DRAFT

REMEDIAL INVESTIGATION WORK PLAN

VOELKERS LANES APARTMENTS

1624, 1628, AND 1634 ELMWOOD AVENUE,
666, 668, 670 AND 680 AMHERST STREET,
155 MARION STREET
BUFFALO, ERIE COUNTY, NEW YORK

Prepared for:

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1.0 INTRODUCTION

This Remedial Investigation Work Plan (RIWP) document presents details of work activities designed to support a Remedial Investigation (RI) at the Voelkers Lanes Apartments Site (Site) located at 666, 668, 670 and 680 Amherst Street; 1624, 1628 and 1634 Elmwood Avenue; and 155 Marion Street in the City of Buffalo, New York (refer to **Figure 1**). The 1.69 -acre site includes the following parcels:

Parcel Address	Tax ID (SBL)	Acreage
1624 Elmwood Ave	89.21-7-7	0.0328
1628 Elmwood Ave	89.21-7-6.2	0.166
1634 Elmwood Ave	89.21-t-6.1	0.0752
666 Amherst Street	89.21-7-11	0.084
668 Amherst Street	89.21-7-10	0.0879
670 Amherst Street	89.21-7-9	0.077
680 Amherst Street	89.21-7-8	0.852
155 Marion Street	89.21-7-5	0.3177

The Site is located in the City of Buffalo, approximately 1.6 miles east of the Niagara River, less than 0.35 miles north of Scajaquada Creek, and about 1.4 miles northwest of the Buffalo Zoo. The topography is relatively flat and sloping southwest. The Site is approximately 600 feet above sea level and is located at latitude 42° 56' 27" N; Longitude -78° 52' 45" W.

A preliminary BCP project schedule is provided in **Figure 2** and a boundary survey map of the Site is provided in **Figure 3**. The Brownfield Cleanup Program (BCP) applicant, Voelkers Apartments LCC, plans to remediate the Site upon acceptance in the BCP program in preparation for redevelopment of the property.

Environmental assessments and investigations conducted on the Site concluded that there are impacted soils across the Site due to the former uses and the presence of impacted urban fill. Previous Phase II Environmental Site Assessments (ESA) identified site soils that have been impacted with metals and polycyclic aromatic hydrocarbon (PAH) related compounds that exceed NYSDEC Part 375 Restricted Residential SCOs. Elevated volatile organic compounds (VOC) were identified in soil vapors during a Phase II ESA sub-slab soil vapor investigation beneath two of the Site buildings that have since been demolished. Elevated VOCs were also identified during the Phase 2 ESA in soil vapor probe samples from locations exterior to Site buildings. Historical use and previous environmental investigations suggest petroleum, solvents and possible PCB impacts may also exist at the Site.

The purpose of the RI phase of the BCP is to address the following activities and requirements:

- Obtain environmental data from the site under site specific quality assurance/quality control (QA/QC) for sampling, analyses, and data evaluation.
- Provide plans and approaches for health and safety and air monitoring for field activities.
- Summarize previous environmental assessments and investigations.
- Describe and illustrate the physical conditions of the site including surface waterbodies, ecological receptors, significant utility corridors.
- Tabulate and illustrate a proposed sampling plan and results to include location, matrix, depth, analytes, methodologies, rationale, and QA/QC.
- Provide a schedule of activities and details of the proposed investigation team.

- Describe the areas of concern including impacted soil, fill material, groundwater and soil vapor.
- Determine the necessity of a fish and wildlife impact analysis and, if required, gather data to evaluate impacts.
- Complete a qualitative exposure assessment for human health and fish/wildlife resources.
- Ensure (1) field work is sufficiently comprehensive to evaluate natural attenuation of groundwater, as applicable, and (2) all waste derived from field work is managed in a manner that does not negatively impact human health and the environment.

1.1 SITE DESCRIPTION AND HISTORY

The eight parcels composing the Site border one another in a rectangular layout and are collectively 1.69-acres in size. Refer to **Figure 5** parcel map. The general parcel descriptions are as follows:

- **680 Amherst Street** Is an irregularly shaped parcel spanning 0.852 acres. A vacant structure was recently demolished that occupied the majority of the property and formerly operated as a bowling alley. An underground storage tank (UST) at 686 Amherst Street, which is now the eastern portion of 680 Amherst Street, and east of the former structure, was removed in May 2003. During the removal of the 5000-gallon heating oil tank, soil contamination was discovered and the spill was assigned #0375107. Approximately 160 tons of contaminated soil were removed from the site and samples were taken around the hole from the tank. The results came back below regulatory guidance and the spill was subsequently closed in September 2003. The parcel abuts Marion Street, the 155 Marion Street parcel and the 1628 Elmwood parcel to the north, Elmwood Ave to the west, Amherst Street to the south, and the 670 Amherst Street parcel to the east.

- **1628 Elmwood Avenue** Is a rectangularly shaped parcel spanning 0.166 acres. It contains a structure on the entirety of the property that is a vacant warehouse. The structure was formerly used by a neon sign making company. The structure is one story and is empty. The parcel abuts 1634 Elmwood Avenue parcel to the north, Elmwood Avenue to the east, the 1624 Elmwood Avenue and 680 Amherst Street parcel to the south, and west.

- **155 Marion Street** Is a rectangularly shaped parcel spanning 0.318 acres. It contains a vacant, one-story structure that occupies the western portion of the parcel. The structure formerly operated as an autobody shop. Most of the remainder of the property is developed as asphalt parking spaces. A hydraulic lift is located in the separate garage area. The building is empty with the exception of some minor debris and empty drums. The parcel abuts Marion Street to the north, a portion of the 680 Amherst Street parcel to the east, the 668, 670, and 680 parcels to the south, and the 141 Marion Street parcel to the west.

- **1634 Elmwood Avenue** is a rectangularly shaped parcel spanning 0.075 acres. It was previously residential and is currently vacant land. Construction and demolition debris are embedded in the ground throughout the parcel. The parcel abuts Marion Street to the north, Elmwood Ave to the east, 680 Amherst Street parcel to the west and 1624 Elmwood Avenue parcel to the south.

- **1624 Elmwood Avenue** is a rectangularly shaped parcel spanning 0.033 acres. The entirety of the parcel is currently hardscaped and used for parking. The property previously contained a storefront in the 1950's. The property abuts the 1628 Elmwood Avenue parcel to the north, Elmwood Avenue to the east, and the 680 Amherst Street parcel to the south and west.

- **670 Amherst Street** is a rectangularly shaped property spanning 0.077 acres. The entirety of the parcel is hardscaped and used for parking. The parcel appears to have been developed as a parking lot since at least 1950. The parcel abuts 155 Marion Street parcel to the north, the 680 Amherst Street parcel to the east, Amherst Street to the south, and the 668 Amherst Street parcel to the west.

- **668 Amherst Street** is a rectangularly shaped parcel spanning 0.0879 acres. Much of the parcel is vacant land, with a portion of the north side a parking lot. The parcel previously contained a storefront from 1916 to 1950 and was then mixed use as both commercial and residential. An earlier structure appears to have been demolished sometime in 2021.

- **666 Amherst Street** is a rectangularly shaped parcel spanning 0.084 acres. The entirety of the parcel is vacant land and there appears to be construction and demolition debris embedded in the ground throughout the parcel. The parcel was developed with residential structures as early as 1916. The structures appear to have been demolished sometime in 2021.

Historic documentation indicates that an auto repair shop was located on the former 155 Marion Street parcel. Municipal records indicate installation of presumed Underground Storage Tanks (USTs) at 155 Marion Street in unknown locations. Specifically, one 1,000-gallon fuel tank was installed in 1946 and one additional 1,000-gallon fuel tank was installed in 1955. Historic documentation indicates that there were historic uses as a former dry cleaners and auto repair shop at 1630 Elmwood Avenue which is now part of parcel 1628, which represents a potential vapor concern. Aboveground Storage Tanks (ASTs) used for fuel oil storage as well as staining proximate to floor drains and cracks in the floor were identified in the basement of the former 680 Amherst Street parcel during site reconnaissance. This could represent a release to the environment. Urban fill material was identified during Phase II ESAs across the Site.

1.2 CONTEMPLATED USE OF THE SITE

Voelkers Apartments LCC plans to construct a mixed-use, 275-unit development at the Site. The development will contain low-income housing in a City Block style mixed-use building. This City block building will front Elmwood Avenue, Amherst Street, and Marion Street.

1.3 PROJECT ORGANIZATION

The following personnel constitute the primary members of the project team:

Project Manager – Jason M. Brydges, P.E.
Engineers – John Berry, P.E., and Jason M. Brydges, P.E.
Project Staff and Field Technicians – Alexis Palumbo-Compton, E.I.T. and Paul Staub, E.I.T.
Health and Safety Officer – Jason M. Brydges, P.E.
QA/QC – John Berry, PE
Project Geologist – John Boyd
Biologist – Craig Ferris
Attorney – Deborah J. Chadsey

2.0 GOALS AND OBJECTIVES

2.1 RI GOALS

In general, an RI has the following goals as listed in New York Codes, Rules, and Regulations (NYCRR) Part 375-1.8(e)(1):

- Delineation of the areal and vertical extent of the contamination emanating from all media at the Site and the nature of that contamination;
- Characterization of the surface and subsurface characteristics of the Site, including topography, surface drainage, ecological resources, stratigraphy, depth to groundwater, and any aquifers that have been impacted or have the potential to be impacted;
- Identification of the sources of contamination, the migration pathways, and actual or potential receptors of contaminants;
- Evaluation of actual and potential threats to public health and the environment; and,
- Production of data of sufficient quality and quantity to support the necessity for, and the proposed extent of, remediation and to support the evaluation of proposed alternatives.

2.2 SPECIFIC OBJECTIVES

Based on the data collected to date and history of the Site, RI activities have been developed that will allow for further assessment of fill material and depth of native soil, depth to bedrock, and depth to groundwater. Specific objectives for the RI are as follows:

- Conduct building environmental condition assessments related to building Pre-demolition/renovation, as necessary, that may include asbestos containing material (ACM), lead-based paint (LBP), and other indoor hazardous materials within the existing structures;
- Perform additional soil borings/test trenches at the Site focusing on impacted areas identified during previous sampling efforts and areas not investigated. Borings or test trenches will better delineate contamination and confirm depth of fill, native soil, groundwater, and bedrock, if sufficiently shallow.
- Focus on identifying former underground storage tank (UST) locations by use of geophysics to determine if USTs are still present;
- Install and sample groundwater wells to assess potential contamination and its sources (i.e., on or off-Site), direction of groundwater flow, and potential impacts.
- Perform a hydraulic assessment of the groundwater in the subsurface using the installed wells;
- Install/sample soil vapor probes to assess potential impacts from historic UST areas and determine if soil vapor intrusion (SVI) is a concern; and,
- Fill in any data gaps resulting from previous assessments.

To the extent possible, RI field work will also include the identification of any significant structures, sensitive areas, or appurtenances that could have an impact on contaminant migration or future remedial action such as any existing stormwater and/or sewer lines.

2.3 CONTAMINANTS AND AREAS OF CONCERN

Based on the findings related to historic use of the Site and previous investigations, contaminants of concern (COCs) in the soils are semi-volatile organic compounds (SVOCs), and metals. SVOCs identified are mostly polycyclic aromatic hydrocarbons (PAHs) in multiple locations across the Site above restricted residential soil cleanup objectives (SCOs). Metal exceedances identified include lead, mercury and cadmium. The potential for chlorinated solvents and petroleum/PCBs exists due to historic petroleum use in connection with the Site and will also be assessed in site soils and groundwater. The full suite of soil contaminants as identified in 6 NYCRR Part 375 (revised 12/31/25) will be analyzed during the RI. Groundwater samples will also be analyzed for the full suite of contaminants per NYSDEC Division of Water TOGS. Soil vapor will be analyzed for TO-15 parameters. See **Figure 4** for previous Phase 2 ESA boring/sampling locations and sample analytical exceedance results.

