ☐ Electrofishing ☐ Gill netting ☐ Trap netting ☐ Trawling ☐ Seining ☐ Angling ☐ Other _____

Preservation Method: ☐ Freezing ☐ Other _____ Notes (SWFDB survey number): _____

FOR LAB USE ONLY- LAB ENTRY NO.	COLLECTION OR TAG NO.	SPECIES	DATE TAKEN	LOCATION	AGE	SEX &/OR REPROD. CONDIT	LENGTH ()	WEIGHT ()	REMARKS

richter: revised 2011, 5/7/15, 10/4/16, 3/20/17; becker: 3/23/17, 4/26/19

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION CHAIN OF CUSTODY

I, _____, of _____ collected the
(Print Name) (Print Business Address)

following on _____, 20____ from _____
(Date) (Water Body)

in the vicinity of _____
(Landmark, Village, Road, etc.)

Town of _____, in _____ County.

Item(s) _____

Said sample(s) were in my possession and handled according to standard procedures provided to me prior to collection. The sample(s) were placed in the custody of a representative of the New York State Department of Environmental Conservation on _____, 20____.

Signature Date

I, _____, received the above mentioned sample(s) on the date specified and assigned identification number(s) _____ to the sample(s). I have recorded pertinent data for the sample(s) on the attached collection records. The sample(s) remained in my custody until subsequently transferred, prepared or shipped at times and on dates as attested to below.

Signature Date

SECOND RECIPIENT (Print Name)	TIME & DATE	PURPOSE OF TRANSFER
SIGNATURE	UNIT	
THIRD RECIPIENT (Print Name)	TIME & DATE	PURPOSE OF TRANSFER
SIGNATURE	UNIT	
FOURTH RECIPIENT (Print Name)	TIME & DATE	PURPOSE OF TRANSFER
SIGNATURE	UNIT	
RECEIVED IN LABORATORY BY (Print Name)	TIME & DATE	REMARKS
SIGNATURE	UNIT	
LOGGED IN BY (Print Name)	TIME & DATE	ACCESSION NUMBERS
SIGNATURE	UNIT	

NOTICE OF WARRANTY

By signature to the chain of custody (reverse), the signatory warrants that the information provided is truthful and accurate to the best of his/her ability. The signatory affirms that he/she is willing to testify to those facts provided and the circumstances surrounding the same. Nothing in this warranty or chain of custody negates responsibility nor liability of the signatories for the truthfulness and accuracy of the statements provided.

HANDLING INSTRUCTIONS

On day of collection, collector(s) name(s), address(es), date, geographic location of capture (attach a copy of topographic map or navigation chart), species, number kept of each species, and description of capture vicinity (proper noun, if possible) along with name of Town and County must be indicated on reverse.

Retain organisms in manila tagged plastic bags to avoid mixing capture locations. Note appropriate information on each bag tag.

Keep samples as cool as possible. Put on ice if fish cannot be frozen within 12 hours. If fish are held more than 24 hours without freezing, they will not be retained or analyzed.

Initial recipient (either DEC or designated agent) of samples from collector(s) is responsible for obtaining and recording information on the collection record forms which will accompany the chain of custody. This person will seal the container using packing tape and writing his signature, the time and the date across the tape onto the container with indelible marker. Any time a seal is broken, for whatever purpose, the incident must be recorded on the Chain of Custody (reason, time, and date) in the purpose of transfer block. Container then is resealed using new tape and rewriting signature, with time and date.

EQUIPMENT LIST

Scale or balance of appropriate capacity for the fish to be collected.

Fish measuring board.

Plastic bags of an appropriate size for the fish to be collected and for site bags.

Individually numbered metal tags for fish.

Manila tags to label bags.

Small envelopes, approximately 2" x 3.5", if fish scales are to be collected.

Knife for removing scales.

Chain of custody and fish collection forms.

Clipboard.

Pens or markers.

Paper towels.

Dish soap and brush.

Bucket.

Cooler.

Ice.

Duct tape.

Appendix G – PFAS Analyte List

Group	Chemical Name	Abbreviation	CAS Number
Perfluoroalkyl sulfonic acids	Perfluorobutanesulfonic acid	PFBS	375-73-5
	Perfluoropentanesulfonic acid	PFPeS	2706-91-4
	Perfluorohexanesulfonic acid	PFHxS	355-46-4
	Perfluoroheptanesulfonic acid	PFHpS	375-92-8
	Perfluorooctanesulfonic acid	PFOS	1763-23-1
	Perfluorononanesulfonic acid	PFNS	68259-12-1
	Perfluorodecanesulfonic acid	PFDS	335-77-3
	Perfluorododecanesulfonic acid	PFDoS	79780-39-5
Perfluoroalkyl carboxylic acids	Perfluorobutanoic acid	PFBA	375-22-4
	Perfluoropentanoic acid	PFPeA	2706-90-3
	Perfluorohexanoic acid	PFHxA	307-24-4
	Perfluoroheptanoic acid	PFHpA	375-85-9
	Perfluorooctanoic acid	PFOA	335-67-1
	Perfluorononanoic acid	PFNA	375-95-1
	Perfluorodecanoic acid	PFDA	335-76-2
	Perfluoroundecanoic acid	PFUnA	2058-94-8
	Perfluorododecanoic acid	PFDaA	307-55-1
	Perfluorotridecanoic acid	PFTTrDA	72629-94-8
	Perfluorotetradecanoic acid	PFTeDA	376-06-7
Per- and Polyfluoroether carboxylic acids	Hexafluoropropylene oxide dimer acid	HFPO-DA	13252-13-6
	4,8-Dioxa-3H-perfluorononanoic acid	ADONA	919005-14-4
	Perfluoro-3-methoxypropanoic acid	PFMPA	377-73-1
	Perfluoro-4-methoxybutanoic acid	PFMBA	863090-89-5
	Nonafluoro-3,6-dioxaheptanoic acid	NFDHA	151772-58-6
Fluorotelomer sulfonic acids	4:2 Fluorotelomer sulfonic acid	4:2-FTS	757124-72-4
	6:2 Fluorotelomer sulfonic acid	6:2-FTS	27619-97-2
	8:2 Fluorotelomer sulfonic acid	8:2-FTS	39108-34-4
Fluorotelomer carboxylic acids	3:3 Fluorotelomer carboxylic acid	3:3 FTCA	356-02-5
	5:3 Fluorotelomer carboxylic acid	5:3 FTCA	914637-49-3
	7:3 Fluorotelomer carboxylic acid	7:3 FTCA	812-70-4
Perfluorooctane sulfonamides	Perfluorooctane sulfonamide	PFOSA	754-91-6
	N-methylperfluorooctane sulfonamide	NMeFOSA	31506-32-8
	N-ethylperfluorooctane sulfonamide	NEtFOSA	4151-50-2
Perfluorooctane sulfonamidoacetic acids	N-methylperfluorooctane sulfonamidoacetic acid	N-MeFOSAA	2355-31-9
	N-ethylperfluorooctane sulfonamidoacetic acid	N-EtFOSAA	2991-50-6
Perfluorooctane sulfonamide ethanol	N-methylperfluorooctane sulfonamidoethanol	MeFOSE	24448-09-7
	N-ethylperfluorooctane sulfonamidoethanol	EtFOSE	1691-99-2

Group	Chemical Name	Abbreviation	CAS Number
Ether sulfonic acids	9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (F-53B Major)	9Cl-PF3ONS	756426-58-1
	11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (F-53B Minor)	11Cl-PF3OUdS	763051-92-9
	Perfluoro(2-ethoxyethane) sulfonic acid	PFEESA	113507-82-7

Appendix H - Data Review Guidelines for Analysis of PFAS in Non-Potable Water and Solids

General

These guidelines are intended to be used for the validation of PFAS using EPA Method 1633 for projects within the Division of Environmental Remediation (DER). Data reviewers should understand the methodology and techniques utilized in the analysis. Consultation with the end user of the data may be necessary to assist in determining data usability based on the data quality objectives in the Quality Assurance Project Plan. A familiarity with the laboratory's Standard Operating Procedure may also be needed to fully evaluate the data. If you have any questions, please contact DER's Quality Assurance Officer, Dana Barbarossa, at dana.barbarossa@dec.ny.gov.

Preservation and Holding Time

Samples should be preserved with ice to a temperature of less than 6°C upon arrival at the lab. The holding time is 28 days to extraction for aqueous and solid samples. The time from extraction to analysis for aqueous samples is 28 days and 40 days for solids.

Temperature greatly exceeds 6°C upon arrival at the lab*	Use professional judgement to qualify detects and non-detects as estimated or rejected
Holding time exceeding 28 days to extraction	Use professional judgement to qualify detects and non-detects as estimated or rejected if holding time is grossly exceeded

*Samples that are delivered to the lab immediately after sampling may not meet the thermal preservation guidelines. Samples are considered acceptable if they arrive on ice or an attempt to chill the samples is observed.

Initial Calibration

The initial calibration should contain a minimum of six standards for linear fit and six standards for a quadratic fit. The relative standard deviation (RSD) for a quadratic fit calibration should be less than 20%.

The low-level calibration standard should be within 50% - 150% of the true value, and the mid-level calibration standard within 70% - 130% of the true value.

%RSD >20%	J flag detects and UJ non detects
-----------	-----------------------------------

Continuing Calibration Verification

Continuing calibration verification (CCV) checks should be analyzed at a frequency of one per ten field samples. If CCV recovery is very low, where detection of the analyte could be in question, ensure a low level CCV was analyzed and use to determine data quality.

CCV recovery <70 or >130%	J flag results
---------------------------	----------------

Blanks

There should be no detections in the method blanks above the reporting limits. Equipment blanks, field blanks, rinse blanks etc. should be evaluated in the same manner as method blanks. Use the most contaminated blank to evaluate the sample results.

Blank Result	Sample Result	Qualification
Any detection	<Reporting limit	Qualify as ND at reporting limit
Any detection	>Reporting Limit and >10x the blank result	No qualification
>Reporting limit	>Reporting limit and <10x blank result	J+ biased high

Field Duplicates

A blind field duplicate should be collected at rate of one per twenty samples. The relative percent difference (RPD) should be less than 30% for analyte concentrations greater than two times the reporting limit. Use the higher result for final reporting.

RPD >30%	Apply J qualifier to parent sample
----------	------------------------------------

Lab Control Spike

Lab control spikes should be analyzed with each extraction batch or one for every twenty samples. In the absence of lab derived criteria, use 70% - 130% recovery criteria to evaluate the data.

Recovery <70% or >130% (lab derived criteria can also be used)	Apply J qualifier to detects and UJ qualifier to non detects
---	---

Matrix Spike/Matrix Spike Duplicate

One matrix spike and matrix spike duplicate should be collected at a rate of one per twenty samples. Use professional judgement to reject results based on out of control MS/MSD recoveries.

Recovery <70% or >130% (lab derived criteria can also be used)	Apply J qualifier to detects and UJ qualifier to non detects of parent sample only
RPD >30%	Apply J qualifier to detects and UJ qualifier to non detects of parent sample only

Extracted Internal Standards (Isotope Dilution Analytes)

Problematic analytes (e.g. PFBA, PFPeA, fluorotelomer sulfonates) can have wider recoveries without qualification. Qualify corresponding native compounds with a J flag if outside of the range.

Recovery <50% or >150%	Apply J qualifier
Recovery <25% or >150% for poor responding analytes	Apply J qualifier
Isotope Dilution Analyte (IDA) Recovery <10%	Reject results

Signal to Noise Ratio

The signal to noise ratio for the quantifier ion should be at least 3:1. If the ratio is less than 3:1, the peak is discernable from the baseline noise and symmetrical, the result can be reported. If the peak appears to be baseline noise and/or the shape is irregular, qualify the result as tentatively identified.

Reporting Limits

If project-specific reporting limits were not met, please indicate that in the report along with the reason (e.g. over dilution, dilution for non-target analytes, high sediment in aqueous samples).

Peak Integrations

Target analyte peaks should be integrated properly and consistently when compared to standards. Ensure branched isomer peaks are included for PFAS where standards are available. Inconsistencies should be brought to the attention of the laboratory or identified in the data review summary report.

Appendix D

Photographic Log



Photograph 1:

View of the eastern entrance to the first-floor space.

Date: October 17, 2025



Photograph 2:

View of the western entrance to the first-floor space.

Date: October 17, 2025



Photograph 3:

Doorway into the partial basement.

Date: October 17, 2025



Photograph 4:

View of the basement doorway from the stairwell.

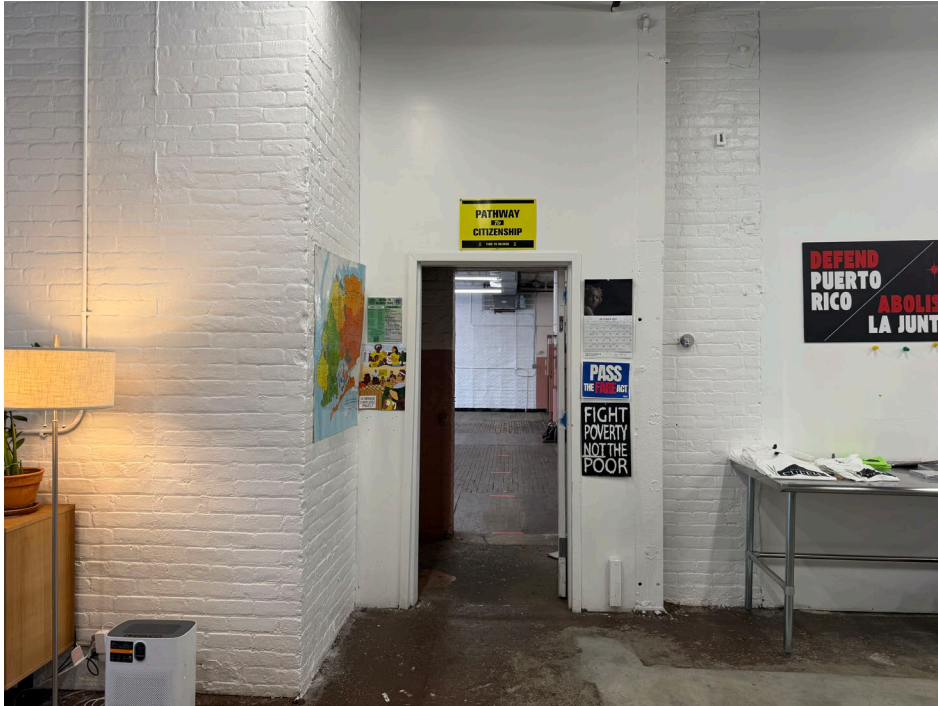
Date: October 17, 2025



Photograph 5:
View of the basement doorway leading to the stairwell.
Date: October 17, 2025



Photograph 6:
View of a doorway between adjacent first-floor rooms.
Date: October 17, 2025



Photograph 7:

Opposite view of a doorway between adjacent first-floor rooms.

Date: October 17, 2025

Appendix E

Soil Vapor Intrusion - Structure Sampling Building Questionnaire

Site No. : _____ Site Name : _____

Date: _____ Time: _____

Structure Address : _____

Preparer's Name & Affiliation : _____

Residential ? ☐ Yes ☐ No Owner Occupied ? ☐ Yes ☐ No Owner Interviewed ? ☐ Yes ☐ NoCommercial ? ☐ Yes ☐ No Industrial ? ☐ Yes ☐ No Mixed Uses ? ☐ Yes ☐ No

Identify all non-residential use(s) : _____

Owner Name : _____ Owner Phone : () _____ - _____

Secondary Owner Phone : () _____ - _____

Owner Address (if different) : _____

Occupant Name : _____ Occupant Phone : () _____ - _____

Secondary Occupant Phone : () _____ - _____

Number & Age of All Persons Residing at this Location : _____

Additional Owner/Occupant Information : _____

Describe Structure (style, number floors, size) : _____

Approximate Year Built : _____ Is the building Insulated? ☐ Yes ☐ NoLowest level : ☐ Slab-on-grade ☐ Basement ☐ Crawlspace

Describe Lowest Level (finishing, use, time spent in space) : _____

Floor Type: ☐ Concrete Slab ☐ Dirt ☐ Mixed : _____Floor Condition : ☐ Good (few or no cracks) ☐ Average (some cracks) ☐ Poor (broken concrete or dirt)Sumps/Drains? ☐ Yes ☐ No Describe : _____

Identify other floor penetrations & details : _____

Wall Construction : ☐ Concrete Block ☐ Poured Concrete ☐ Laid-Up Stone

Identify any wall penetrations : _____

Identify water, moisture, or seepage: location & severity (sump, cracks, stains, etc) : _____

Heating Fuel : ☐ Oil ☐ Gas ☐ Wood ☐ Electric ☐ Other : _____Heating System : ☐ Forced Air ☐ Hot Water ☐ Other : _____Hot Water System : ☐ Combustion ☐ Electric ☐ Boilermate ☐ Other: _____Clothes Dryer : ☐ Electric ☐ Gas Where is dryer vented to? _____

If combustion occurs, describe where air is drawn from (cold air return, basement, external air, etc.) : _____

Fans & Vents (identify where fans/vents pull air from and where they vent/exhaust to) : _____

Describe factors that may affect indoor air quality (chemical use/storage, unvented heaters, smoking, workshop):

Attached garage ? ☐ Yes ☐ No Air fresheners ? ☐ Yes ☐ No

New carpet or furniture ? ☐ Yes ☐ No What/Where ? _____

Recent **painting** or **staining** ? ☐ Yes ☐ No Where ? : _____

Any **solvent** or **chemical-like** odors ? ☐ Yes ☐ No Describe : _____

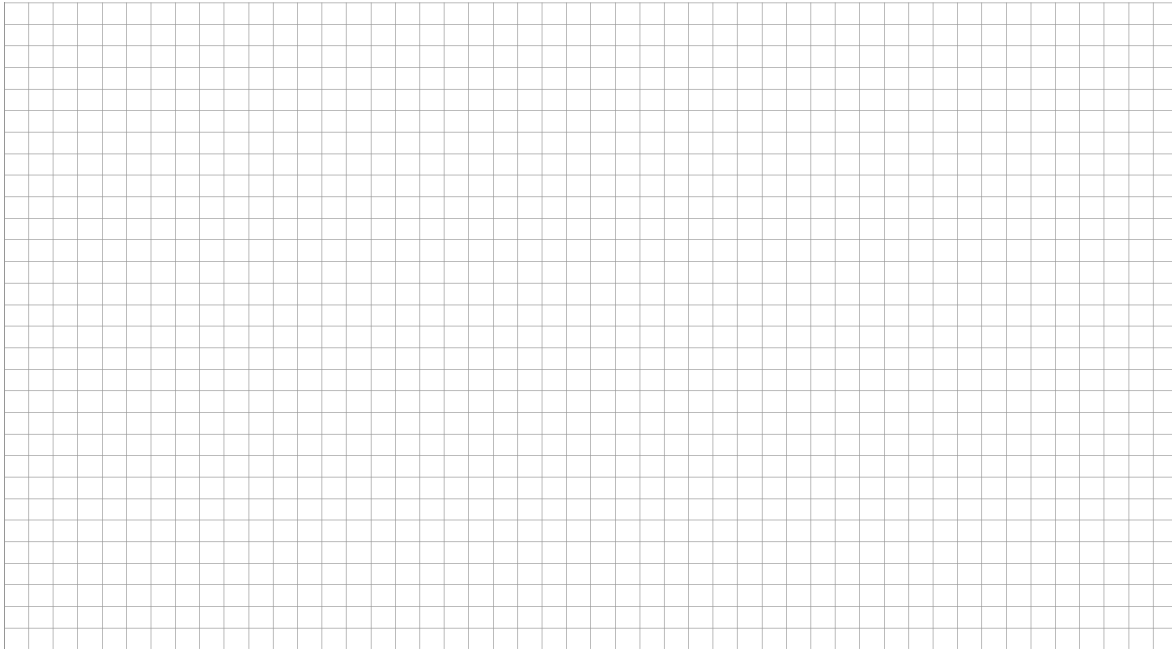
Last time **Dry Cleaned** fabrics brought in ? _____ What / Where ? _____

Do any building occupants use solvents at work ? ☐ Yes ☐ No Describe : _____

Any testing for Radon ? ☐ Yes ☐ No Results : _____

Radon System/Soil Vapor Intrusion Mitigation System present ? ☐ Yes ☐ No If yes, describe below

Lowest Building Level Layout Sketch



- Identify and label the locations of all sub-slab, indoor air, and outdoor air samples on the layout sketch.
- Measure the distance of all sample locations from identifiable features, and include on the layout sketch.
- Identify room use (bedroom, living room, den, kitchen, etc.) on the layout sketch.
- Identify the locations of the following features on the layout sketch, using the appropriate symbols:

B or F	Boiler or Furnace	o	Other floor or wall penetrations (label appropriately)
HW	Hot Water Heater	xxxxxxx	Perimeter Drains (draw inside or outside outer walls as appropriate)
FP	Fireplaces	#####	Areas of broken-up concrete
WS	Wood Stoves	● SS-1	Location & label of sub-slab vapor samples
W/D	Washer / Dryer	● IA-1	Location & label of indoor air samples
S	Sumps	● OA-1	Location & label of outdoor air samples
@	Floor Drains	● PFET-1	Location and label of any pressure field test holes.

Structure Sampling - Product Inventory

Page ____ of ____

Homeowner Name & Address: _____ **Date:** _____

Samplers & Company: _____ **Structure ID:** _____

Site Number & Name: _____ **Phone Number:** _____

Make & Model of PID: _____ **Date of PID Calibration:** _____

Identify any Changes from Original Building Questionnaire : _____

[illegible]

Appendix F

Vapor Pin® Standard Operating Procedure Installation and Extraction of Vapor Pin®



Standard Operating Procedure Installation and Extraction of the Vapor Pin®

Updated September 9, 2016

Scope:

This standard operating procedure describes the installation and extraction of the VAPOR PIN® for use in sub-slab soil-gas sampling.

Purpose:

The purpose of this procedure is to assure good quality control in field operations and uniformity between field personnel in the use of the VAPOR PIN® for the collection of sub-slab soil-gas samples or pressure readings.

Equipment Needed:

- Assembled VAPOR PIN® [VAPOR PIN® and silicone sleeve(Figure 1)]; Because of sharp edges, gloves are recommended for sleeve installation;
- Hammer drill;
- 5/8-inch (16mm) diameter hammer bit (hole must be 5/8-inch (16mm) diameter to ensure seal. It is recommended that you use the drill guide). (Hilti™ TE-YX 5/8" x 22" (400 mm) #00206514 or equivalent);
- 1½-inch (38mm) diameter hammer bit (Hilti™ TE-YX 1½" x 23" #00293032 or equivalent) for flush mount applications;
- ¾-inch (19mm) diameter bottle brush;
- Wet/Dry vacuum with HEPA filter (optional);
- VAPOR PIN® installation/extraction tool;
- Dead blow hammer;
- VAPOR PIN® flush mount cover, if desired;
- VAPOR PIN® drilling guide, if desired;

- VAPOR PIN® protective cap; and
- VOC-free hole patching material (hydraulic cement) and putty knife or trowel for repairing the hole following the extraction of the VAPOR PIN®.