3.0 PAST ENVIRONMENTAL ASSESSMENTS/INVESTIGATIONS

Various Environmental assessments have occurred on the property including the following:

May 2019 Phase I ESA, completed by TurnKey

A Phase I ESA was previously completed by TurnKey Environmental Restoration, LLC in May 2019. The report included the Site parcels (shown under Property 2 below) in this report as well as 1609 Elmwood Avenue and 111 and 141 Marion Street. The RECs found in this report for each property assessed are as follows:

Property 1 (1609 Elmwood Avenue):

- Thorough Dry Cleaners, a presumed dry-cleaning operation, occupied a former building on the southern portion of Property 1 (current asphalt parking lot area) from at least 1935 through at least 1955.

Property 2 (668, 670, 680 Amherst Street, 1624, 1628, and 1634 Elmwood Avenue and 155 Marion Street):

- Current operations include automotive repair with the storage and use of hazardous/regulated materials. Historic operations have included automotive repair and/or a collision shop, a trucking company, an electrical equipment company, tool manufacturing, a machine shop, refrigeration service and laundry/laundromat facilities with the potential for dry cleaning. In addition, a portion of a railroad spur was formerly located on-site.

- Floor drains located within current repair areas and a paint room in Building 5 (155 Marion Street) reportedly discharge into the municipal sanitary sewer system.

- Black staining/spillage was noted to concrete ground surfaces proximate to a floor drain within Building 5 (155 Marion Street).

- Additional black staining was noted to concrete ground surfaces proximate to fuel oil ASTs within the basement of Building 2 (680 Amherst Street). Some of the staining was noted proximate to cracks in the concrete floor. In addition, a floor drain was noted proximate to the staining.

- A petroleum odor was noted within the basement of Building 2 (680 Amherst Street) proximate to the fuel oil ASTs.

July 2019 Phase II ESA, completed by TurnKey

A subsequent Phase II ESA was also completed by TurnKey in July 2019 to investigate the previously identified RECs. Property 2 includes the Site parcels. The conclusions are as follows:

- On-Site fill materials (i.e., urban fill containing significant amounts of non-soil debris) identified across the Site would be considered solid waste undercurrent NYSDEC solid waste regulations if removed from the property and would therefore need to be properly disposed of if removed from the Site for geotechnical or other redevelopment purposes.

- The P1SB-4/4W area at Property 1 (1609 Elmwood Avenue) proximate to the former dry cleaner where solvent-like odors and elevated PID readings were identified should be properly addressed via remedial excavation during construction activities. Due to the history of dry cleaning at Property 1 with field evidence of solvent-like impacts identified, if Building 1 is to remain, a Soil Vapor Intrusion Assessment should be completed within Building 1 to assess the potential for impacted breathing air within the building. Installation of an active sub slab depressurization (ASD) system would be required to address VOC-impacted air within the existing or future buildings at Property 1.

- NYSDEC regulations require proper removal of the existing UST at Property 2, the two existing USTs at Property 3 and any orphan USTs encountered during the redevelopment project; the USTs and any impacted soil, groundwater or other materials encountered during the work should be removed in accordance with applicable local, state and federal regulations. Based on field

December 2023 Phase I ESA, completed by BE3

A Phase I ESA was completed in December 2023, for 666, 668, 670, and 680 Amherst Street, 1624, 1628, and 1634 Elmwood Avenue, and 155 Marion Street. The following RECs, HRECs, and BERs were identified:

The following RECs are associated with the subject properties as follows:

- REC – Historic uses as an auto repair shop at 155 Marion Street represents a REC for the subject properties. Municipal records indicate installation of presumed USTs at 155 Marion Street in unknown locations. Specifically, one 1000-gallon gas tank was installed in 1946 and one additional 1,000-gallon tank was installed in 1955.
- REC – Historic uses as a former dry cleaners and auto repair shop at 1630 Elmwood Avenue may represent a potential vapor concern.
- REC – ASTs in the basement of 680 Amherst used for fuel oil storage as well as staining proximate to floor drains and cracks in the floor could represent a release to the environment.
- REC – Suspected USTs adjacent to the Site at 141 Marion Street represent a REC for the subject properties due to the unknown status of the tanks and proximity.

The following HREC is associated with the Site as follows:

- HREC - The Voelker's Bowling Center UST at 686 Amherst Street, which is now the eastern portion of 680 Amherst Street, was removed in May 2003. During the removal of the 5000-gallon heating oil tank, contamination was discovered and the spill was assigned #0375107. Approximately 160 tons of contaminated soil was removed from the site and samples were taken around the hole from the tank. The results came back below regulatory guidance and the spill was subsequently closed in September 2003. Even though the spill appears to have been adequately cleaned, it is still considered an HREC for the subject properties.

The following BERs are associated with the subject properties as follows:

- BER – Historic adjacent property uses near the subject properties including dry cleaners located at 1611 Elmwood Avenue and a filling station located at 1602 Elmwood Avenue may represent a potential vapor concern.
- BER – On-Site fill material (i.e., urban fill containing significant amounts of non-soil debris) identified in the Phase II ESA by TurnKey in July 2019 across the Site is considered a BER for the subject properties.

April 2024 Phase II ESA, completed by BE3

A subsequent Phase II ESA was also completed in April 2024 to investigate the previously identified RECs and assess eligibility for the BCP. The subsurface soil assessment identified the existence of fill materials across the site down to at least 4 feet below ground surface (bgs). Material such as construction and demolition debris, black clayey silts, cinder, and coal were observed in each of the soil borings advanced as part of the April 2024 Phase II ESA. Soil sample laboratory results indicate that there are urban fill conditions existing at the property with several elevated metals and polycyclic aromatic hydrocarbon (PAH) compounds above the restricted residential NYSDEC Soil Cleanup Objective (SCO) which require remediation to allow for the anticipated future use of the property. Specific metals include lead and mercury; and specific SVOCs (PAHs) include benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, fluoranthene, indeno(1,2,3-cd)pyrene, phenanthrene, and pyrene (see **Figure 4**).

January 2026 Phase II ESA, completed by BE3

A subsequent Phase II ESA was completed in January 2026 to investigate the previously identified RECs and assess eligibility for the BCP. The subsurface soil assessment identified the existence of fill materials across the site down to at least 3 feet below ground surface (bgs). Material such as construction and demolition debris, black clayey silts, cinder, and coal were observed in each of the soil borings advanced as part of the January 2026 Phase II ESA. Soil sample laboratory results indicate that there are urban fill conditions existing at the property with several elevated metals and PAH compounds above the restricted residential NYSDEC SCO which require remediation to allow for the anticipated future use of the property. Specific metals include cadmium, lead, and mercury; and specific SVOCs (PAHs) include benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, and phenanthrene. See **Figure 4** and **Appendix F** for all past investigation analytical results..

4.0 INVESTIGATION SCOPE OF WORK

4.1 INTRODUCTION

The investigation will include a geophysical investigation; soil sampling/analysis; groundwater sampling/analysis; groundwater hydraulic assessment and soil vapor sampling/analysis (refer to **Figure 6**). All investigation field work will be completed in accordance with the Health and Safety Plan (HASP) in **Appendix A** and the Community Air Monitoring Program (CAMP) in **Appendix B**. It is anticipated that the RI can be completed in a single phase and include the following:

- Geophysical survey to locate and assess former UST locations;
- Soil investigation to include surface soil, soil borings/test trenches, sampling, and chemical analysis;
- Groundwater investigation, to include well installation, sampling, chemical analysis, and hydraulic assessment;
- Soil vapor investigation to include soil vapor probe installation, sampling, and chemical analysis; and,
- Building Hazardous materials and universal waste survey/assessment.

These activities will be documented as daily reports and presented in the remedial investigation report (RIR). Daily reports will also be submitted to NYSDEC and NYSDOH at the end of the following day.

Any deviations from the RIWP will be reported to the NYSDEC Project Manager as soon as possible and documented in the RIR.

4.2 GEOPHYSICAL ASSESSMENT

Prior ESAs indicated underground storage tanks (USTs) may remain in the former parking lot area east of the existing building on the 155 Marion Street parcel of the Site. A geophysical survey will be conducted in this area (see **Figure 6**) and will entail the use of a highly sensitive metal detector (i.e., Geonics EM61) or a Ground Penetrating Radar (GPR) instrument to survey the near surface for the presence of metallic or metal-containing objects. The geophysics survey will be conducted prior to the soil boring investigation. The investigation will be conducted by establishing a grid line spacing across the surface of the agreed upon area to detect ferrous metals. Anomalies that may be related to buried USTs, metal pipes, or metal fill material will be recorded and annotated on a site map. The advantage of conducting a non-invasive survey is that information concerning the possible identity and location of buried metal objects can be ascertained without property disturbance or the risk of disturbance or puncture and release of product.

4.3 SURFACE, SUBSURFACE/SUB-SLAB SOIL

Surface and subsurface assessments have been conducted during previous investigations (Refer to Section 3.0). As such, the objective of the RI soil assessment will be to use the previous assessment data as guidance to complete additional borings/sampling in areas of concern identified in previous assessments. A total of 22 soil borings and six (6) test trenches will be completed. The borings will be spread out with a focus on (1) previously identified impacted areas, (2) areas where investigation has not been conducted, and (3) areas where previous historical operations may have impacted the site. Test trenches will be completed where USTs may be located in the geophysical survey area (See **Figure 6**). The precise sampling locations will be based on field observations and photoionization detector (PID) readings and will specifically target potential contaminant features while ensuring that areas of concern are examined.

4.3.1 Surface Soil

At a minimum, to characterize exposures to site contaminants in surface soil, four (4) surface soil samples will be collected in the 0-2-inch interval below the vegetative cover at the Site and analyzed for full suite analysis (Part 375 Brownfields constituent list parameters) minus VOCs. The surface samples will be collected based on field observations of surface soils (see **Figure 6**).

4.3.2 Soil Borings – Subsurface Soil

The borings will be advanced to an estimated depth of between 8 to 12 feet bgs, to native soil, or refusal using Geoprobe® direct push technology. The borings will be advanced deeper than 12 feet if environmental impacts appear to continue deeper. During Phase II investigations, bedrock was not encountered. Continuous soil sampling will be conducted using a Geoprobe® with a two-inch diameter, 4-foot-long sampler. Visual observations and PID readings will be used to assess potential contaminant downward migration in the soil below the fill layer. If impacts are observed either by visual/olfactory observations and/or PID readings, the boring will be advanced as deep as possible based on equipment location and limitations. If no impacts are identified in a soil boring, samples will be collected from the bottom interval of the bore or from immediately above confirmed confining layers. Based on the Phase 2 program an urban fill layer (mix of brick, stone and soil) was encountered at an average of 4 feet bgs. Native soil below the fill consists primarily red to brown stiff silty clay. Table 4.3.2 reflects these subsurface conditions. A minimum of 22 subsurface fill/soil samples and 10 native soil samples will be collected from soil borings. An additional five (5) soil samples will be collected during monitoring well boring installation for a total of 37 subsurface soil samples. All boreholes will be filled with indigenous soil or clean sand prior to leaving each location and backfilling of boreholes will follow DER-10 Section 3.3(e).