Figure 1. Assembled VAPOR PIN®

Installation Procedure:

- 1) Check for buried obstacles (pipes, electrical lines, etc.) prior to proceeding.
- 2) Set up wet/dry vacuum to collect drill cuttings.
- 3) If a flush mount installation is required, drill a 1½-inch (38mm) diameter hole at least 1¾-inches (45mm) into the slab. Use of a VAPOR PIN® drilling guide is recommended.
- 4) Drill a 5/8-inch (16mm) diameter hole through the slab and approximately 1-inch (25mm) into the underlying soil to form a void. Hole must be 5/8-inch (16mm) in diameter to ensure seal. It is recommended that you use the drill guide.

VAPOR PIN® protected under US Patent # 8,220,347 B2, US 9,291,531 B2 and other patents pending

- 5) Remove the drill bit, brush the hole with the bottle brush, and remove the loose cuttings with the vacuum.
- 6) Place the lower end of VAPOR PIN® assembly into the drilled hole. Place the small hole located in the handle of the installation/extraction tool over the vapor pin to protect the barb fitting, and tap the vapor pin into place using a dead blow hammer (Figure 2). Make sure the installation/extraction tool is aligned parallel to the vapor pin to avoid damaging the barb fitting.



Figure 2. Installing the VAPOR PIN®

During installation, the silicone sleeve will form a slight bulge between the slab and the VAPOR PIN® shoulder. Place the protective cap on VAPOR PIN® to prevent vapor loss prior to sampling (Figure 3).



Figure 3. Installed VAPOR PIN®

- 7) For flush mount installations, cover the vapor pin with a flush mount cover, using either the plastic cover or the optional stainless-steel Secure Cover (Figure 4).



Figure 4. Secure Cover Installed

- 8) Allow 20 minutes or more (consult applicable guidance for your situation) for the sub-slab soil-gas conditions to re-equilibrate prior to sampling.
- 9) Remove protective cap and connect sample tubing to the barb fitting of the VAPOR PIN®. This connection can be made using a short piece of Tygon™ tubing to join the VAPOR PIN® with the Nylaflo tubing (Figure 5). Put the

Nylaflow tubing as close to the VAPOR PIN® as possible to minimize contact between soil gas and Tygon™ tubing.



Figure 5. VAPOR PIN® sample connection

- 10) Conduct leak tests in accordance with applicable guidance. If the method of leak testing is not specified, an alternative can be the use of a water dam and vacuum pump, as described in SOP Leak Testing the VAPOR PIN® via Mechanical Means (Figure 6). For flush-mount installations, distilled water can be poured directly into the 1 1/2 inch (38mm) hole.



Figure 6. Water dam used for leak detection

- 11) Collect sub-slab soil gas sample or pressure reading. When finished, replace the protective cap and flush mount cover

until the next event. If the sampling is complete, extract the VAPOR PIN®.

Extraction Procedure:

- 1) Remove the protective cap, and thread the installation/extraction tool onto the barrel of the VAPOR PIN® (Figure 7). Turn the tool clockwise continuously, don't stop turning, the VAPOR PIN® will feed into the bottom of the installation/extraction tool and will extract from the hole like a wine cork, DO NOT PULL.
- 2) Fill the void with hydraulic cement and smooth with a trowel or putty knife.



Figure 7. Removing the VAPOR PIN®

- Prior to reuse, remove the silicone sleeve and protective cap and discard. Decontaminate the VAPOR PIN® in a hot water and Alconox® wash, then heat in an oven to a temperature of 265° F (130° C) for 15 to 30 minutes. For both steps, STAINLESS – 1/2 hour, BRASS 8 minutes
- 3) Replacement parts and supplies are available online.

Appendix G

Health and Safety Plan

Health and Safety Plan

276-284 Starr Street, NYSDEC BCP Site No. C224430

276-284 Starr Street, Brooklyn, Kings County, New York

Prepared for

Churches United For Fair Housing, Inc.
280 Starr Street
Brooklyn, New York 11237

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Acronyms and Abbreviations

1,1,1-TCA	1,1,1-trichloroethane
ACGIH	American Conference of Governmental Industrial Hygienists
ANSI	American National Standards Institute
Applicant	Churches United For Fair Housing, Inc. (CUFFH)
APR	air-purifying respirator
AST	above-ground storage tank
BCP	Brownfield Cleanup Program
bgs	below ground surface
(c)	ceiling limit
Carson Voci	Carson Voci Engineering and Geology, D.P.C.
CDC	Centers for Disease Control and Prevention
CFR	Code of Federal Regulations
COPCs	chemicals of potential concern
dBA	Decibels
ESA	environmental site assessment
eV	electron volts
°F	Degrees Fahrenheit
ft	feet
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
kV	kilovolts
µg/m ³	micrograms per meter cubed
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
OSHA	Occupational Safety and Health Administration
PCB	polychlorinated biphenyls
PCE	tetrachloroethene
PEL	permissible exposure limit
PFAS	per- and polyfluoroalkyl substances
PID	Photoionization Detector
PPE	Personal Protective Equipment
ppm	parts per million
QA/QC	quality assurance/quality control
REC	recognized environmental condition
RI	remedial investigation

the Site	276-284 Starr Street, Brooklyn, Kings County, New York
SPF	Sun Protective Factor
SSHO	Site Safety and Health Officer
STEL	short term exposure limit
SVOC	semi volatile organic compound
TAL	Target Analyte List
TCE	trichloroethene
TCL	Target Compound List
Terraphase	Terraphase Engineering Inc.
TLV	threshold limit value
TWA	time weight average
UST	underground storage tank
UV	Ultraviolet
VOCs	volatile organic compounds

Signature Sheet

This section provides a detailed listing of the individuals responsible for drafting, reviewing, implementing, and approving this HASP.

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7/30/2026

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Date

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7/30/2026

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Corporate Health and Safety Officer Approval:



7/30/2026

Daren Roth, Associate H&S Director

Date

1 Introduction

This Health and Safety Plan (HASP) was developed for the supplemental remedial investigation (RI) activities to be conducted at the New York State (NYS) Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program Site No. Site No. C224430 identified as 276-284 Starr Street at 276-284 Starr Street in Brooklyn, New York (“the Site”). The HASP was prepared by Carson Voci Engineering and Geology D.P.C. an affiliate of Terraphase Engineering Inc. (herein referred to as “Carson Voci” or “Terraphase”) for the field work to be conducted on behalf of Churches United For Fair Housing, Inc. (CUFFH; “Applicant”, “Participant”).

This document constitutes the HASP, which is central to the safety and health program for the project. This document is considered a living document and can be amended as needed. A hardcopy of this HASP will remain on Site at all times during the field investigation activities.

1.1 Field Work Activities

Prior to intrusive sampling, a private utility detection company will be employed to verify the location of utilities and subsurface structures and to ensure clearance for proposed boring and sample locations requiring GeoProbe® direct-push sampling methods. Soil will be collected either with hand tools (i.e., hand auger) or a direct push drill rig. Two of the boring locations and several soil gas points will be installed in the basement of the site building. Concrete areas will be cored or hammer-drilled prior to soil core collection.

Approximately 12 soil borings will be installed to a variety of depths, with a maximum depth of 25 feet (ft) below ground surface (bgs). Soil samples will be collected from various depths and analyzed for a combination of contaminants including volatile organic compounds (VOCs), semi volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), per- and polyfluoroalkyl substances (PFAS), target compound list (TCL) pesticides/herbicides, and target analyte list (TAL) metals. In addition, several monitoring wells and temporary monitoring wells will be installed to facilitate the subsequent collection of groundwater samples. Up to six sub-slab soil vapor and indoor air samples will be collected throughout the building.

1.2 Corporate Policy

Safety should take the highest priority in any Terraphase project; as evident in Terraphase’s corporate motto “Safety First.” It is Terraphase’s policy that its personnel and its subcontractor(s) on site shall assume full responsibility and liability for compliance with all applicable Federal, State and local regulations pertaining to their work practices at the Site. Terraphase’s hard-earned reputation as a successful consulting company directly correlates to our high standards for safety during our projects. The goal for safety is no illness or injuries with zero lost work days due to work conditions.



1.3 Purpose and Regulatory Compliance

The HASP covers each of the required elements as specified in 29 CFR 1910.120. When combined with the Terraphase Health and Safety Program, this site-specific plan meets all applicable regulatory requirements. This HASP will be made available to all personnel and subcontractors involved for this project. The HASP has been reviewed by the Corporate Health and Safety Officer. By signing the documentation form provided with this plan (Attachment 2), project workers also certify their agreement to comply with the HASP. For subcontractors, this HASP represents minimum safety procedures. Subcontractors are responsible for their own HASP and safety protocols while present onsite or conducting work for this project. Both Terraphase and its subcontractors are independently responsible for the health and safety of their own employees on the project.

2 Site Background

The Site was reportedly undeveloped until the current building was constructed. In 1933 the building was operated by a store fixture manufacturer, and from 1937 through 1965 the building was occupied by a machine shop (Queens Machine Corporation). From 1970 through 2008 the property was occupied by garment companies including Quarex Knitting Mills (1970 to at least 1973) and PJ Knitting Mills (1985 to 2008). The building was most recently used as an antique store and fitness studio, prior to CUFFH's purchase of the property and transition to use as a commercial office and meeting space.

In June 2022, a Phase I ESA was completed for the Site by BBG on behalf of CUFFH prior to their purchase of the Site. The Phase I ESA indicated that the Site was initially developed with the current structure in 1933 for use as a store fixture manufacturer. From 1937 through 1965 the building was occupied by a machine shop (Queens Machine Corporation), and from 1970 through 2008 the property was occupied by garment companies including Quarex Knitting Mills (1970 to at least 1973) and PJ Knitting Mills (1985 to 2008). The building was most recently used as an antique store and fitness studio/martial arts gym prior to CUFFH's purchase of the property and future transition to use as a full-time commercial office and meeting space.

Based on this information, the historical operations were identified as a REC due to the likelihood that petroleum products or hazardous substances (e.g. solvents or degreasers) had been stored, managed or generated on the property and that a release of these materials could have occurred. BBG also identified a vent pipe on the northern exterior of the building facing Starr Street. Due to the density of stored materials within the basement, the current or former presence of an aboveground storage tank (AST) or underground storage tank (UST) could not be fully evaluated, and the vent pipe was therefore identified as an REC.

The property's historical industrial uses and the presence of the UST were further investigated during the Phase II Subsurface Investigation performed by BBG and subsequent Phase II ESA performed by Liberty Environmental. Indoor air analytical results identified detections of trichloroethene (TCE), tetrachloroethene (PCE), 1,1,1-trichloroethane (1,1,1-TCA), methylene chloride, and benzene. In the partial basement, indoor air samples contained TCE at concentrations recommending mitigation in the applicable guidance with a maximum concentration of 81.4 $\mu\text{g}/\text{m}^3$. Comparatively, TCE was identified in one IA sample from the first floor at a concentration (7.88 $\mu\text{g}/\text{m}^3$) recommending mitigation.

The indoor air analytical results from the sampling event identified concentrations of TCE, cyclohexane, and toluene at concentrations greater than applicable guidance mitigation values for indoor air. In IA samples collected in the partial basement, TCE, cyclohexane, and toluene were identified at concentrations greater than applicable guidance mitigation values with maximum concentrations of 34 $\mu\text{g}/\text{m}^3$, 48 $\mu\text{g}/\text{m}^3$, and 59 $\mu\text{g}/\text{m}^3$, respectively. In IA samples collected from the first floor, TCE and cyclohexane were identified at concentrations greater than applicable guidance mitigation values with maximum concentrations of 2.4 $\mu\text{g}/\text{m}^3$ and 28 $\mu\text{g}/\text{m}^3$, respectively. Based on these results, Liberty recommended vapor mitigation followed by indoor air sampling to confirm compliance with applicable state regulations.

In April 2023, Liberty's review of property records revealed that a 1,080-gallon fuel oil UST was formerly used at the Site and was closed in place in 2001. No additional investigation of the UST was conducted by Liberty.

3 Hazards

Hazards that could be encountered include chemical hazards, environmental hazards, biological hazards, and/or physical hazards. The sub-categories of these four types of hazards are explained in further detail below.

3.1 Chemical Hazards

Chemical hazards may be encountered during the field activities to be conducted at the Site. These hazards may be encountered through inhalation, absorption (dermal contact), or ingestion. Based on historical site usage and investigation activities, the following COCs may be encountered during surveying, boring activities, and the collection of soil/groundwater samples:

- VOCs, primarily chlorinated solvents
- SVOCs
- PCBs
- PFAS
- Pesticides/herbicides
- Metals

Silica dust may also be encountered when coring, drilling or saw cutting into the concrete, and metals dust may be encountered due to the nature of the work done at the Site.

3.1.1 Absorption and Ingestion Risk

The anticipated concentrations of contaminants of potential concern (COPCs) in soil are such that the absorption and ingestion risk can be minimized by proper personal hygiene and use of personal protective equipment (PPE). The PPE requirements are discussed further in Section 8.0. If work is anticipated in areas where one or more of the COPCs exceed acceptable risk-based screening levels; the work practices, engineering controls, and required PPE will be assessed and modified as necessary in an addendum to this HASP.

3.1.2 Inhalation Risk

3.1.2.1 VOCs and SVOCs

Inhalation risk associated with VOCs and select SVOCs is possible when disturbing the subsurface (e.g., well installation). During the periods of field activities when the subsurface is disturbed, real-time air monitoring of the worker breathing zone will be conducted. Air monitoring is discussed further in section 9.0. If field personnel experience short-term health effects such as headaches, nausea, or eye and respiratory irritation that are often associated with these compounds, they will take a break to relieve symptoms and further assess the risk to other personnel in the immediate area.

3.1.2.2 Other COPCs

The inhalation risk associated with other COPCs at the Site (select SVOCs, PCBs, pesticides/herbicides, and metals) can be minimized with proper dust control during the proposed field activities. The proposed drilling and sampling activities are anticipated to produce minimal dust. The need for air monitoring for dust or metals will be assessed prior to changes in site activities and action levels will be developed as necessary based on soil analytical data in the proposed work areas.

3.1.2.3 Per- and Polyfluoroalkyl Substances (PFAS)

With the exception of workers involved in the making, handling, or processing PFAS and PFAS-containing materials, there is minimal inhalation risk associated with PFAS, especially in soil and groundwater. Similar to metals and PCBs, the risk will be further reduced by minimizing dust generation.

3.1.2.4 Silica Dust

Silica dust may be generated during the coring, drilling, or sawing of concrete prior to the advancement of soil borings or excavations. OSHA recommends engineering controls be implemented during all concrete coring/demolition to minimize inhalation risk to field personnel from silica dust, as outlined in 29 CFR 1926.1153. Engineering controls can substantially reduce the potential for exposure from silica dust.

The required engineering controls, in accordance with Table 1 in 29 CFR 1926.1153, include the following:

- Core saws will be equipped with an integrated water delivery system with water flow rates sufficient to minimize the release of visible dust. The resulting slurry will be cleaned up (most likely with a wet/dry vacuum) to prevent the slurry from drying and releasing silica dust into the air.
- When using a handheld drill (e.g., rotary hammer, hammer drill, etc.), a vacuum dust collection system (e.g., hammer drill collection attachment) will be used to reduce exposure to silica dust. The vacuum must provide adequate airflow to remove dust at the drilling point and be equipped with a HEPA filter.

3.2 Environmental Hazards

In Brooklyn, New York, the maximum average high temperature occurs in July at around 83 degrees Fahrenheit and the minimum average low temperature occurs in January at around 29 degrees Fahrenheit (°F). The average annual precipitation is approximately 39.6 inches of rain and 17.5 inches of snow. As such, all field personnel should be prepared for a change in weather conditions.

3.2.1 Heat Stress

Heat stress is caused by a number of interacting factors, including environmental conditions, clothing, workload, etc., as well as the physical and conditioning characteristics of the individual. All employees must be informed of the importance of adequate rest, acclimation, and proper diet in the prevention of heat stress disorders.

Heat stress monitoring and work rest cycle implementation must commence when the ambient temperatures exceed 80°F. The site safety and health officer (SSHO), project manager, and/or task manager should monitor the anticipated high temperatures prior to the start of work, as well and monitor real-time temperatures during the work day using a reputable website (i.e. <http://www.weather.gov/>) or onsite weather station.

Employees shall be allowed and encouraged to take a preventative cool-down rest in the shade at a time when they feel the need to do so to protect themselves from overheating. Such access to shade shall be permitted at all times. An individual employee who takes a preventative cool-down rest (A) shall be monitored and asked if he or she is experiencing symptoms of heat illness; (B) shall be encouraged to remain in the shade; and (C) shall not be ordered back to work until any signs or symptoms of heat illness have abated, but in no event less than 5 minutes in addition to the time needed to access the shade.

High Heat Procedures will be implemented in accordance with the OSHA heat illness prevention regulations if the temperature at the Site equals or exceeds 95°F. This must include the following:

1. Ensuring that effective communication by voice, observation, or electronic means is maintained so that employees at the work site can contact a supervisor when necessary. An electronic device, such as a cell phone or text messaging device, may be used for this purpose only if reception in the area is reliable.
2. Observing employees for alertness and signs or symptoms of heat illness. The employer shall ensure effective employee observation/monitoring by implementing one or more of the following:
 - a. (A) Supervisor or designee observation of 20 or fewer employees, or
 - b. (B) Mandatory buddy system, or
 - c. (C) Regular communication with sole employee such as by radio or cellular phone, or
 - d. (D) Other effective means of observation.
3. Designating one or more employees on each worksite as authorized to call for emergency medical services, and allowing other employees to call for emergency services when no designated employee is available.
4. Reminding employees throughout the work shift to drink plenty of water.

Pre-shift meetings before the commencement of work to review the high heat procedures, encourage employees to drink plenty of water, and remind employees of their right to take a cool-down rest when necessary.

3.2.2 Hypothermia

Hypothermia can result from abnormal cooling of the core body temperature. It is caused by exposure to a cold environment and wind-chill. Wetness or water immersion can also play a significant role. Typical warning signs of hypothermia include fatigue, weakness, lack of coordination, apathy, and drowsiness. A confused state is a key symptom of hypothermia. Shivering and pallor are usually absent, and the face may appear puffy and pink. Body temperatures below 90°F require immediate treatment to

restore temperature to normal. Current medical practice recommends slow re-warming as treatment for hypothermia, followed by professional medical care. This can be accomplished by moving the person into a sheltered area and wrapping with blankets in a warm room. In emergency situations, where body temperature falls below 90°F and heated shelter is not available, use a sleeping bag, blankets, and body heat from another individual to help restore normal body temperature.

3.2.3 Ultraviolet (UV) Radiation (Sunlight)

Moderate to high potential for overexposure to UV light exists for field personnel. To prevent erythema (sunburn), workers will be provided Sun Protection Factor (SPF) 30 or greater sunscreen to apply to areas not covered with clothing or PPE. Workers will be encouraged to seek shade whenever possible.

3.2.4 Rain/Thunder/Lightning

Due to the site's location, foul weather including rain storms can occur frequently. Monitor local weather through available media or a weather radio. Although not as frequent, electrical storms can potentially be very hazardous to field personnel. During lightning and thunderstorms, the following is necessary:

- Equipment shutdown;
- Seek shelter in a building or vehicle; and
- Await further instruction from Project Leader.

A 30-minute STAND DOWN period is required after encountering Lightning or Thunder in order to allow the storm to pass.

3.3 Physical Hazards

Physical hazards discussed under this section include traffic hazards, underground and overhead utilities, drill rigs, machinery and moving parts, electrical hazards, confined space entry, noise, slips, trips, and falls, motor vehicle and heavy equipment operation, and ergonomic hazards.

3.3.1 Underground and Overhead Utilities

Reasonable efforts will be made to identify the location(s) of underground utilities (e.g., pipes, electrical conductors, fuel lines, and water and sewer lines) before soil intrusive work is performed. The state underground utility notification authority UDig NY (New York 811) will be notified at least 3 full business days prior to starting field activities. UDig NY in turn will notify representatives of the utility companies who will mark the location of underground services entering the property. UDig NY markings will be noted prior to drilling to prevent damage to utility lines. In addition, Terraphase will have a private utility locate conducted a geophysical survey at all proposed excavation and soil boring installation locations prior to the initiation of intrusive excavation/drilling activities.

The Project Manager is responsible to ensure that underground utility locations are identified prior to the commencement of any subsurface activities. Resources include site plans, utility companies, and

regional utility locating services. The proper utility company personnel should certify the deactivation of utilities, and the certification should be retained in the permanent log. Only qualified persons shall perform subsurface installation locating activities, and all such activities shall be performed.

When soil borings approach the approximate location of subsurface installations, the exact location of the installations shall be determined by safe and acceptable means that will prevent damage to the subsurface installation, as provided by 29 CFR 1926.650-652.

If a utility strike presents an immediate danger to the work crew or general public (i.e., electrical, gas, high pressure water line), then the crew should evacuate to a safe distance, contact 911 immediately, and cordon off the area to prevent public access.

All utility strikes should be reported out to the PM and/or SSHO as soon as it is safe to do so, and then a plan will be made for reporting to the utility company and client. If a utility strike does occur refer to the accident reporting requirements in Section 7.0.

Prior to mechanized drilling, the following techniques will be employed to determine the location of subsurface structures:

- contracting the services of a qualified private utility locator, and
- prior to mechanized drilling, subsurface testing (i.e., hand auguring and/or potholing) to the expected depth of probable utilities (not less than 5 feet)

If utilities cannot be located and/or if unlocated utilities are suspected to be present, subsurface activities (i.e., borings, excavation) should not be conducted prior to confirming the location(s) or absence of underground utilities.

Equipment with articulated upright booms or masts shall not be permitted to pass within 20 feet of an overhead utility line (less than 50 kilovolts [kV]) while the boom is in the upright position. For transmission lines in excess of 50 kV, an additional distance of 4 inches for each 10 kV over 50 kV will be used.

Excavation, drilling, crane, or similar operations adjacent to overhead lines shall not be initiated until operations are coordinated with the utility officials. Operations adjacent to overhead lines are prohibited unless one of the following conditions is satisfied:

- Power has been shut off and positive means (e.g. lockout/tagout) have been taken to prevent lines from being energized. Wherever possible, the SSHO will observe power shut off and place a lock and tag on the switch. In all cases utility company personnel shall certify in writing to the Project Manager or SSHO the deactivation of overhead utilities, and the certification retained in the project files. The Site Manager or SSHO must also attempt to verify power shut off by checking that power is no longer available to the affected building or equipment.
- Equipment, or any part of the equipment, cannot come within the following minimum clearance from energized overhead lines (please note that Terraphase recommends that 10 feet be added to the minimum required clearances presented below):

Power Lines Nominal System (kv)	Minimum Required Clearance
0-50	10 feet
50- 75	11 feet
75-125	13 feet
125-175	15 feet
175-250	17 feet
250-370	21 feet
370-550	27 feet
550-1000	42 feet

3.3.2 Drill Rigs

The operator of the Drill Rig will comply with the precautions specified in the above section. In addition, the following precautions should be observed whenever a drill rig is in use:

- Workers must not wear loose clothing, nor leave long hair, boot laces, or jacket ties uncontrolled while operating moving equipment;
- Hard hats, hearing protection, safety footwear, and eye protections must be worn at all times;
- Prior to the start of daily operations, the drill rig operator should inspect the drill rig carefully to be sure that it is suitable for the day's work;
- The drill rig operator will ensure that there is adequate lighting on the rig to enable the job to be performed safely;
- The drill rig must be equipped with an operable kill switch and personnel must be aware of restarting procedures;
- All fittings, connections, and hydraulic hoses must be of a standard to operate in a safe manner;
- At no time will the operator of the drill rig operate the drill controls and add stem while alone, unless the drill rig is designed to operate as a single person operation;
- Repairs and service must not be attempted while rotary machinery is running; and
- If electrical storms can be seen or heard, drilling operation will be shut down until it is deemed safe by the SSHO.