Table 4.3.2 Summary of Proposed Soil Sampling

Location	Boring Depths (ft bgs)	Proposed Sampling Depth (ft bgs)	Sampling	Target Analysis
RI-BH-1	12	0-4	Urban Fill Layer	TCL VOCs + TICs, TCL SVOCs + TICs, TAL Metals, PCBs, TCL Pesticides, 1,4dioxane, PFAS (PFOA/PFOS) Total Cyanide
		4-12	Native	
RI-BH-2 RI-BH-3 RI-BH-4/RI-VP-1	12	0-4	Urban Fill Layer	TCL VOCs + TICs, TCL SVOCs + TICs, TAL Metals, PCBs, TCL Pesticides, 1,4dioxane, PFAS (PFOA/PFOS) Total Cyanide

RI-BH-5	12	0-4	Urban Fill Layer	TCL VOCs + TICs, TCL SVOCs + TICs, TAL Metals, PCBs, TCL Pesticides, 1,4dioxane, PFAS (PFOA/PFOS) Total Cyanide
		4-12	Native	
RI-BH-6/RI-VP-2 RI-BH-7/RI-VP-3 RI-BH-8	12	0-4	Urban Fill Layer	TCL VOCs + TICs, TCL SVOCs + TICs, TAL Metals, PCBs, TCL Pesticides, 1,4dioxane, PFAS (PFOA/PFOS) Total Cyanide
RI-BH-9	12	0-4	Urban Fill Layer	TCL VOCs + TICs, TCL SVOCs + TICs, TAL Metals, PCBs, TCL Pesticides, 1,4dioxane, PFAS (PFOA/PFOS) Total Cyanide
		4-12	Native	
RI-BH-10	12	0-4	Urban Fill Layer	TCL VOCs + TICs, TCL SVOCs + TICs, TAL Metals, PCBs, TCL Pesticides, 1,4dioxane, PFAS (PFOA/PFOS) Total Cyanide
RI-BH-11/RI-VP-4 RI-BH-12/RI-VP-5	12	0-4	Urban Fill Layer	TCL VOCs + TICs, TCL SVOCs + TICs, TAL Metals, PCBs, TCL Pesticides, 1,4dioxane, PFAS (PFOA/PFOS) Total Cyanide
		4-12	Native	
RI-BH-13/RI-VP-6 RI-BH-14	12	0-4	Urban Fill Layer	TCL VOCs + TICs, TCL SVOCs + TICs, TAL Metals, PCBs, TCL Pesticides, 1,4dioxane, PFAS (PFOA/PFOS) Total Cyanide
RI-BH-15 RI-BH-16 RI-BH-17	12	0-4	Urban Fill Layer	TCL VOCs + TICs, TCL SVOCs + TICs,

		4-12	Native	TAL Metals, PCBs, TCL Pesticides, 1,4dioxane, PFAS (PFOA/PFOS) Total Cyanide
RI-BH-18 RI-BH-19 RI-BH-20	12	0-4	Urban Fill Layer	TCL VOCs + TICs, TCL SVOCs + TICs, TAL Metals, PCBs, TCL Pesticides, 1,4dioxane, PFAS (PFOA/PFOS) Total Cyanide
RI-BH-21/RI-VP-7 RI-BH-22/RI-VP-8	12	0-4	Urban Fill Layer	TCL VOCs + TICs, TCL SVOCs + TICs, TAL Metals, PCBs, TCL Pesticides, 1,4dioxane, PFAS (PFOA/PFOS) Total Cyanide
		4-12	Native	
RI MW-1 through RI-MW-5	16	8-16	Characterize Soil Surrounding Well Screens	TCL VOCs + TICs, TCL SVOCs + TICs, TAL Metals, PCBs, TCL Pesticides, 1,4dioxane, PFAS (PFOA/PFOS) Total Cyanide

4.3.3 Test Trenches

Test trenches will be installed in the area where the geophysical survey was conducted to uncover and assess suspected USTs area. Test trenches will be excavated with a backhoe and the average dimensions of each trench will be 4 feet wide, 6 to 8 feet long and 5 to 10 feet deep. Test trenches will be installed as close as possible to suspected USTs identified during the geophysical survey. If an UST is encountered, enough soil will be removed to try to determine the UST size and if the UST is, or has, leaked and impacted soil exists. Impacted soils will be sampled and if an UST fill port is uncovered the contents, if any, of the UST will be assessed where possible. If an UST is determined to be leaking a determination will be made, after consultation with the NYSDEC, if the UST will require immediate closure per DER-10 Section 5.5. Otherwise the UST will be recovered and closure undertaken as part of the future remediation. An estimated six (6) test trenches (TP-1 to TP-6) will be installed. If The geophysical survey does not indicate the presence of any USTs a determination will be made, after consultation with NYSDEC, if some of the test trenches will be replaced with soil borings. An estimated one soil sample will be collected from each test trench and analyzed for the target analysis parameters shown in Table 4.3.2. Additional soil samples may be collected where test trenches uncover USTs

The locations of the soil borings/trenches will be field located and are subject to accessibility and the location of underground utility lines. All soil borings/trenches will be advanced at a minimum distance of 2.5 feet away from marked utilities, where present, to reduce the possibility of accidentally damaging an underground line. All probe holes will be filled with indigenous soil or clean sand prior to leaving the location. An asphalt patch will be placed, as necessary. Test trench material will be returned to the trench in the order in which it was removed.

4.3.4 Soil Data Collection and Analysis

At each boring/test trench location the following will be recorded:

- Thickness and characteristics of the cover/fill material;
- Depth to bedrock, if encountered;
- Depth to groundwater, if encountered;
- Thickness and characteristics of the native soil, if encountered;
- PID screening results; and,
- Estimated depth of analytical samples collected.

A record will be made of soil stratigraphy and PID soil gas readings. Soil samples will be collected from locations showing the highest PID reading and/or visual/olfactory observations; and/or based on location. A detailed log of these records will be maintained to assist field personnel in selecting the most appropriate sample location, and to supplement future analytical results. Soil data will also be collected and recorded during installation of monitoring wells including soil sampling. These samples may include native soils and should be at screened intervals to allow for soil and groundwater data comparison. An estimated total of 51 samples including subsurface soil, test trench soil, surface soil, soil from well locations and QA/QC samples (estimated 4 samples) will be collected for laboratory analyses.

As per DER-10 Section 3.11(b)3, if more than one type of historic fill material is encountered in any boring/test trench, one sample is required for each type of fill material encountered. All soil samples collected from the borings/test trenches will be grab samples. Proposed soil samples to be collected are summarized in **Appendix C** – Quality Assurance/Quality Control Plan. Please note that any surface samples collected will originate from the top 2 inches of surface material below any vegetative or hardscape cover.

The soil samples will be analyzed by a NYSDOH environmental laboratory accreditation program (ELAP) certified laboratory that produces NYSDEC Category B data package deliverables. Data Usability Summary Reports (DUSRs) will be prepared for all samples. All samples will be analyzed for the full Part 375 Brownfields constituent list which includes the following along with the EPA analytical method:

- Target Compound List (TCL) VOCs + TICs (Method-8260).
- TCL SVOCs (Method-8270).
- Target Analyte List (TAL) Metals (including total mercury and hexavalent chromium) (Methods-6010/7470/7471).
  Cyanide Total (Method 9012)
- PCBs (Method-8082).
- TCL Pesticides (Method- 8081).
- 1,4-dioxane (Method-8270SIM).
- Per & Polyfluoroalkyl Substances (PFAS) (Method-1633).

Note: Surface soil samples will not be analyzed for VOCs.

Field equipment will be operated in accordance with standard practices and in a safe and efficient manner as to minimize any hydraulic system leaks or lubricant and fuel leaks (See **Appendix A** for details).

Additional field activities performed by the geologist/technician include proper labeling, packaging, delivering samples to the laboratory; supervising field operations; and completing boring/test trench logs, which can be performed in the office after recording field data in a logbook. The geologist/technician will update the Project Manager daily on progress in the field and results of the subsurface investigation. Major changes in the subsurface investigations will not occur unless approved by the Project Manager, who will also notify the Client and NYSDEC regarding project developments. A detailed description of the sampling methods is provided in **Appendix D** – Field Sampling Plan (FSP). A table which includes the analytical results compared to applicable SCOs and protection of groundwater will be provided in the RI report.

4.4 GROUNDWATER

During the 2019 Phase II investigation temporary groundwater monitoring wells were installed and indicated groundwater at approximately 9 bgs. To meet the BCP requirements to assess groundwater, a total of five (5) overburden groundwater monitoring wells will be installed using a conventional truck mounted drill rig with hollow stem auger drilling techniques (RI-MW-1 to RI-MW-5). Refer to **Figure 6** for locations Note that well locations may be revised in the field to accommodate logistics and previous PID detections). In addition, as noted in Section 4.3.2, five (5) soil samples will be collected for laboratory analysis during installation of the wells.

4.4.1 Well Construction

Each well will be installed to an approximate depth of 16 feet and will consist of a 2-inch inside diameter, schedule 40 PVC casing equipped with a well screen that is Schedule 40 pipe with 0.010 slot size and 10 feet in length. Place sand in the space between the borehole and the PVC screen and riser to the required depth then place bentonite and cement above the sand- pack. Place the sand in very slowly so it does not bridge in the well bore. Section 3.1 of **Appendix D** provides a step-by-step method of installing a groundwater well once a boring or augured hole has been drilled to a desired depth within the subsurface.

Wells will either be completed at the ground surface and covered with a curb box in current or future high traffic areas or be completed as a stick up, where the top of the well riser pipe extends approximately three feet above grade and be fitted with a lockable J-plug and protected by a vented, 4-inch diameter protective steel casing. The steel casing will be installed to a depth of approximately 2 feet bgs and anchored in a 2-foot by 2-foot concrete surface pad. Each steel protective casing will be fitted with a locking cap, keyed alike (for all three wells) lock, and labeled with permanent markings for identification. The concrete surface pad will be constructed around the protective steel casing to allow surface water to drain away from the well.

In accordance with DER-10 Section 3.3(e) ii (2), cuttings and spoil from boreholes used for the installation of a monitoring well cannot be reused on-site and require disposal. Therefore, all cuttings and spoil will be placed in sealed NYSDOT-approved drums and labeled for subsequent characterization and disposal. Disposal will be done in accordance with all RCRA standards.

A survey will be completed of the wells following installation to record the location and elevation of the well casing.

All fieldwork will adhere to the Health and Safety Plan provided in **Appendix A**.

4.4.2 Well Development

After installation of monitoring wells, but not within 24 hours, new wells will be developed in accordance with **Appendix D** – Section 3.2 and NYSDEC protocols. Initially, development water will be containerized in NYSDOT-approved drums and labeled per monitoring well location. If light non-aqueous phase liquid (LNAPL), dense nonaqueous phase liquid (DNAPL), odors, or sheen are encountered during well development, water will be properly characterized and disposed accordingly. Based on the RI groundwater analytical results, it will be determined, in consultation with NYSDEC, if the containerized development water is acceptable for surface discharge in the vicinity of the monitoring well being developed or requires subsequent on-site treatment and/or off-site disposal.

4.4.3 Groundwater Sampling

Sampling will commence as soon as adequate well recharge has occurred. It is recommended that purging and sampling occur at least 24 hours after development to allow for adequate recharge. Prior to sample collection, static water levels will be measured and recorded from all on-site monitoring wells to facilitate the preparation of an isopotential map. Following water level measurement, field personnel will purge and sample monitoring wells using a submersible pump or low-flow surface pump depending on well depth with dedicated pump tubing following low-flow/minimal drawdown purge and sample collection procedures provided in Sections 3.3 – Well Purging and 3.4 – Well Sampling of **Appendix D**. In the event of pump failure or the saturated unit does not permit the proper implementation of low-flow sampling, a dedicated polyethylene bailer will be used to purge and sample the well. Field measurements for pH, temperature, turbidity, DO, ORP, specific conductance and water level, as well as PID, visual and olfactory field observations will be periodically recorded and monitored for stabilization and health and safety purposes. Low-flow purging will be considered complete when the field measurements stabilize, and turbidity falls below 50 Nephelometric Turbidity Units (NTU) or becomes stable above 50 NTU regardless of volume purged. A second sampling event will be conducted approximately 3-6 months after this first sampling event to fully delineate the extent of contamination in groundwater.

Collected groundwater samples will be transported under chain-of-custody to a NYSDOH Environmental Laboratory Approval Program (ELAP)-certified analytical laboratory for the analyses indicated in Section 4.3.4.

4.4.4 Groundwater Sample Analyses

One groundwater sample will be collected from each of the four monitoring wells. Well development and sampling will be in accordance with **Appendix D** - FSP. Groundwater samples will be analyzed for the following Part 375 brownfield constituents:

- Target Compound List (TCL) VOCs + TICs (Method-8260).
- TCL SVOCs (Method-8270).
- Target Analyte List (TAL) Metals (including total mercury and hexavalent chromium) (Methods-6010/7470/7471).
  Cyanide Total (Method 9010)
- PCBs (Method-8082).
- TCL Pesticides (Method- 8081).
- 1,4-dioxane (Method-8270SIM).
- Per & Polyfluoroalkyl Substances (PFAS) (Method-1633).

Sample analysis will be in accordance with ASP, Cat B requirements. DUSRs will be completed for all samples. QA/QC requirements for all sample analysis are provided in **Appendix C** Quality Assurance/Quality Control Plan. Table 1 in Appendix C summarizes the number of Groundwater samples to be collected.

All detected sample concentrations will be included in a table and compared to NYSDEC Groundwater Standards (TOGS) as well as applicable standards, criteria, and guidance materials (e.g., Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances [PFAS]).

Table 5.3.4 Summary of Proposed Groundwater Monitoring Wells

Location	Estimated Depth (ft bgs)	Screen interval (ft bgs)	Target Analysis
RI-MW-1 To RI-MW-5	16	6-16	TCL VOCs + TICs, TCL SVOCs + TICs, TAL Metals, PCBs, TCL Pesticides, 1,4dioxane, PFAS (PFOA/PFOS)

4.4.5 Groundwater Flow/Hydraulic Assessment

A hydraulic assessment of the Site will be performed. Static depth to groundwater measurements will be obtained from the newly installed RI monitoring wells. Groundwater elevation data will be calculated and used to develop an isopotential map that will indicate the general direction of groundwater flow. Groundwater elevations will be relative to an arbitrary site-specific vertical datum and benchmark (e.g., fire hydrant)/survey). A well construction summary table will be prepared and include top of riser and grade elevations as well as construction depths (elevations) and materials.

If contamination is found in groundwater, in-Situ Hydraulic Conductivity Testing will be determined using the variable-head test method (“rising head”) (Bouwer and Rice Method, 1976). Hydraulic assessment includes the completion of hydraulic conductivity tests and the measurement of water levels in monitoring wells. Variable head tests will be completed using a stainless steel or PVC slug to displace water within the well or by removing water from the well with a bailer or pump. The recovery of the initial water level is then measured with respect to time. Data obtained using this test will be evaluated using procedures presented in “The Bouwer and Rice Slug Test - An Update,” Bouwer, H., Groundwater Journal, Vol. 27, No. 3, May-June 1989, or similar method.

4.5 SOIL VAPOR INVESTIGATION

Prior ESAs indicated underground storage tanks (USTs) may remain in the former parking lot area east of the existing building on the 155 Marion Street parcel of the Site and historic records indicate the existing building on 155 Marion was used for auto/trucking repair operations. Historic records also indicate that the existing building on the 1628 Elmwood parcel was used for auto repair, machine shop and laundry operations. Because of these historic operations a vapor intrusion investigation will be undertaken to assess possible impacts in these locations of the Site. Vapor probes will also be installed in additional soil borings to assess soil vapor conditions across the Site.

Soil vapor probes will be installed directly using a Geoprobe or in converted RI soil borings upon completion of boring and soil sampling.

Vapor samples will be collected from the following eight (8) soil vapor probe locations which are shown on **Figure 6**:

- RI VP-1 installed in soil boring RI BH-4;
- RI VP-2 installed in soil boring RI-BH-6;
- RI VP-3 installed in soil boring RI-BH-7;
- RI VP-4 installed in soil boring RI BH-11;
- RI VP-5 installed in soil boring RI-BH-12- floor slab area in 1628 Elmwood building;
- RI VP-6 installed in soil boring RI BH-13- floor slab area in 1628 Elmwood building;
- RI VP-7 installed in soil boring RI BH-21- Floor slab area in 155 Marion building; and,
- RI VP-8 installed in soil boring RI BH-22- Floor slab area in 155 Marion building.

Probe holes will be 2 inches in diameter and installed with a Geoprobe to between 8 and 10 feet bgs or, a minimum of one foot above the groundwater table. A ¼ inch PVC tube with a 3/8-inch stainless steel screen will be installed at the bottom of each probe hole. Vapor Point Installation diagrams will be developed. Porous sand will be backfilled around the screen to a two-foot depth (or less depending on total depth of the borehole) of each hole. Soil vapor probes will be sealed above the sampling zone with a bentonite slurry for a minimum distance of 3 feet and the remainder of the borehole backfilled with clean material in accordance with Final NYSDOH SVI 2006. Installation/sampling procedures will be in accordance with Section 2.7.1 of the October 2006, New York State Department of Health Guidance for Evaluating Soil Vapor Intrusion in the State of New York and its amendments. Eight (8) six (6) liter Summa canisters will be used to collect all samples by attaching a pre-calibrated/certified 24-hour flow controller to the summa canisters. Flow rates will not exceed 0.2 liters per minute to minimize outdoor air infiltration during sampling. A tracer gas will be used prior to collecting soil vapor samples to verify that an adequate seal has been achieved. NYSDEC Category B analytical data package deliverables will be provided. Vapor samples to be collected are summarized in Table 1 of **Appendix C** along with QA/QC requirements. Data Usability Summary Reports (DUSRs) will be completed for all samples. Soil vapor probes will be temporary.

All soil vapor samples will be analyzed for TCL VOCs by EPA Method TO-15.

4.6 BUILDING ENVIRONMENTAL CONDITION ASSESSMEMNT

The RI will also include: (1) an ACM survey; (2) an LBP survey (3) a PCB inventory assessment and (4) existing floor drain assessment for the building on the 155 Marion Street parcel and the building on the 1628 Elmwood Parcel.

4.6.1 ACM Survey

AMD Environmental Consultants, Inc. (NYS DOL # 56177), under subcontract to BE3, will provide New York State Department of Labor Certified Asbestos Inspectors to identify and quantify homogenous areas, and to collect bulk samples of each homogenous area within the building for laboratory analysis. Asbestos sampling activities will be conducted in accordance with guidelines and techniques identified in New York Code Rule 56. The samples will be sent to a laboratory approved by NYSDOH ELAP for subsequent analysis.

Layered building materials will be separated by layer into individual homogenous areas. The sampling event will include a visual examination to identify the location, approximate quantities, apparent condition, and friability of materials that are typically suspected to contain asbestos as identified in 12 NYCRR 56-5.1.

Bulk samples will be laboratory analyzed for the presence of asbestos, using polarized light microscopy (PLM). Samples that are determined by the laboratory to be non-friable organically bound (NOB) in nature and determined to contain less than one percent asbestos by PLM analysis, will also be analyzed by transmission electron microscopy (TEM). TEM analysis is required by the NYSDOH to conclusively determine that NOB materials contain less than one percent asbestos. An asbestos survey report will be completed for inclusion in the RI report.

4.6.2 Lead Inspection

BE3/AMD will provide EPA certified LBP Risk Assessors/Environmental Technicians to perform an LBP inspection of the interior and exterior surfaces of the buildings using X-Ray Fluorescence (XRF) analyzer. Surfaces will be classified as LBP using HUD criteria which defines LBP as any paint, varnish, stain, or other applied coating measuring 1.0 mg/cm^2 or 0.5 percent by weight or more of lead. All surfaces yielding inconclusive results during the XRF inspection shall be assumed positive for LBP. A report documenting the results of the LBP survey will be developed and included in the RI report.

4.6.3 PCB Survey

BE3/AMD will provide Environmental Technicians to identify transformer oils, lubricating oils, window caulks, and fluorescent light fixtures for suspect PCB containing materials and collect verification samples. The samples will be submitted to an accredited laboratory to determine the presence of PCBs and compare them against existing EPA standards. The survey will also investigate lighting ballasts for PCB related labelling and provide a count of fixtures that are not labelled as being non-PCB containing. A report will be developed for inclusion in the RI report. Note that analytical results from the PCB Survey will also complete DUSRs and be submitted to EQuIS, in accordance with the Quality Assurance/Quality Control Plan (QA/QC Plan (see also Section 8.0 DATA REDUCTION, VALIDATION, AND USABILITY of attached QA/QC plan.

4.6.4 Floor Drain Survey

A survey of any building floor drains will be conducted and contents characterized.

4.7 COMMUNITY AIR MONITORING PROGRAM

The CAMP provided in **Appendix B** is required to be implemented during all ground-intrusive activities. The CAMP generally involves real-time monitoring for VOCs and particulates at the upwind and downwind perimeter of the site. All CAMP exceedances will be reported to NYSDEC and NYSDOH's Project Managers the same day, or next business day if after hours, along with the reason for exceedance, what was done to correct it, and if the action was effective. All CAMP data will be provided in the Daily Field Reports (DFRs) and included in the Remedial Investigation Report (RIR) and Final Engineering Report (FER).

5.0 ADDITIONAL SUPPLEMENTAL FIELD INVESTIGATIONS

All the data generated during the RI will be evaluated to determine if additional investigation activities are needed beyond what is described herein. Additional assessment may include an additional subsurface boring and sample analysis limited to contaminants identified during the RI program.

If the nature and extent of contamination under the on-site building is unable to be investigated fully during the RI, a Supplemental Investigation may be required to fill data gaps after building demolition.

6.0 INVESTIGATION DERIVED WASTE MANAGEMENT

All investigation derived waste (IDW) will be containerized in NYSDOT approved 55-gallon drums on the day of generation and properly labeled within 48 hours. The anticipated sources of IDW include soil cuttings generated during well installation and groundwater resulting from well development/purging therefore IDW will be stored adjacent to each well location. IDW generated on site that cannot be disposed of on site will be containerized and disposed of at an approved facility typically during the remedial phase of the project following NYCRR Part 360 guidance. IDW will be managed in accordance with NYSDEC DER-10 Section 3.3e.

7.0 QUALITATIVE EXPOSURE ASSESSMENT

Qualitative exposure assessments will be completed in accordance with DER-10 sections 3.3(c) 3 & 4. The assessments will include what impacts site contaminants and field activities may have, if any, on human health and fish and wildlife resources considering all media (ground/surface water, soil, soil vapor, ambient air, and biota). Human health and ecological exposure impacts will be assessed as outlined in DER-10 Appendix 3B - Qualitative Human Health Exposure Assessment and Appendix 3C - Fish and Wildlife Resources Impact Analysis (FWRIA) Decision Key. The Appendix 3C Fish and Wildlife Resources Impact Analysis Decision Key is provided in **Appendix E**. No FWRIA is needed based on the completed decision key process. This determination is based on the following:

- The Site was a residential/commercial mixed-use zone (N-3C, N- 3E);
- The contamination at the site has very low potential to migrate into or impact any on or off-site habitat of endangered, threatened, or special concern species or other fish and wildlife resource; there are no critical habitats onsite, and the closest offsite habitat is more than ¼ mile away. with the Niagara River and Lake Erie more than 1 mile away per FEAF and Env. Resource Mapper.

The qualitative human health exposure assessment will evaluate the five elements (DER-10 Appendix 3B) associated with exposure pathways and describe how each of these elements pertains to the Site. The exposure pathway elements that will be addressed include:

- A description of the contaminant source(s) including the location of the contaminant release to the environment (any waste disposal area or point of discharge) or if the original source is unknown, the contaminated environmental medium (soil, indoor or outdoor air, biota, and water) at the point of exposure;
- An explanation of the contaminant release and transport mechanisms to the exposed population;
- Identification of all potential exposure point(s) where actual or potential human contact with a contaminated medium may occur;
- Description(s) of the route(s) of exposure (i.e., ingestion, inhalation, dermal absorption); and,
- A characterization of the receptor populations who may be exposed to contaminants at a point of

exposure.