3.3.3 Machinery/Moving Parts

Drilling and vacuum equipment may have various motors, booms, and other equipment. These present a general physical hazard from moving parts. Personnel will stand clear of machinery at all times unless specific instructions are given by the trained operator, or other person in authority. Steel toed shoes or boots will be worn at all times when on the site. When possible, appropriate guards will be in place

during equipment use. Field personnel should be careful to keep loose clothing, hands, and feet away from vacuum hose inlets.

3.3.4 Hand and Power Tools

Use of power tools presents potential physical hazards (e.g., pinch points, electrical hazards, flying debris, and struck-by/caught-between hazards) to personnel operating them. The following safety rules must be implemented:

- Inspect tools frequently for defects. Turn in all tools which are burred, mushroomed, have split or loose handles, have worn or sprung jaws, have exposed wires, or are generally unsafe.
- Use hand tools properly and for their intended use only.
- Do not to operate power tools, machinery, or equipment without proper training or supervision.
- Do not operate equipment unless all guards and other protective devices are properly secured and correctly adjusted.
- Keep cords of electrical equipment coiled when not in use.
- When using electrical equipment, position its power cord to avoid its being run over by vehicles or equipment.
- Turn off, and if possible unplug, machinery before cleaning, oiling, adjusting, or repairing unless the equipment is designed or fitted with safeguards to protect the person performing the work.
- Do not wear loose or frayed clothing, dangling ties, finger rings, etc. when operating or working near moving machinery or other mechanical sources of entanglement.
- Do not lift or lower portable electric tools by means of a power cord; use a handline.
- Never throw tools, equipment, or material up or down from one working level to another; always use a handline. Do not disconnect air hoses at compressors until hose line has been bled.

3.3.5 Portable Generator Use

A portable generator is not expected to be required for the scope of work. However, if a generator is utilized on-site the following procedures will be observed.

Care shall be exercised while refueling generators to prevent fire and spills. A generator must be shut off prior to refueling. Personnel shall eliminate static electricity by grounding themselves (touching metal) prior to handling refueling hoses and or containers of petroleum liquids. Items being refueled shall be grounded or be located on the ground and not on a trailer, work bench or inside a truck bed. Equipment that is hot must be allowed to cool prior to refueling. Spill response materials shall be available when conducting refueling operations.

Proper ventilation shall be ensured during generator operation to prevent carbon monoxide poisoning. Portable generators shall never be used indoors or in enclosed spaces and shall maintain a minimum of 3 to 4 feet of clear space on all sides and above to ensure adequate ventilation. The portable generator will never be placed near doors, windows or vents that could allow carbon monoxide to enter a building.

3.3.6 Electrical Hazards

In order to prevent accidents caused by electrical shock, field personnel will inspect electrical equipment being used (e.g. power tools, electrical cords) on a daily basis for evidence of frayed or loose connections.

3.3.7 Lock-out/Tag-out

Lock-out/Tag-out procedures should be used on any pieces of equipment being worked on by field personnel. The only exception to this is equipment with a plug, which can be unplugged and remain in control of the worker. Proper lock-out/tag-out includes the identification and isolation of hazardous energy. The energy sources must be locked out so that only the worker(s) has the key to release the isolation point. Stored energy (e.g. air or water pressure) must also be released prior to conducting work on the equipment. If necessary, all provisions of the OSHA standard as stated in 29 CFR 1910.147 will be followed for controlling hazardous energy or locking out or tagging out electrical and utility hazards.

3.3.8 Confined Spaces

Confined space entry is not anticipated for this project. Terraphase field personnel will not enter any confined space without specific approval of the Project Manager. Subcontractors may need to conduct permit-required confined space entries and should notify Terraphase Project Leader prior to the entry.

If confined space entries are conducted, they will be in accordance with the subcontractor's confined space entry program. An attendant will be stationed above the confined space while the entrant(s) are in the confined space. A full-body harness with emergency retrieval equipment or another means of egress (e.g. ladder) shall be in use if necessary and if the confined space is greater than 6 feet deep.

Before conducting any work inside a confined space (e.g. tank), the personnel will conduct a visual inspection of the area from the opening to identify any hazards before proceeding. Gas measuring devices will be utilized to detect any presence of harmful or dangerous atmospheres. Any floating or rotating machinery that are in the confined space are turned off and locked out prior to beginning any work.

3.3.9 Noise

Appropriate hearing protection (ear muffs or ear plugs with a noise reduction rating of at least 20 decibels [dBA]) will be used if individuals work near high-noise generating equipment (> 85 dBA). Determination of the need for hearing protection will be made by the Project Leader and follow the Terraphase Hearing Conservation program document and 29 CFR 1910.95. The determination will be based on historical area noise surveys for similar tasks. If recent representative data is not available for specific noise producing equipment/tasks, then area noise surveys will be conducted. Personal noise dosimetry will also be conducted if area noise surveys indicate that employees may be exposed to noise in excess of 85 dBA over an 8-hour time-weighted average (8-hour TWA).

Hearing protection is further discussed in section 10.5.

3.3.10 Slips, Trips, and Falls

Slips, trips, and falls are a leading cause of injury on construction and remediation worksites. Water and slime collect on horizontal surfaces and stairs, posing a potential hazard. Proper housekeeping is the key to preventing injuries of this nature. To minimize potential for injuries, the following measures will be implemented:

- Site around open manholes, excavations, trenches, etc. will be kept clean and orderly.
- All potential trip and fall hazards will be clearly marked, modified to reduce the hazard, or engineered in a configuration to eliminate the hazard (if possible).
- All floors and stair treads will be kept clean of water, oil, and polymer.
- All hoses will be coiled and stored out of the way when not in use.
- There will be no running on the site.

As with all field work sites, caution will be exercised to prevent slips on rain slick surfaces, stepping on sharp objects, etc. Work will not be performed on elevated platforms without fall protection.

3.3.11 Heavy Equipment Operation

Physical hazards can arise from loading and off-loading heavy equipment from tractor-trailers and locating equipment to designated areas of use. Hazards will be mitigated by personnel avoiding close proximity to moving equipment and immovable objects.

Belts and rotating parts have the ability to injure, crush, or amputate body parts and limbs. Personnel will avoid contact with any moving part. Any loose items will be removed before working around moving or rotating equipment. Any moving parts that can be guarded will have an appropriate machine guard installed. Equipment will not be operated without the proper guards in place. Repairs/adjustments will be done with the equipment stopped and locked out as appropriate.

The following measures will be implemented for heavy equipment operation:

- The minimum required work uniform for all field personnel (e.g. Level D protection) shall be general work clothes, steel-toed construction boots American National Standards Institute (ANSI) approved, safety goggles or glasses, work gloves, high visibility vest, hearing protection, and a hard hat (ANSI approved).
- Adequate workspace shall be maintained during equipment operation.
- Equipment shall be inspected for proper working condition prior to use.
- Field personnel shall only approach operating equipment from the operator's angle of view, and only after making eye contact with the equipment operator.
- A 10-foot perimeter will be maintained around all active equipment as a "Danger Zone".
- Only trained and qualified persons shall operate individual equipment.

On-site haulage or earth-moving vehicles subject to the requirements of OSHA 1926.602 will have a functional audible alarm in compliance with the referenced standard. In addition, the warning sound shall

be of such magnitude that it will normally be audible from a distance of 200 feet and will sound immediately on backing. In congested areas or areas with high ambient noise which may obscure the audible alarm, a signaler, in clear view of the operator, shall direct the backing operation.

3.3.12 Motor Vehicle Operation

Employees may be exposed to vehicle accident hazards associated with the operation of vehicles during the project. To control these hazards, the following safety requirements will be strictly enforced:

- Seat belts shall be worn anytime a vehicle is in motion, regardless of speed or distance to be traveled. Seat belt requirements also apply to the operation of backhoe and other construction equipment;
- The basic speed law shall be followed at all times; and
- Vehicles shall never be operated at a speed that is not safe for the conditions (i.e. road surface, traffic, visibility, weather, etc.).

3.3.13 Traffic Hazards

Although the proposed work is not anticipated to occur along active streets or in the public right-of-way, employees should always follow:

- The traffic control plan prepared for the work (if required).
- Park work vehicle between on-coming traffic and work zone to the extent feasible.
- Demarcate the work zone with high visibility traffic cones.
- Wear high visibility vest.
- Follow all laws regarding pedestrian crossing of streets.
- Traffic considerations should be made to minimize driver frustration and confusion.
- Provide as much barrier between work area and traffic lanes as practicable.
- When possible, employees should not walk between the traffic cones and the active lane of traffic.
- Equipment and supplies should be unloaded from the back of the vehicle or the sidewalk side of the vehicle to minimize the potential to travel in the active traffic lane.

A common hazard on all construction sites is being struck by a moving vehicle or large equipment. Every project is to be planned and organized to ensure vehicles, machines and equipment are not operated in reverse or are operated in reverse as little as possible. All heavy equipment must be equipped with an automatic audible alarm that signals when they are being operated in reverse.

3.3.14 Illumination

Proper illumination is important in the prevention of slips, trips, and falls. It is anticipated that work will be conducted during daylight hours and within actively lit structures. Therefore, no additional illumination will be required. If site activities are to occur during non-traditional hours (i.e., night-time),

or inside the adjacent building, an addendum to this HASP will be prepared to specify auxiliary lighting requirements if necessary as outlined in the HAZWOPER standard.

3.3.15 Ergonomic Hazards

The initial site safety briefing given to all workers prior to the start of the project will cover the basics of ergonomics and focus on the following topics:

- Ergonomic injuries – their prevalence, causes, and significance
- Proper lifting procedures and planning all lifts
- Proper posture when standing, operating a motor vehicle or heavy equipment
- Avoiding overexertion
- Awareness of repetitive task and the hazards that they can pose

3.4 Biological Hazards

This section provides health and safety precautions against potential biological agents that might be encountered by field personnel during field activities. The biological hazards that may be encountered include: microbiological agents, insects and wild animals.

3.4.1 Vermin

Feral cats, skunks, rats, mice, squirrels and rabbits may be carriers of disease. Where vermin are identified in work areas, the Project Leader shall be immediately notified. Bites will be immediately reported and medical care obtained. Infections may occur in humans associated with activities that bring humans into contact with rodents, rodent saliva, or rodent excreta. Disturbing rodent-infested areas may bring humans into contact with the etiologic agents causing infections.

Transmission of disease may occur through broken skin, contact with conjunctivae, ingestion of contaminated food or water, or inhalation of aerosols. Personal hygiene practices, such as frequent hand washing, will help prevent rodent-borne diseases as well as using caution in areas likely to be occupied by vermin.

Workers will be advised that if a fever or respiratory illness develops within 45 days of the potential exposure, they should seek medical attention and inform the physician of potential Hantavirus exposure. All precautions will be made to ensure Hantavirus exposure is eliminated in the field. Rodent-borne diseases, including Hantavirus, result in severe respiratory distress and plague.