As called for in DER-10 for volunteers in the BCP, sufficient field information and sampling data will be provided to identify the presence of contamination, if any, that maybe leaving the Site to support qualitative off-site exposure assessments by others. As part of the Qualitative Human Health Exposure Assessment in the Remedial Investigation Report, potential sensitive receptor populations such as nearby schools, daycares, nursing homes, and other community facilities will also be identified and evaluated.

8.0 REPORTING

An RI report will be prepared in accordance with the applicable requirements of DER-10 and Part 375. All validated RI data will be submitted to the NYSDEC EQuIS database.

A schedule is provided in **Figure 2**. It is anticipated that an RI report including a discussion of the results of all CAMP monitoring including any exceedances, alongside the reason for each exceedance, will be submitted to the NYSDEC and NYSDOH. The corresponding AAR that (1) evaluates remedial alternatives based upon the data obtained in the RI, and (2) contains the remedial action work plan (RAWP) as an appendix will be submitted following the RIR submission.

A Citizen Participation Plan (CPP) has been prepared for the Site (submitted under separate cover) in accordance with the requirements outlined in NYSDEC's DER-23 Citizen Participation Handbook for Remedial Programs, issued January 2010, as amended and submitted separately with the RIWP. The CPP provides for issuance of fact sheets and public meetings at various stages in the investigation/remedial process. A fact sheet will be prepared by NYSDEC to announce the availability of the RIWP for review, followed by a 30-day comment period. A public meeting will be held, if requested, during the public comment period.

The major components of the CPP are as follows:

- Names and addresses of the interested public as set forth on the Brownfield site contact list provided with the BCP application;
- Identification of major issues of public concern related to the site and that may be encountered during the remediation project;
- A description of citizens participation activities already performed and to be performed during remediation;
- Identification of document repositories for the project; and,
- A description and schedule of public participation activities that are either required by law or needed to address public concerns related to the Site.

Summaries of the RI investigation will be submitted to the NYSDEC as monthly progress reports as noted in Section XI of the BCA. Fact sheets documenting the goals and progress of the project will be prepared at key milestones during the project and distributed to those on the project mailing list. The distribution list is included in the CPP.

9.0 WORK PLAN CERTIFICATION

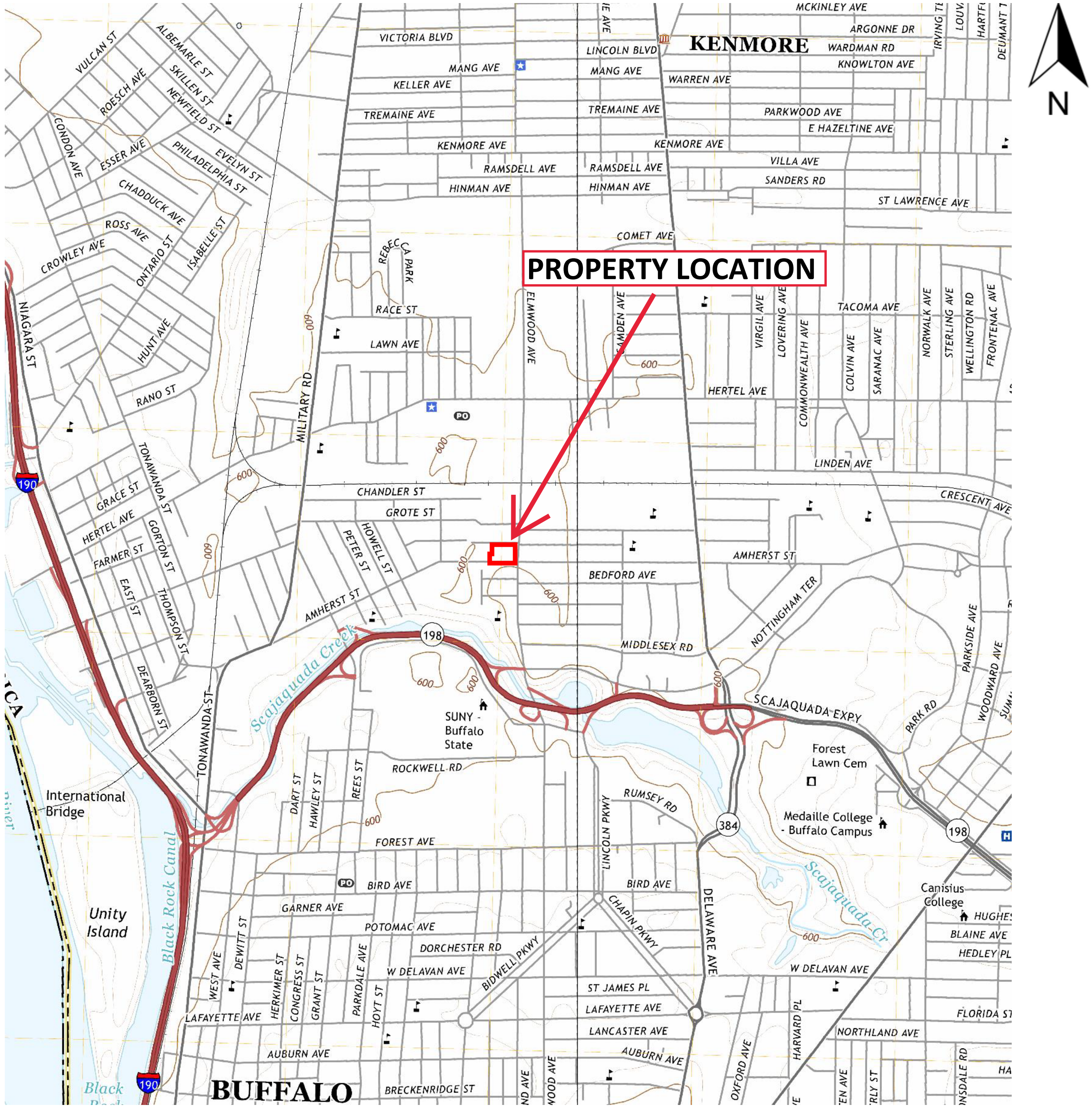
I Jason M. Brydges certify that I am currently a New York State registered professional engineers/Qualified Environmental Professional as defined in 6 NYCRR Part 375 and that this Remedial Investigation Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

____

Jason M. Brydges, P.E.

FIGURES

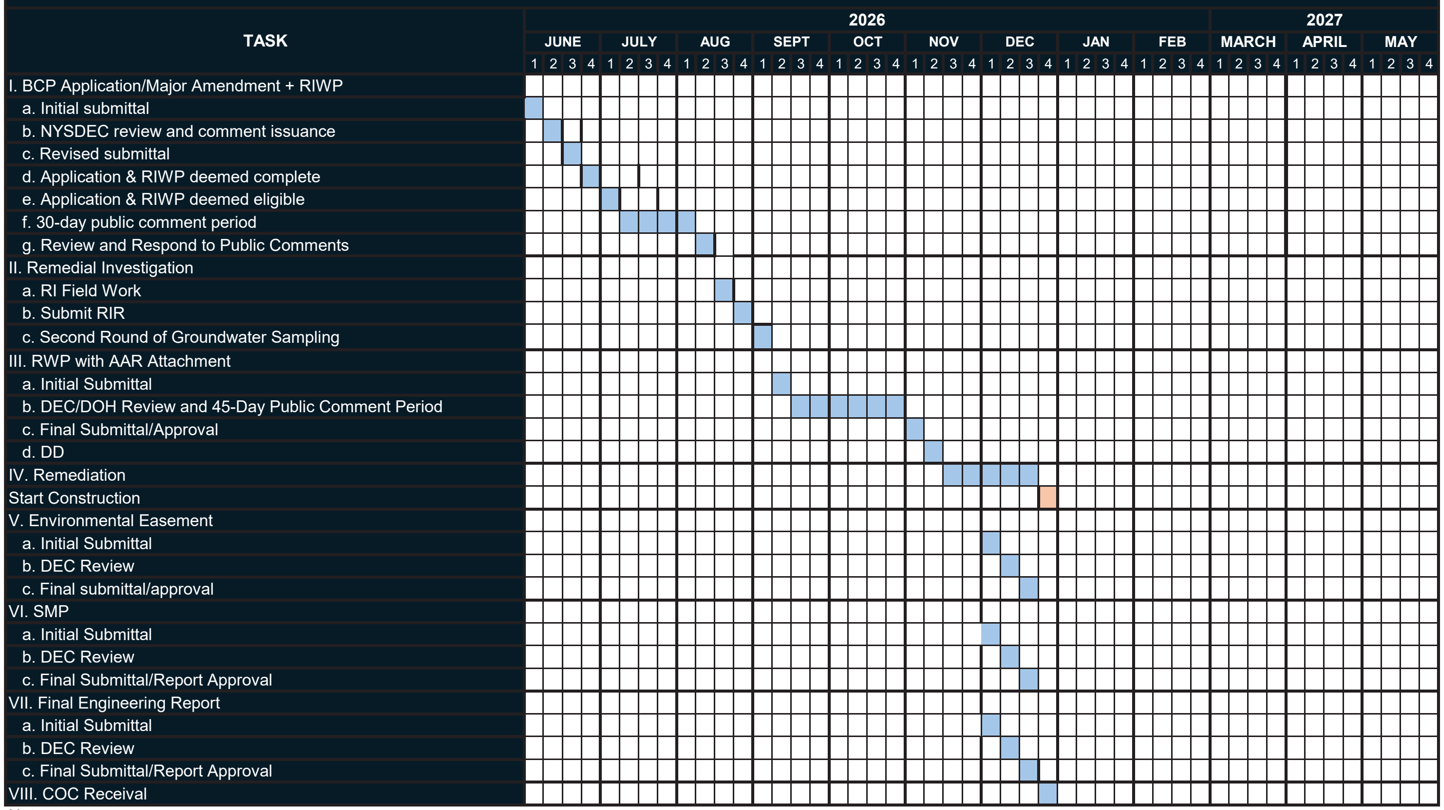
Figure 1: Historical Topographic Map



BE3 BRYDGES ENGINEERING IN ENVIRONMENT AND ENERGY, DPC	Figure 1: Property Location
Voelkers	3/28/2026
Buffalo, New York	SAA EVI MC Family, LLC

FIGURE 2 - PROJECT SCHEDULE - VOELKERS LANES APARTMENTS

BUFFALO, NY



Notes:

BCP - Brownfield Cleanup Program

DEC - Department of Environmental Conservation

DD - Decision Document

DOH - Department of Health

HFA - Housing Finance Agency

FER - Final Engineering Report

COC - Certificate of Completion

RWP - Remedial Work Plan

RIR - Remedial Investigation Report

RIWP - Remedial Investigation Work Plan

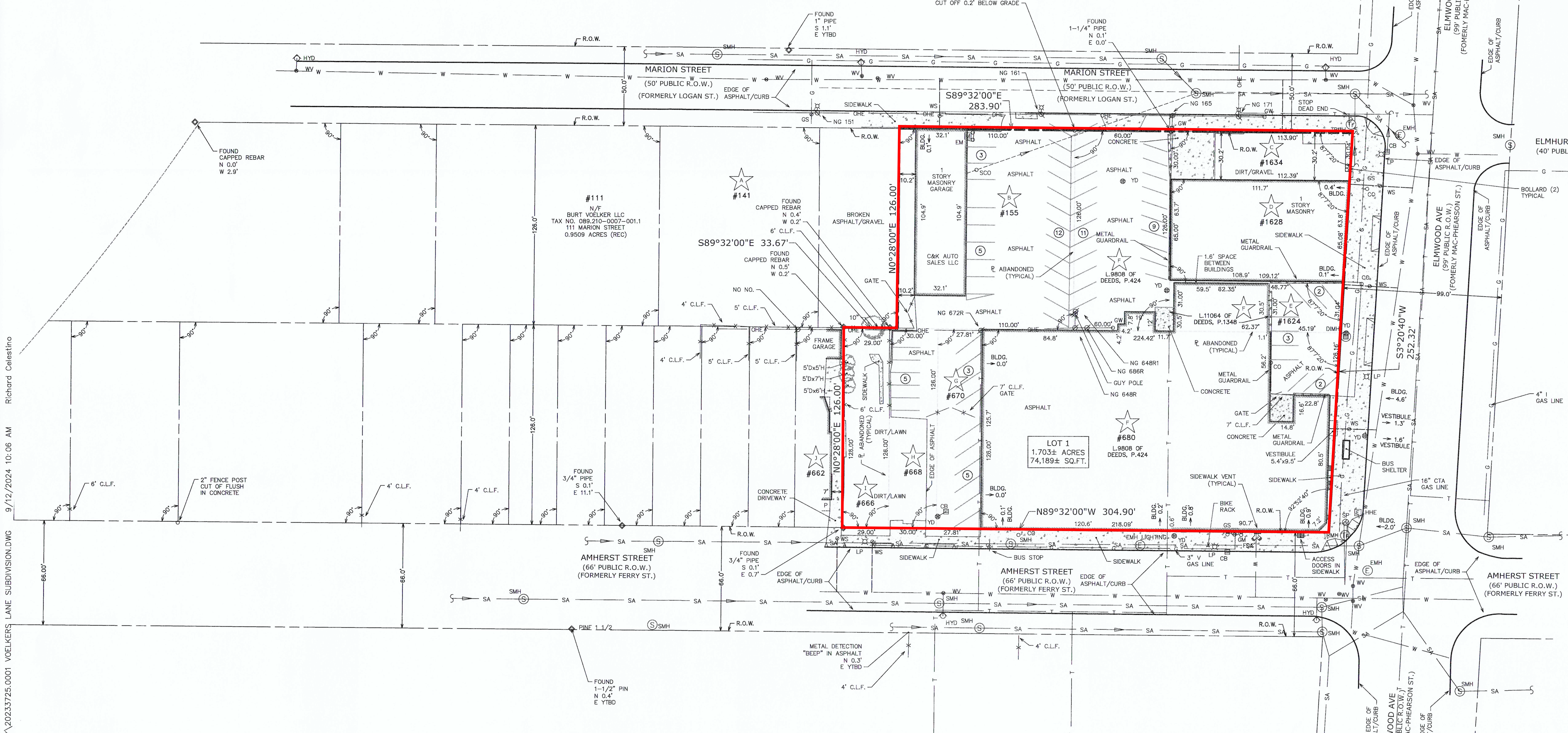
SMP - Site Management Plan

BCP Items

Funding Items

CITY OF BUFFALO						
☆	TAX ACCOUNT NUMBER	STREET ADDRESS	N/F = NOW OR FORMERLY	ACRES ±	LIBER OF DEEDS	PAGE
A**	089.210-0007-004.000	141 MARION ST.	LABRADOR BUILDING SYSTEMS INC	0.434	10,895	3,395
B	089.210-0007-005.000	155 MARION ST.	LABRADOR BUILDING SYSTEMS	0.318	10,344	674
C	089.210-0007-006.100	1634 ELMWOOD AVE.	BURT VOELKER LLC	0.078	11,416	8,404
D	089.210-0007-006.200	1628 ELMWOOD AVE.	LABRADOR BUILDING SYSTEMS INC	0.165	10509	418
E	089.210-0007-007.000	1624 ELMWOOD AVE.	BURT VOELKER LLC	0.033	11,342	6,385
F	089.210-0007-008.000	680 AMHERST ST.	AM-ELM REALTY INC.	0.858	11,064	1,348 AND L.9808, P.424
G	089.210-0007-009.000	670 AMHERST ST.	CHARLIE THE MAGNIFICENT LLC	0.080	11,416	8407
H	089.210-0007-010.000	668 AMHERST ST.	CHARLIE THE MAGNIFICENT LLC	0.087	11,416	8407
I	089.210-0007-011.000	666 AMHERST ST.	CHARLIE THE MAGNIFICENT LLC	0.084	11,416	8407
J**	089.210-0007-012.000	662 AMHERST ST.	JOAN S MILLER	0.087	11,095	9347

** INFORMATION FOR REFERENCE ONLY, PARCEL NOT INCLUDED AS PART OF THIS SURVEY



LEGEND

Property Boundary

REFERENCE:

1. DEEDS AS SHOWN
2. MC 268

SURVEY NOTES:

1. THE HORIZONTAL DATUM HERON IS REFERENCED TO THE N.Y.S. PLANE COORDINATE SYSTEM, WESTERN ZONE, TRANSVERSE MERCATOR SYSTEM, NAD 83 (2011 ADJ.) USING RTK GPS FROM THE NYSNET CONTINUOUSLY OPERATING REFERENCE STATIONS.
2. ELEVATIONS SHOWN HEREON ARE REFERENCED TO NAVD 88 ELEVATIONS USING RTK GPS FROM THE NYSNET CONTINUOUSLY OPERATING REFERENCE STATIONS.
3. DISTANCES SHOWN HEREON ARE GROUND DISTANCES. BEARINGS AND COORDINATES ARE REFERENCED TO GRID.
4. THE PROJECT BOUNDARY SURVEY WAS MADE USING PROCEDURES NECESSARY TO ACHIEVE A HORIZONTAL ACCURACY OF 1 PART IN 20,000 (1:20,000) OR BETTER PROPORTIONAL ACCURACY AND A NETWORK POSITIONAL ACCURACY AT TWO SIGMA, 95% CONFIDENCE LEVEL NOT EXCEEDING 0.04 FEET.
5. NO ABSTRACT OF TITLE WAS PROVIDED FOR THIS SURVEY

THE SOLE PURPOSE OF THIS MAP IS TO COMBINE THE FOLLOWING TAX ACCOUNT NUMBERS.

089.210-0007-005.000
089.210-0007-006.100
089.210-0007-006.200
089.210-0007-007.000
089.210-0007-008.000
089.210-0007-009.000
089.210-0007-010.000
089.210-0007-011.000

CERTIFICATION:

WE, PASSERO ASSOCIATES, CERTIFY THAT THIS MAP OR PLAT AND THE SURVEY ON WHICH IT IS BASED WERE MADE IN ACCORDANCE WITH THE 2021 MINIMUM STANDARD DETAIL REQUIREMENTS FOR ALTA/NSPS LAND TITLE SURVEYS, JOINTLY ESTABLISHED AND ADOPTED BY ALTA AND NSPS. FIELD WORK WAS COMPLETED ON 2024 MAR 14.

CERTIFIED TO:
1. SAA_EVI

STATE OF NEW YORK · ROBERT A. VENTO · 049701 · LICENSED LAND SURVEYOR

9/12/24

ROBERT A. VENTO N.Y.S.P.L.S. NO. 049701 — DATE
bvento@passero.com

ONLY COPIES FROM THE ORIGINAL OF THIS SURVEY MARKED WITH AN ORIGINAL INKED OR EMBOSSED SEAL AND INKED SIGNATURE SHALL BE CONSIDERED A TRUE AND VALID COPY.

CERTIFICATION INDICATED HEREON SHALL RUN ONLY TO THE PERSON FOR WHOM THE SURVEY IS PREPARED, AND ON HIS BEHALF TO THE AGENCIES LISTED HEREON. CERTIFICATIONS ARE NOT TRANSFERABLE TO ADDITIONAL INSTITUTIONS OR SUBSEQUENT OWNERS.

FIGURE 3

Y:\PROJECTS-NEW\2023\20233725\20233725.0001\01_CAD-BIM-MODELS\SURVEY\20233725.0001 VOELKERS LANE SUBDIVISION.DWG 9/12/2024 10:06 AM Richard Celestino

Passero Associates
Rochester, NY • Fernandina Beach, FL
www.passero.com

ABBREVIATION TABLE	
BLDG.	BUILDING
C.I.	CAST IRON
CNC.	CONCRETE
E.O.P.	EDGE OF PAVEMENT
MEAS.	MEASURES
R.O.W.	RIGHT OF WAY

LEGEND	
CB	CATCHBASIN
CO	CLEANOUT (UNKNOWN TYPE)
DCO	CLEANOUT DRAINAGE SEWER
SCO	CLEANOUT SANITARY SEWER
	END SECTION DRAINAGE PIPE
GV	GAS VALVE
HYD	HYDRANT
LP	LIGHTPOLE
MH	MANHOLE (UNKNOWN TYPE)
EMH	MANHOLE ELECTRIC
MH	MANHOLE DRAINAGE INLET
DMH	MANHOLE DRAINAGE SEWER
SMH	MANHOLE SANITARY SEWER
TMH	MANHOLE TELE/COMM
	SIGN POST (SINGLE)
SP	TRAFFIC LIGHT SPAN POLE
	TREE CONIFEROUS
	TREE DECIDUOUS
PP	UTILITY POLE
GW	UTILITY POLE ANCHOR WIRE
	UTILITY POLE WITH LIGHT
WS	WATER SERVICE
WV	WATER VALVE

Revisions

No.	Date	By	Description

UNAUTHORIZED ALTERATIONS OR ADDITIONS TO THIS DRAWING IS IN VIOLATION OF STATE EDUCATION LAW ARTICLE 145 SECTION 7209 AND ARTICLE 147 SECTION 7307. THESE PLANS ARE COPYRIGHT PROTECTED ©

SITE
MARION ST.
AMHERST ST.
ELMWOOD AVE.
PENN CENTRAL CONRAIL

City of Buffalo - Not to Scale

Passero Associates
242 WEST MAIN STREET, SUITE 100
ROCHESTER, NY 14614
(585) 325-1000
Fax: (585) 760-8580

Principal-in-Charge: David L. Cox, PE
Project Manager: Robert A. Vento, PLS
Drafted by: R.D.C.