3.4.2 Arthropods - Insects, Ticks, and Spiders

The work area does have biological hazards. Venomous spiders native to the area include the Black Widow and the Brown Recluse. The female black widow is normally shiny black, with a red hourglass marking on the underside of abdomen. Black widows can be found both outdoors and indoors. In indoor settings, black widows prefer undisturbed, cluttered areas, which may exist in the warehouse at the site. The same goes for the Brown Recluse. Field personnel should wear long sleeves and work gloves if they

need to move stored material or debris at the site to avoid Black Widow and Brown Recluse bites. If itching, visually assess the area for swelling, pain, and redness. It may take up to 8 hours for the pain to become intense. Ticks are less common in densely developed urban areas; however, make sure to check yourself as tick bites are often painless and it can take over a week to see symptoms.

3.4.3 Snakes

The work area includes asphalt- and concrete-paved areas and will occur mostly within a structure. As such, snakes are not anticipated to be present.

4 Roles and Responsibilities

The following section describes the roles and responsibilities of the personnel involved with the project. The roles and levels of authority are presented in schematic in Section 4.4 below. Appendix A has a list of contact names and phone numbers related to this project.

4.1 Project Manager

The project manager has the responsibilities to:

- staff the project with qualified personnel (including proper training and certifications);
- ensure proper documentation is being collected and maintained;
- provide adequate resources and equipment to field personnel;
- monitor the performance of field activities; and
- ensure company policy is in compliance with all applicable regulations.

4.2 Project Leader

The project leader will serve as the SSHO and will report to the Project Manager. The project leader has the responsibilities to:

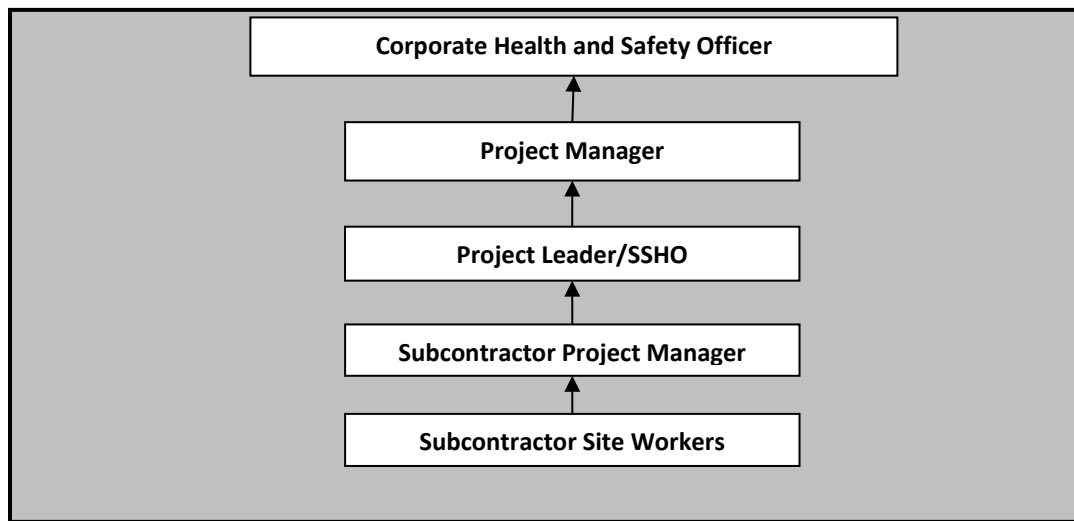
- act as the liaison between field personnel and the subcontractor(s);
- lead the daily and weekly safety meetings;
- ensure the HASP is being followed;
- provide adequate resources and equipment to field personnel; and
- monitor the performance of field activities.

4.3 Subcontractor(s)

Terraphase Subcontractor's are responsible for the oversight and implementation of their project safety program. Each subcontractor will be required to designate one individual to communicate directly with the Terraphase SSHO, and to ensure safety responsibilities are being met by their workers as part of their HASPs prepared for this field effort. Coordination and control of work flow will be achieved through frequent meetings (formal and informal) and job site inspection. The designated subcontractor safety designee (subcontractor project manager) must be granted stop work authority over persons from their company.

Subcontractor control and coordination will be through the chain of command identified below. Although each subcontractor is ultimately responsible for the performance and actions of their employees, the SSHO has the authority to take action when a violation of safety guidelines is in question.

4.4 Chain of Command



4.5 Training

Field personnel engaged in project operations that potentially expose them to hazardous wastes, hazardous substances, or any combination of hazardous wastes or hazardous substances shall have satisfied the requirements of 29 CFR Part 1910.120 through completion of:

- Initial 40-hour HAZWOPER training, and
- Annual 8-hour HAZWOPER refresher training current within one year.

4.5.1 General Site-Specific Training

All potential field personnel will review this HASP before commencing work which will serve as site-specific training. The SSHO will review the HASP before field operations begin and the SSHO, or designee, will conduct daily tailgate safety meetings (i.e. pre-entry briefings) to bring up appropriate health and safety concerns and discuss any changes in field conditions. The SSHO will conduct additional pre-entry briefings with entrants to the site who are not present for the tailgate safety meeting. Field personnel will certify their review by signing a HASP acknowledgement form (Appendix B). Social distancing practices should be observed during all site meetings.

Any additional site-specific safety concerns such as, noise, heat illness prevention, or lock-out/tag-out will be addressed by the Project Manager and the SSHO will be provided with proper Site-specific training with accordance with any OSHA regulations prior to the start of the project, as applicable.

4.5.2 First Aid/CPR

Medical assistance is in near proximity to the Site, and therefore, per 29 CFR 1910.151, a designated first aid provider is not required. Personnel trained in first aid/CPR and bloodborne pathogens (29 CFR 1910.151 and 1910.1030) may administer first aid and CPR if needed.

4.5.3 Respiratory Protection

It is not anticipated that respiratory protective equipment will be required for this project. However, field personnel will be properly equipped with a PID to monitor the breathing zone. Should the PID indicate that respiratory protection be necessary, all site activities will halt and a respiratory plan will be enacted. In the case that respiratory protection is required, Terraphase will provide the appropriate mask style and filter type for the specific tasks as well as fit tested prior commencing work. Onsite workers will have successfully completed respiratory protection training in accordance with the requirements of OSHA 1910.134 should it be necessary. More information about breathing zone monitoring with a PID can be found in Section 9.0.

5 Personal Hygiene and Sanitation Facilities

The following personal hygiene requirements, as well as those outlined in Section 3.4.1, will be observed:

- Water Supply: a water supply meeting the following requirements will be utilized:
 - Potable Water: an adequate supply of potable water will be available for field personnel consumption. Potable water will be provided in the form of water bottles, canteens, or water coolers by the SSHO. Potable water containers will be properly identified in order to distinguish them from non-potable water sources.
 - Non-Potable Water: non-potable water may be used for hand washing and cleaning activities. Non-potable water will not be used for drinking purposes. All containers of non-potable water will be marked with a label stating: “Non-Potable Water; Not Intended for Drinking Water Consumption.”
- Toilet Facilities: Restrooms and sanitation facilities are available at the Site.

6 Safety Meetings

All workers permitted access to the site will receive a site orientation briefing and a review of pertinent aspects of the project and HASP before the start of work. Personnel will sign a form (Appendix B) documenting they have had an opportunity to review the HASP, understand the requirements, and agree willfully to adhere to the safety aspects of the plan.

The site orientation briefing will include the following aspects:

- Key personnel and responsibilities
- Site hazards (known and potential)
- PPE requirements
- Emergency procedures (including signals, evacuation locations, and what constitutes an emergency)
- Location and route to the nearest medical facility
- Incident reporting procedures

Meetings typically last no less than 10 minutes in time and attendance will be documented. Daily informal safety meeting will be conducted each morning before work commences. Daily meeting attendance will be documented. Sign in sheets for the safety meetings are included in Appendix C.

Personnel are encouraged to immediately report any unsafe work conditions or work practices observed to the SSHO.

7 Accident Reporting

Workers are required to immediately report all accidents, incidents, near-miss incidents, injuries, illnesses and injuries requiring first-aid (no matter how trivial) to their supervisor and/or the SSHO.

In the event of a worker injury or illness, the SSHO must be notified, who will in turn immediately report the incident to the Project Manager to assist with the coordination of required medical assistance and related workers compensation case management follow-up.

Should an incident such as a serious injury (requiring hospitalization), explosion, fire, or a spill or release of toxic materials occur, during the project, the SSHO will immediately report the incident to the project manager and appropriate government agencies. The written report must include the following information:

- Name, organization, telephone number, and location of the contractor
- Name and title of the person(s) reporting the incident
- Date and time of the incident
- Location of the incident
- Approximate chronological summary of details occurring before and at the time of the incident
- Cause of incident (if immediately known)
- Casualty information (fatalities or disabling injuries)
- Details of any existing chemical hazard or contamination
- Estimated property damage (if applicable)
- Nature of the damage and effect on the contract
- Actions taken to preserve safety and security
- Other damages or injuries sustained
- Witness statements

If a utility strike does occur, report this to the Project Manager and utility operator as soon as it is safe to do so. The contact info for potential utility operators near the Site are available in the One-Call ticket which is included in Appendix E.

8 Personal Protective Equipment

PPE in the form of protective footwear and appropriate work clothing are required for all field activities. PPE for specific field activities is listed below. **Additional specifications for PFAS-free PPE used to avoid cross-contamination during PFAS sampling events are outlined in Terraphase SOP 210-23-00-Low Flow Groundwater Sampling for PFAS.**

All Field Activities (Level D PPE):

- Boots – chemical resistant, steel (or equivalent) toe and shank (ASTM F2412-18 and F2413-18, Safety Toe Footwear Classification 75). Boots shall be equipped with deep traction sole.
- Work clothing (e.g. long pants)
- Safety Vests (Yellow or orange with reflective strips)
- Safety Glasses (ANSI Z87.1)

Drilling/Excavation and Loading Operations:

- Hard Hat (ANSI Z89.1-2014 Type 1 Class E and G; if overhead hazards are present)
- Hearing Protection (foam inserts)
- Gloves – Chemical (Nitrile)
- Work Gloves (Leather or equivalent) – if splitting cores or other activities that require more resilient gloves

Soil Sampling:

- Gloves – Chemical (nitrile)
- Work Gloves (Leather or equivalent) – if splitting cores or other activities that require more resilient gloves

If necessary:

- Safety Face Shield (splash hazard)
- Tyvek® suit or similar coverall (splash hazard)
- Rubber boots or over boots (wet conditions or if wet boot decontamination is necessary)
- Respirator – Half or full-face air-purifying respirator (APR) fitted with organic vapor (OV)/high-efficiency particulate air (HEPA; rating P100) filter cartridges

PPE offers a high degree of protection, yet the equipment must be maintained and inspected on a regular basis to ensure its effectiveness. Hard hats should be discarded if cracked. Boots should be maintained (use waterproofing if necessary) to prevent injuries, disease (from wet conditions) and insect/snake bites.

Employees required to wear PPE will be trained to know at least the following:

- When PPE is necessary.
- What PPE is necessary.

- How to properly put on, take off, adjust and wear the PPE.
- The limitations of the PPE.
- Proper care, maintenance, useful life and disposal of PPE.

Changes in the workplace or in the type of required PPE that make prior training obsolete may require additional training or retraining of employees.

If air monitoring exceeds action levels identified Section 9.0, work will be modified to reduce vapors. If air monitoring indicates that an upgrade to level C PPE is necessary, Level C includes the PPE specified above plus the NIOSH-approved half- or full-face air-purifying respirator (APR) equipped with the appropriate filter cartridges for organic vapors. Personnel will be fit-tested for the specific make and model respirator that will be used. Note: safety glasses or goggles are not required when wearing a full-face APR.

9 Air Monitoring

Air monitoring will be conducted during intrusive (including soil vapor purging and sampling) activities as the potential exists to contact soil impacted with VOCs and select SVOCs. The work environment will be monitored using a PID.

9.1 Direct Reading Instruments

9.1.1 Photoionization Detector

A PID with a 10.6 electron volt (eV) lamp will be used to determine the presence and concentration of organic vapors. Contaminants such as petroleum hydrocarbons and associated VOCs are detectable with a PID. Air monitoring and actions will be implemented identified in 9.2 below.