Client:
SAA_EVI
Connor Kenney
110 Elmwood Avenue
Buffalo, NY 146201
(716) 984-5710

VOELKER'S LANES
SUBDIVISION
1.703± ACRES

PART OF TOWN LOT 83, TOWNSHIP 11, RANGE 8, OF THE HOLLAND LAND COMPANY'S SURVEY, CITY OF BUFFALO, ERIE COUNTY, NEW YORK STATE

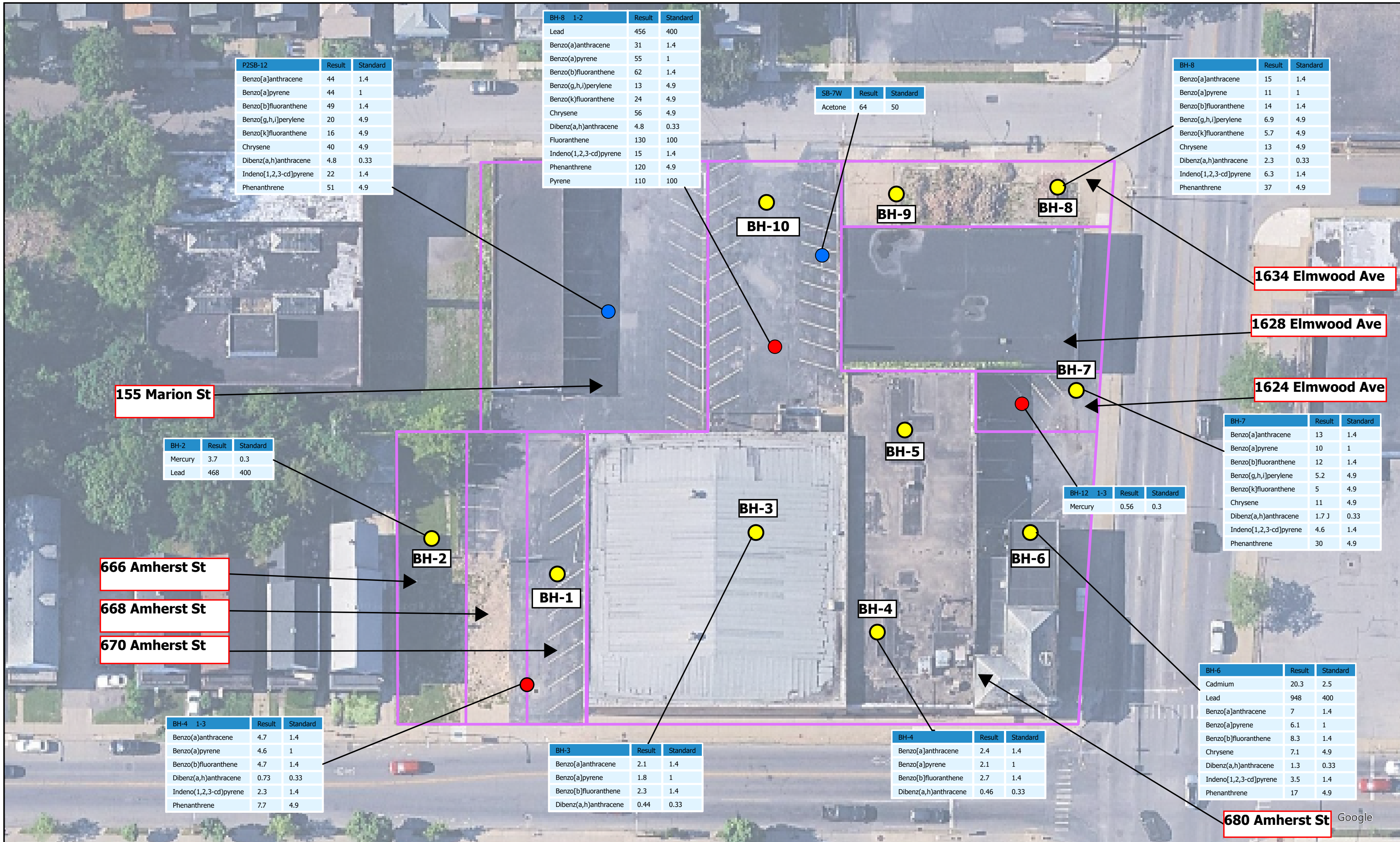
Project No. 20233725.0001

Drawing No. SUB-1

Sheet No. 1 of 1

Scale: 1" = 40'

Date: SEPTEMBER 2024



P2SB-12	Result	Standard
Benzo[a]anthracene	44	1.4
Benzo[a]pyrene	44	1
Benzo[b]fluoranthene	49	1.4
Benzo[g,h,i]perylene	20	4.9
Benzo[k]fluoranthene	16	4.9
Chrysene	40	4.9
Dibenz(a,h)anthracene	4.8	0.33
Indeno[1,2,3-cd]pyrene	22	1.4
Phenanthrene	51	4.9

BH-8 1-2	Result	Standard
Lead	456	400
Benzo(a)anthracene	31	1.4
Benzo(a)pyrene	55	1
Benzo(b)fluoranthene	62	1.4
Benzo(g,h,i)perylene	13	4.9
Benzo(k)fluoranthene	24	4.9
Chrysene	56	4.9
Dibenz(a,h)anthracene	4.8	0.33
Fluoranthene	130	100
Indeno(1,2,3-cd)pyrene	15	1.4
Phenanthrene	120	4.9
Pyrene	110	100

SB-7W	Result	Standard
Acetone	64	50

BH-8	Result	Standard
Benzo[a]anthracene	15	1.4
Benzo[a]pyrene	11	1
Benzo[b]fluoranthene	14	1.4
Benzo[g,h,i]perylene	6.9	4.9
Benzo[k]fluoranthene	5.7	4.9
Chrysene	13	4.9
Dibenz(a,h)anthracene	2.3	0.33
Indeno[1,2,3-cd]pyrene	6.3	1.4
Phenanthrene	37	4.9

BH-7	Result	Standard
Benzo[a]anthracene	13	1.4
Benzo[a]pyrene	10	1
Benzo[b]fluoranthene	12	1.4
Benzo[g,h,i]perylene	5.2	4.9
Benzo[k]fluoranthene	5	4.9
Chrysene	11	4.9
Dibenz(a,h)anthracene	1.7 J	0.33
Indeno[1,2,3-cd]pyrene	4.6	1.4
Phenanthrene	30	4.9

BH-2	Result	Standard
Mercury	3.7	0.3
Lead	468	400

BH-12 1-3	Result	Standard
Mercury	0.56	0.3

BH-6	Result	Standard
Cadmium	20.3	2.5
Lead	948	400
Benzo[a]anthracene	7	1.4
Benzo[a]pyrene	6.1	1
Benzo[b]fluoranthene	8.3	1.4
Chrysene	7.1	4.9
Dibenz(a,h)anthracene	1.3	0.33
Indeno[1,2,3-cd]pyrene	3.5	1.4
Phenanthrene	17	4.9

BH-4 1-3	Result	Standard
Benzo(a)anthracene	4.7	1.4
Benzo(a)pyrene	4.6	1
Benzo(b)fluoranthene	4.7	1.4
Dibenz(a,h)anthracene	0.73	0.33
Indeno(1,2,3-cd)pyrene	2.3	1.4
Phenanthrene	7.7	4.9

BH-3	Result	Standard
Benzo[a]anthracene	2.1	1.4
Benzo[a]pyrene	1.8	1
Benzo[b]fluoranthene	2.3	1.4
Dibenz(a,h)anthracene	0.44	0.33

BH-4	Result	Standard
Benzo[a]anthracene	2.4	1.4
Benzo[a]pyrene	2.1	1
Benzo[b]fluoranthene	2.7	1.4
Dibenz(a,h)anthracene	0.46	0.33

LEGEND

- Soil Boring 01/2026
- Previous Exceedance 03/2024
- Previous Exceedance 06/2019
- Project Boundary

NOTES

1. All buildings besides the one on 155 Marion Street and the one on 1628 Elmwood Ave have been demolished
2. Basemap adapted from Google Maps
3. All values except for Table SB-7W are presented in parts per million (ppm) or milligram per kilogram (mg/kg)
4. Values presented in Table SB-7W are presented in parts per billion (ppb) or micrograms per liter (ug/L)
5. All standards except for Table SB-7W are 12/31/2025 Part 375 Restricted Residential Soil Cleanup Objective (SCO)
6. Standard for Table SB-7W is NYS Ambient Water Quality and Guidance Values

BE3
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CLIENT - SAA EVI MC FAMILY, LLC

Figure 4 - Phase II ESA Investigation Exceedances
666,668, 670, and 680 Amherst Street;
1624, 1628, ad 1634 Elmwood Avenue; and
155 Marion Street
Buffalo, NY 14207

DATE ISSUED:
February 25, 2026

△
△
△
△

Scale: 1:734

LEGEND

- BCP Site
- Adjacent Parcel Boundaries

NOTES

Imagery adopted from City of Buffalo Property Viewer

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Prepared for: SAA & EVI LLC

Figure 5
Site Location Parcel Map

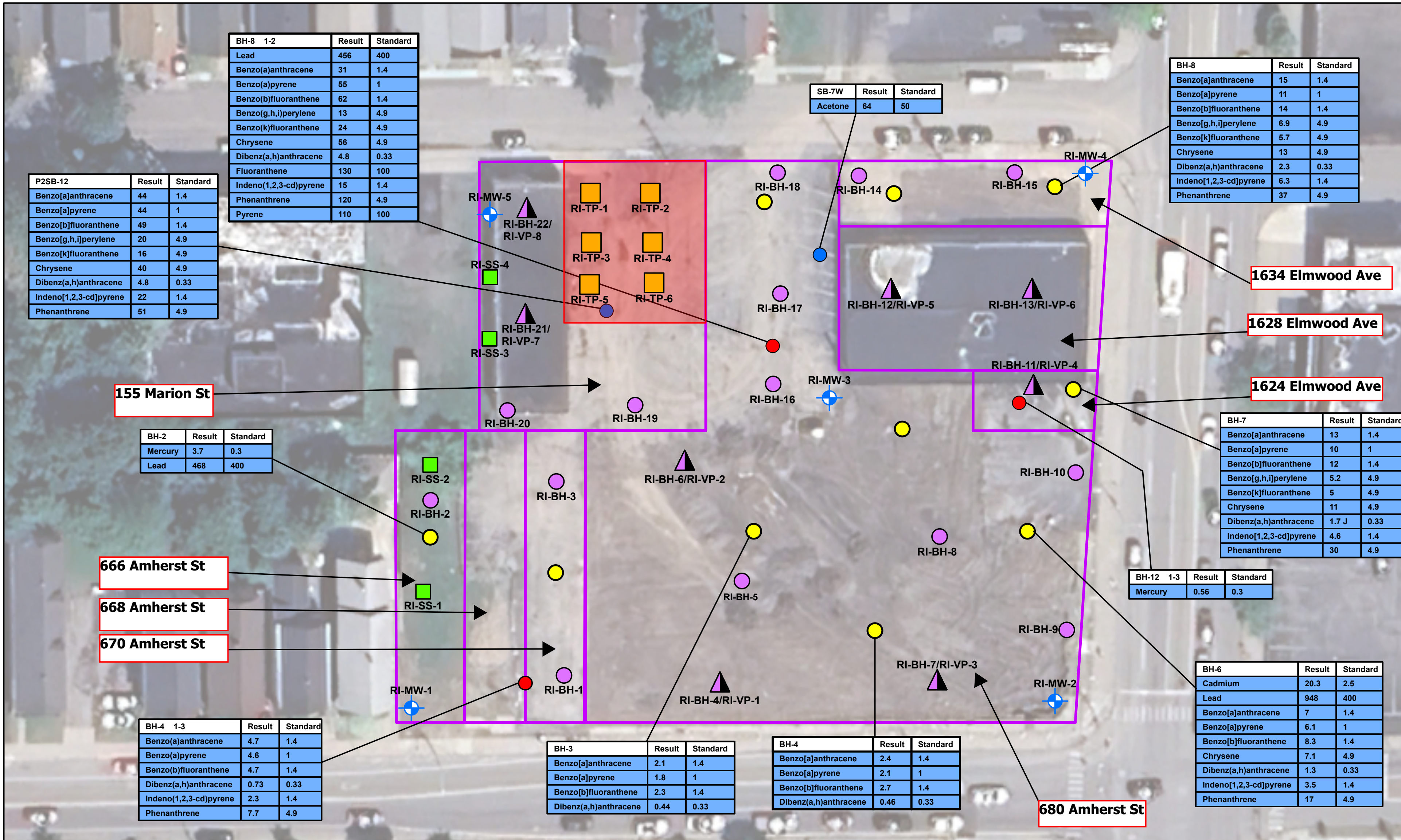
Voelkers Lanes Apartments
Buffalo, NY 14207

N W E S

DATE ISSUED:
March 28, 2026

△

SCALE: 1:1,667



BH-8 1-2	Result	Standard
Lead	456	400
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Benzo[a]anthracene	2.4	1.4
Benzo[a]pyrene	2.1	1
Benzo[b]fluoranthene	2.7	1.4
Dibenz(a,h)anthracene	0.46	0.33

LEGEND

- BCP Site Boundary
- Historic Soil Boring (01/2026)
- Historic Soil Boring (03/2024)
- Historic Soil Boring (06/2019)
- Geophysical Survey Area
- RI Test Pit (RI-TP-#)
- RI Boring (RI-BH-#)
- RI Boring/Vapor Point (RI-BH-#/RI-VP-#)
- RI Monitoring Well (RI-MW-#)
- RI Surface Sample (RI-SS-#)

NOTES

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CLIENT: SAA EVI MC FAMILY, LLC

Figure 6 - Remedial Investigation Plan

666,668, 670, and 680 Amherst Street; 1624, 1628, ad 1634 Elmwood Avenue; and 155 Marion Street Buffalo, NY 14207

N W E S

DATE ISSUED:
May 26, 2026

Scale: 1:734

Appendices

Appendix A

Health and Safety Plan

HEALTH AND SAFETY PLAN
for
SITE INVESTIGATIONS AND REMEDIAL OVERSIGHT

VOELKERS LANES APARTMENTS

1624, 1628, 1634 ELMWOOD AVENUE; 666, 668, 670, 680
AMHERST STREET; 155 MARION STREET
BUFFALO, ERIE COUNTY, NEW YORK

Prepared for:

SAA | EVI
110 Elmwood Avenue
Buffalo, NY 14201

Prepared by:

BRYDGES ENGINEERING IN ENVIRONMENT AND ENERGY, DPC

960 Busti Avenue, Suite B-150
Buffalo, New York 14213

May 2026

Table of Contents

ATTACHMENTS

1.0 INTRODUCTION

The following health and safety procedures apply to Brownfield Cleanup Program (BCP) project personnel, including subcontractors, performing activities described in the Release Investigation Work Plan (RIWP). Please note, however, that contractors performing investigation/remedial work are required to either develop their own Health and Safety Plans (HASPs) meeting these requirements at a minimum or adopt this plan.