9.2 Monitoring Strategy

Inhalation is one of the primary routes of exposure for VOCs. The following approach to air monitoring was selected based onsite conditions and background information presented in section 2.

9.2.1 Total Organic Vapor Monitoring

During intrusive sampling and remediation activities, SVOCs and VOCs could potentially become airborne and result in exposure to employees. When intrusive or soil vapor purging and sampling activities are being conducted or when known or suspected contaminated soils or groundwater are encountered, total organic vapors will be monitored with a PID or a similar device. **Total organic vapor readings will be taken in the breathing zone approximately once per half hour or more frequently as Site conditions warrant.**

If the PID detects total organic vapors at concentrations greater than 10 parts per million (ppm), then sustained for at least 1 minute, additional controls will be implemented to prevent exposure. If possible, all personnel will evacuate the area and wait for vapors to dissipate to levels below 10 ppm before resuming work. If personnel must remain in an area where vapors above 10 ppm are present, air-purifying respirators will be worn to try to identify the source of contaminants, and implement engineering controls (e.g., portable fans with pre-staged power such as available onsite power or portable generator) to reduce the vapors to below occupational exposure limits (see below). If the PID readings exceed 100 ppm sustained (for greater than 1 minute), all work will be stopped and the project manager notified. Work may not resume until airborne total organic vapors readings are recorded below 100 ppm. Onsite personnel wearing C Level PPE should try to identify the source of the contaminants once readings fall to below 100 ppm.

Chemicals of Potential Concern (COPCs)		
Direct Reading Instrument Action Levels for Area Monitoring and Breathing Zone Monitoring		
Monitored Parameter	Action Level	Response to Action Level
VOCs in the work area will be monitored using a PID and colorimetric gas detection tubes (as needed).	≥ 10 ppm continuous reading in the breathing zone for 1 minute	The SSHO should: • Stop work • Don Level C (HEPA/OV cartridges) to identify source of airborne contamination • Initiate vapor suppression measures or other engineering controls (e.g. work upwind, blower fan) to maintain levels to less than 10 ppm
	≥ 100 ppm continuous reading in the breathing zone for 1 minute	The SSHO should: • Stop work • Contact PM if VOC levels cannot be controlled to less than 100 ppm total.

The Site action levels were derived using the following regulatory exposure limits:

Compound	OSHA		ACGIH	
	PEL	STEL	TLV	TLV-STEL
TCE	100	--	10	25

Concentrations presented in parts per million (ppm)

(c) = ceiling limit

PEL = permissible exposure limit, 8-hour time weighted average

STEL = short term exposure limit, 15-minute

TLV = threshold limit value, 8-hour time weighted average

ACGIH = American Conference of Governmental Industrial Hygienists

In addition, Terraphase anticipate the following other chemicals may be present in vapors at the site, but are not anticipated to be present at concentrations above occupational exposure limits.

- Benzene
- Cyclohexane
- 1,1,1-TCA
- Methylene Chloride
- PCE
- Toluene

9.3 Quality Assurance/Quality Control

Adherence to a proper quality assurance and quality control (QA/QC) plan is essential for a meaningful air sampling effort. The major concerns of a QA/QC plan are calibration of equipment and document control.

9.3.1 Calibration and Maintenance Procedures

All direct reading instruments will be calibrated daily before work and checked against calibration gas at the end of the day. Calibration records will be kept that detail date, time span, gas or other standard, and the name of the person performing the calibration. The calibration gas for the PID is isobutylene. The SSHO will ensure that the instrument is kept clean and will follow manufacturer's directions for keeping the lamp clean. The SSHO will perform no other maintenance procedures unless approved by the Project Manager.

9.3.2 Documentation

Strict adherence to document and data control procedures is essential for good QA/QC. Data and calibration records must be accounted for and retrievable at all times. Types of documents that are essential include notes, logbooks, maps, data sheets, and reports. These must be placed in the project files. Copies of all field data reports and personal sampling records will be sent to the project manager for review.

Documentation of employee exposure monitoring results must be made available and maintained in compliance with 29 CFR 1910.1020.

10 Decontamination of Personnel and Equipment

Despite protective procedures, personnel and equipment may come in contact with potentially hazardous compounds while performing work tasks. If so, decontamination must occur using an Alconox or TSP wash (or other effective means), followed by a rinse with clean water. Standard decontamination procedures for levels C and D are as follows:

- equipment drop
- boot cover and outer glove wash and rinse
- boot cover and outer glove removal
- suit wash and rinse
- suit removal
- safety boot wash and rinse
- inner glove wash and rinse
- respirator removal
- inner glove removal
- field wash of hands and face

Additional decontamination specifications for PFAS compounds are detailed in Terraphase SOP 109-23-00-Field Equipment Decontamination. Workers should employ only applicable steps in accordance with level of PPE worn and extent of contamination present. The SSO shall maintain adequate quantities of clean water to be used for personal decontamination (i.e., field wash of hands and face) whenever a suitable washing facility is not located in the immediate vicinity of the work area. Disposable items will be disposed of in an appropriate container. Wash and rinse water generated from decontamination activities will be handled and disposed of properly. Non-disposable items may need to be sanitized before reuse. Each site worker is responsible for the maintenance, decontamination, and sanitizing of his/her own PPE.

Used equipment may be decontaminated as follows:

- An Alconox or TSP and water solution will be used to wash the equipment.
- The equipment will then be rinsed with clean water.

Each person must follow these procedures to reduce the potential for transferring chemically affected materials off site.

11 Medical Surveillance

Any field personnel engaged in project operations that expose them to hazardous wastes, hazardous substances, or any combination of hazardous wastes or hazardous substances shall be participants in a Medical Surveillance program that meet the OSHA requirements. These persons must be medically evaluated and cleared for use of respiratory protection devices and protective clothing for working with hazardous materials by the examining physicians. The medical clearance shall be current within one year through at least the last day of field operations. The applicable requirements under the OSHA standards for HAZWOPER and Respiratory Protection Program will be observed. Current copies of training certificates and statements of medical program participation for all Terraphase personnel are maintained by the Terraphase headquarters office.

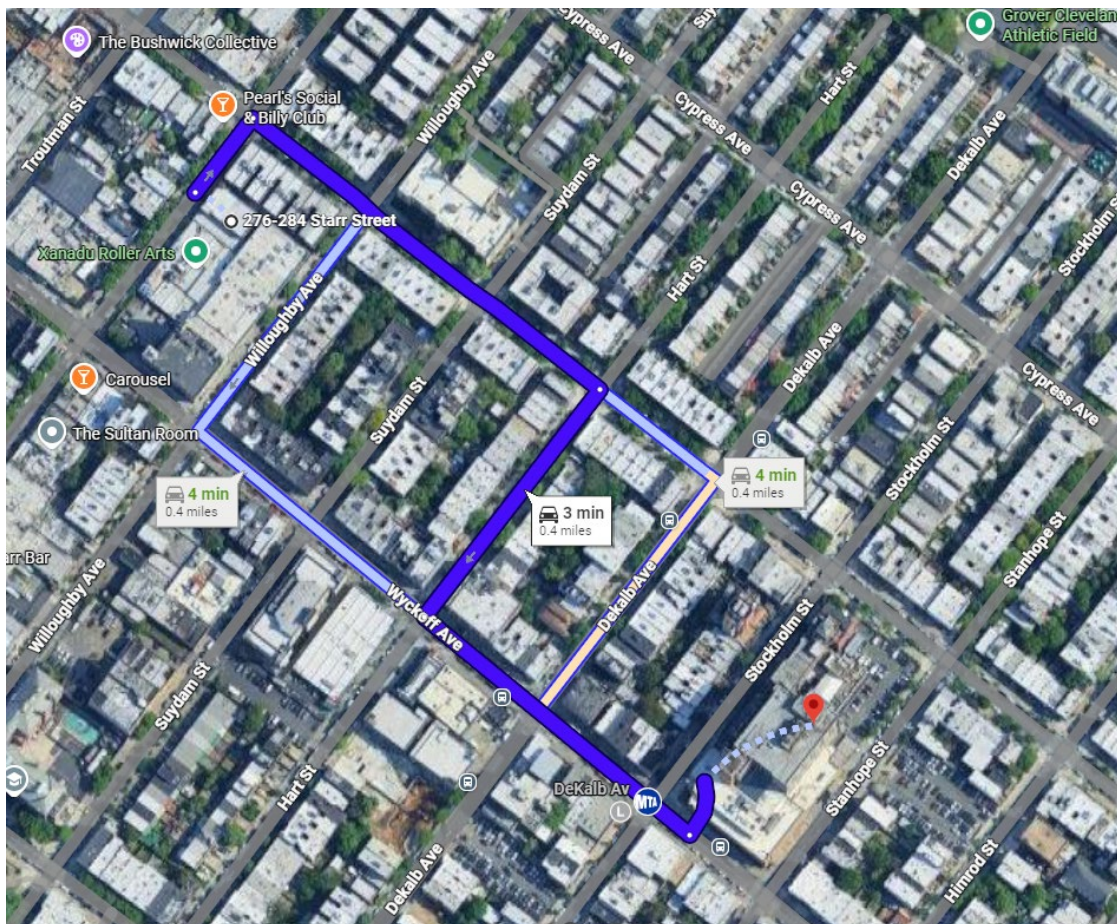
12 First Aid and Medical Treatment

All persons on site must report any near-miss incident, accident, injury, or illness to the SSHO. A trained site first aid provider will provide first aid. Injuries and illnesses requiring medical treatment must be documented. The SSHO must conduct an accident investigation as soon as emergency conditions no longer exist and first aid and/or medical treatment have been completed. All necessary reports must be completed and submitted to the Project Manager within 24 hours after the incident.

If treatment beyond first aid is required, the injured should be transported to the nearest medical facility off-site. If the injured is not ambulatory, or shows any sign of not being in a comfortable and stable condition for transport, then an ambulance/paramedics should be summoned. If there is any doubt as to the injured worker's condition, it is best to let the local paramedic or ambulance service examine and transport the worker.

The closest 24-hour medical facility is Wyckoff Heights Medical Center, as described below. A map of the driving directions is included on the next page and in Appendix D.

Directions to Wyckoff Heights Medical Center, 374 Stockholm St, Brooklyn, NY 11237 (Map in Appendix D)



276-284 Starr St

Brooklyn, NY 11237

↑ Head toward St Nicholas Ave

167 ft

↪ Turn right at the 1st cross street onto St Nicholas Ave

0.1 mi

↪ Turn right at the 3rd cross street onto Hart St

0.1 mi

↶ Turn left at the 1st cross street onto Wyckoff Ave

0.1 mi

↶ Turn left

i Destination will be on the right

102 ft

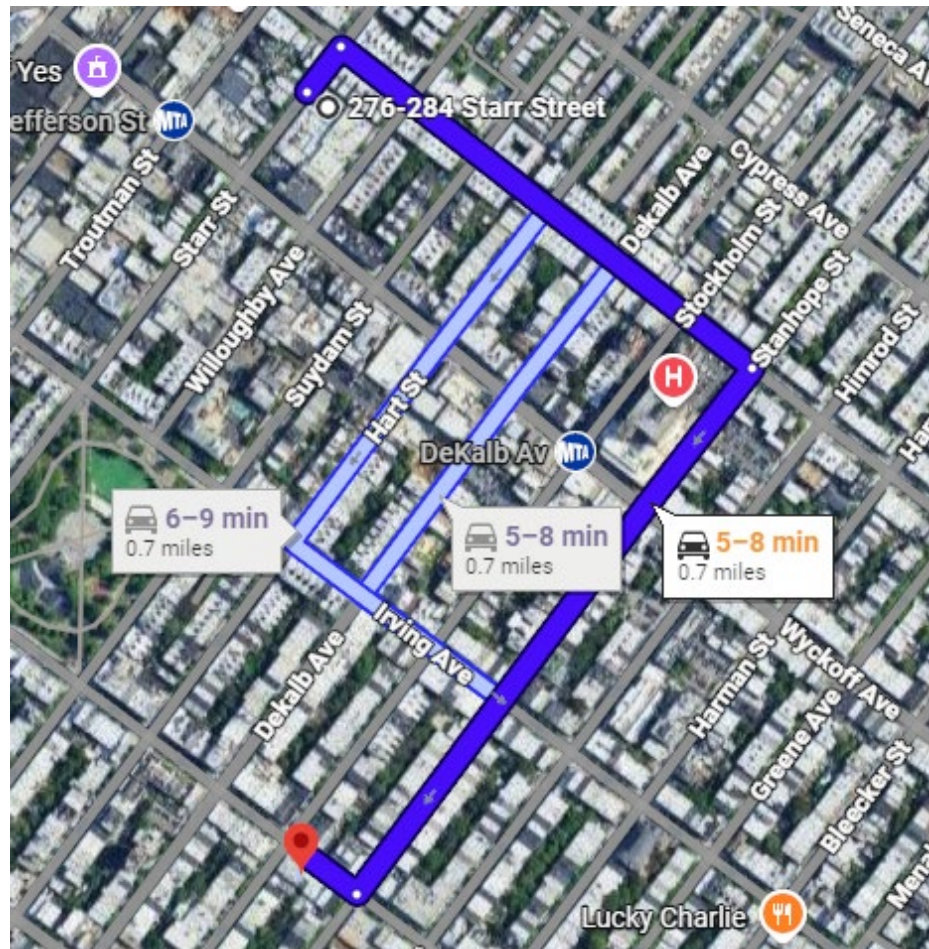
Wyckoff Heights Medical Ctr

374 Stockholm St, Brooklyn, NY 11237

2

The closest urgent care facility is White Plains Urgent Care, as described below. A map of the driving directions is included on the next page and in Appendix D.

Directions to ModernMD Urgent Care, 366 Knickerbocker Ave, Brooklyn, NY 11237 (Map in Appendix D)



276-284 Starr St

Brooklyn, NY 11237

↑ Head toward St Nicholas Ave

167 ft

↪ Turn right at the 1st cross street onto St Nicholas Ave

0.3 mi

↪ Turn right onto Stanhope St

0.4 mi

↪ Turn right onto Arie A. Bucheister Way/Knickerbocker Ave

i Destination will be on the left

164 ft

ModernMD Urgent Care - Bushwick

366 Knickerbocker Ave, Brooklyn, NY 11237

Appendix A

Contact Names and Phone Numbers



Emergency Contacts

Emergency Services (Police/Fire Department/Ambulance): 911

Wyckoff Heights Medical Center: (718) 963-7391 or (718) 963-7392

WorkCare 24-hour Telehealth Service: (888) 449-7787

National Response Center: (800) 424-8802

Poison Control Center: (800) 876-4766 or (800) 222-1222

CHEMTREC: (800) 424-9300

Terraphase

Conshohocken Office:

Office Number: (215) 297-3502

Princeton Office:

Office Number: (609) 236-8171

Corporate Health and Safety Officer: Daren Roth

Office Number: (925) 444-0555 x38

Cell Number: (925) 719-5496

Project Manager: Nicholas Krasnecky

Cell Number: (201) 552-0224

Project Leader/SSHO: Ellie Johnston

Cell Number: (267) 745-2611



Appendix B

HASP Review and Acceptance Form



HASP Review and Acceptance Form

All field personnel working on the site must be familiar with the HASP. By signing below, you confirm you have read, understand, and agree to abide by the HASP. Any questions regarding health and safety on this site may be directed to either the Project Leader/SSHO or Project Manager.

[illegible]

Appendix C

Safety Meeting Sign-In Sheets



Safety Meeting Sign-In Sheet

Conducted By: _____

Date: _____

Topics Discussed: _____

Concerns/Problems/Hazards: _____

Meeting Attendees	
Name	Company

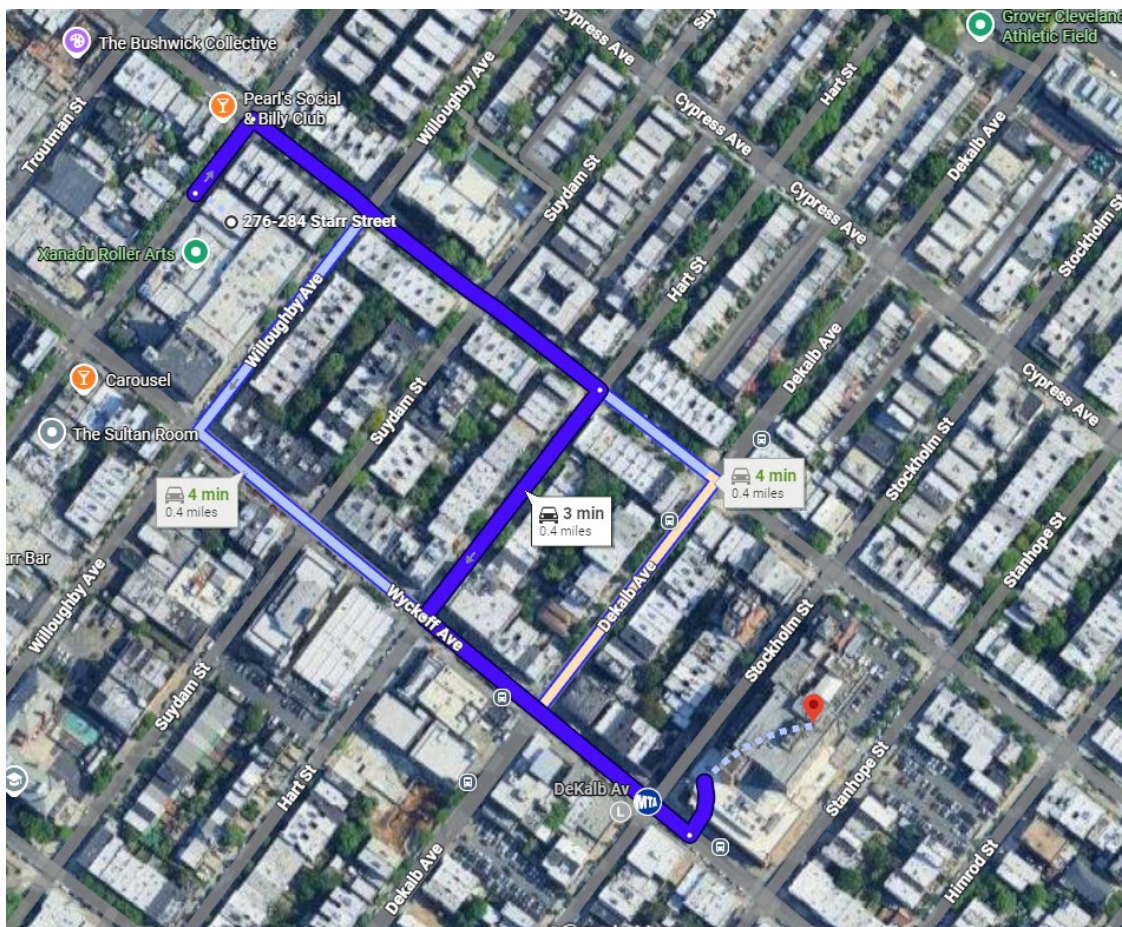


Appendix D

Driving Directions to Nearest Urgent Care or Hospital



Directions to Wyckoff Heights Medical Center, 374 Stockholm St, Brooklyn, NY 11237 (Map in Appendix D)



276-284 Starr St
Brooklyn, NY 11237

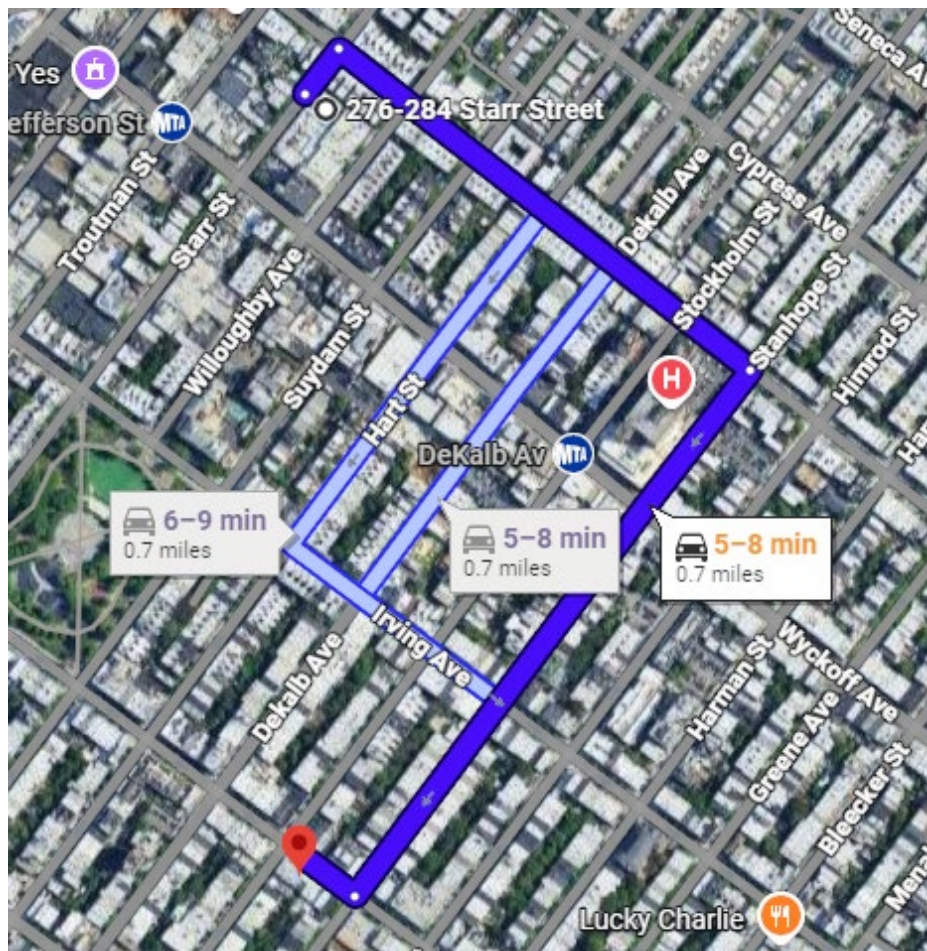
- ↑ Head toward St Nicholas Ave
167 ft
- ↪ Turn right at the 1st cross street onto St Nicholas Ave
0.1 mi
- ↪ Turn right at the 3rd cross street onto Hart St
0.1 mi
- ↩ Turn left at the 1st cross street onto Wyckoff Ave
0.1 mi
- ↩ Turn left
i Destination will be on the right
102 ft

Wyckoff Heights Medical Ctr
374 Stockholm St, Brooklyn, NY 11237



The closest urgent care facility is White Plains Urgent Care, as described below. A map of the driving directions is included on the next page and in Appendix D.

Directions to ModernMD Urgent Care, 366 Knickerbocker Ave, Brooklyn, NY 11237 (Map in Appendix D)



Appendix H

Community Air Monitoring Program

Appendix 1A

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.

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. “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 baling/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 (DEC 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/m^3) 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 $150 \text{ mcg}/\text{m}^3$ 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 $150 \text{ mcg}/\text{m}^3$ 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 $150 \text{ mcg}/\text{m}^3$ of the upwind level and in preventing visible dust migration.

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

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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.

- 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.
- 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.
- 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 I

Estimated Project Schedule