1.1 PURPOSE

Directed at protecting the health and safety of the field personnel during field activities, the following HASP was prepared to provide safe procedures and practices for personnel engaged in conducting the field activities associated with this project. The plan has been developed using the Occupational Safety and Health Administration (OSHA) 1910 and 1926 regulations and New York State Department of Environmental Conservation (NYSDEC) Brownfields Department of Environmental Remediation (DER)-10 as guidance. The purpose of this HASP is to establish personnel protection standards and mandatory safety practices and procedures for this task specific effort. This plan assigns responsibilities, establishes standard operating procedures, and provides for contingencies that may arise during the field efforts.

1.2 APPLICABILITY

The provisions of the plan are mandatory for all personnel engaged in field activities. All personnel who engage in these activities must be familiar with this plan and comply with its requirements. The plan is based on available information concerning the project area and planned tasks. If more data concerning the project area becomes available that constitute safety concerns, the plan will be modified accordingly. A member of each contractor on the BCP project will be designated as Field Safety Officer and will be responsible for field safety. Any modifications to the plan will be made by the Field Safety Officer after discussion with the Project Manager and Health and Safety Officer. All modifications will be documented and provided to the Project Manager and the Health and Safety Officer for approval. A copy of this plan will be available to all on-site personnel, including subcontractors, prior to their initial entry onto the site.

Before field activities begin, all personnel will be required to read the plan. All personnel must agree to comply with the minimum requirements of this plan, be responsible for health and safety, and sign the Statement of Compliance before site work begins.

1.3 FIELD ACTIVITIES

The work addressed by this HASP includes remedial investigation (RI) activities such as assessment of subsurface conditions related to soil, groundwater and vapor and oversight activities related to remediation. Field work will be conducted that can include soil borings, monitoring well installation, groundwater, vapor sampling and soil sampling, etc.

1.4 PERSONNEL REQUIREMENTS

Key personnel are as follows:

Health and Safety Officer – Jason M Brydges, PE – MBA
Engineers and Project Managers – Jason M Brydges, P.E, Alexis Palumbo, EIT, Paul Staub, EIT
Geologist – John Boyd, PG
Technicians – William Goldsmith
QA/QC – John Berry, P.E.

Responsibilities of some of the key personnel are as follows:

Project Manager:

- Assuring that personnel are aware of the provisions of the HASP and are proficient in work practices necessary to ensure safety and in emergencies;
- Verifying that the provisions of this plan are implemented;
- Assuring that appropriate personnel protective equipment (PPE), if necessary, is available and properly utilized by all personnel;
- Assuring that personnel are aware of the potential hazards associated with Site operations;
- Supervising the monitoring of safety performance by all personnel and ensuring that required work practices are employed; and,
- Maintaining sign-off forms and safety briefing forms.

Health and Safety Officer:

- Monitoring work practices to determine if potential hazards are present, such as heat/cold stress, safety rules near heavy equipment, etc.;
- Determining changes to work efforts or equipment to ensure the safety of personnel;
- Evaluating on-site conditions and recommend to the Project Manager modifications to work plans needed to maintain personnel safety;
- Determining that appropriate safety equipment is readily available and monitor its proper use;
- Stopping work if unsafe conditions occur or if work is not being performed in compliance with this plan:
- Monitoring personnel performance to ensure that the required safety procedures are followed.
- Documenting incident and reporting to Project Manager within 48 hours of occurrence if established safety rules and practices are violated; and,
- Conducting safety meetings as necessary.

Field Personnel, including geologists and technicians:

- Understanding the procedures outlined in this plan;
- Taking precautions to prevent injury to themselves and co-workers;
- Performing only those tasks believed to be safe;

- Reporting accidents or unsafe conditions to the Health and Safety Officer and Project Manager;
- Notifying the Health and Safety Officer and Project Manager of special medical problems (e.g., allergies, medical restrictions, etc.);
- Thinking about safety first while conducting field work; and,
- Not eating, drinking or smoking in work areas.

All Site personnel have the authority to stop work if conditions are deemed to be unsafe. Visitors will be required to report to the overall Site Project Manager or designee and follow the requirements of this plan and the Contractor's HASP (if different).

2.0 SITE DESCRIPTION AND SAFETY CONCERNS

2.1 SITE BACKGROUND AND DESCRIPTION

The eight parcels composing the Site border one another in a rectangular layout and are collectively 1.69-acres in size. Historic documentation indicates that an auto repair shop was located on the former 155 Marion Street parcel. Municipal records indicate installation of presumed Underground Storage Tanks (USTs) at 155 Marion Street in unknown locations. Specifically, one 1,000-gallon fuel tank was installed in 1946 and one additional 1,000-gallon fuel tank was installed in 1955. Historic documentation indicates that there were historic uses as a former dry cleaners and auto repair shop at 1630 Elmwood Avenue which is now part of parcel 1628, which represents a potential vapor concern. Aboveground Storage Tanks (ASTs) use for fuel oil storage as well as staining proximate to floor drains and cracks in the floor were identified in the basement of the former 680 Amherst Street parcel during site reconnaissance. This could represent a release to the environment. Urban fill material was identified during Phase II ESAs across the Site.

2.2 HAZARD EVALUATION

Specific health and safety concerns to the project tasks include working around low levels of heavy metals, semi-volatile organic compounds (SVOCs), and volatile organic compounds (VOCs) in soil and groundwater. Physical hazards include those associated with working near open excavations and adjacent to field equipment and heavy equipment such as back hoes and drill rigs. Contractors will have separate detailed health and safety procedures/requirements for excavations and the transportation and disposal of impacted material that will meet or exceed requirements in this plan. A table of potential hazards and OSHA Standards for consideration during investigation and remedial activities is provided in **Attachment 1**.

2.2.1 Chemical Hazards

Chemical hazards detected at the site include metals and organic compounds that were detected in soil samples and groundwater at concentrations that exceed NYSDEC Part 375 soil cleanup objectives or groundwater standards. These compounds could be encountered during the RI and remedial activities and potential routes of exposure include:

- Skin contact;
- Inhalation of vapors or particles;

- Ingestion; and,
- Entry of contaminants through cuts, abrasions or punctures.

The anticipated levels of personnel protection will include Level D PPE that includes the following:

1. Long sleeve shirt and long pants
2. Work boots with steel toe
3. Hard hats when heavy equipment or overhead hazards are present
4. Safety glasses
5. Work gloves and chemical resistant gloves when sampling potentially contaminated materials
6. High visibility vests or outer gear when Site traffic is significant

Modifications may include booties, overalls, hearing protection, or respiratory protection if air monitoring levels indicate sustained photoionization detector (PID) readings greater than 5 ppm above established background levels. If these levels are reached, work will be halted pending discussions with field and office management. If any readings are recorded above background, work will proceed with caution and breathing zone monitoring will be conducted.

2.2.2 Other Physical Hazards

Depending on the time of year, weather conditions or work activity, some of the following physical hazards could result from project activities:

- Noise
- Heat Stress
- Cold Stress
- Slips, trips, and falls
- Exposure to moving machinery during drilling and excavation activities
- Physical eye hazards
- Lacerations and skin punctures
- Back strain from lifting equipment
- Electrical storms and high winds
- Contact with overhead or underground utilities

Slips, Trips, and Falls. Field personnel shall become familiar with the general terrain and potential physical hazards that are associated with the risk of slips, trips, and falls. Special care shall be taken when working near demolition and excavation operations and material stockpiles. Workers will observe all pedestrian and vehicle rules and regulations. Extra caution will be observed while working near roadways and while driving in reverse to ensure safety.

Noise. All personnel shall wear hearing protection devices, such as earmuffs or ear plugs, if work conditions warrant. These conditions would include difficulty hearing while speaking to one another at a normal tone within three feet. If normal speech is interfered with due to work noise, the Health and Safety Officer or designee will mandate the use of hearing protection or other noise-producing equipment or events.

Heat/Cold Stress. Heat stress work modification may be necessary during ambient temperatures of greater than 29 degrees Celsius (°C) (85 degrees Fahrenheit [°F]) while wearing normal clothing or exceeding 21°C (70°F) while wearing PPE. Because heat stress is one of the most common and potentially serious illnesses at work sites, regular monitoring and preventive measures will be utilized such as additional rest periods, supplemental fluids, restricted consumption of drinks containing caffeine, use of cooling vests, or modification of work practices. Most of the work to be conducted during the oversight and monitoring operations is expected to consist of light manual labor and visual observation. Given the nature of the work and probable temperatures, heat stress hazards are not anticipated. See **Attachment 2** for heat stress management procedures.

If work is to be conducted during winter conditions, cold stress may be a concern to the health and safety of personnel. Wet clothes combined with cold temperatures can lead to hypothermia. If the air temperature is less than 4°C (40°F) and a worker perspires, the worker should change to dry clothes. The following summary of the signs and symptoms of cold stress is provided as a guide for field personnel.

1. Incipient frostbite is a mild form of cold stress characterized by sudden blanching or whitening of the skin.
2. Chilblain is an inflammation of the hands and feet caused by exposure to cold moisture. It is characterized by a recurrent localized itching, swelling, and painful inflammation of the fingers, toes, or ears. Such a sequence produces severe spasms, accompanied by pain.
3. Second-degree frostbite is manifested by skin with a white, waxy appearance and the skin is firm to the touch. Individuals with this condition are generally not aware of its seriousness because the underlying nerves are frozen and unable to transmit signals to warn the body. Immediate first aid and medical treatment are required.
4. Third-degree frostbite will appear as blue blotchy skin. The tissue is cold, pale, and solid. Immediate medical attention is required.
5. Hypothermia develops when body temperature falls below a critical level. In extreme cases, cardiac failure and death may occur. Immediate medical attention is warranted when the following symptoms are observed:

   - Involuntary shivering
   - Irrational behavior
   - Slurred speech
   - Sluggishness

Fire and Explosion. These hazards will be minimal for activities associated with this project. All heavy equipment will be equipped with a fire extinguisher.

Trenching and Excavations. There are a variety of potential health and safety hazards associated with excavations. These include:

- Surface encumbrances, such as structures, fencing, stored materials, etc.;
- Below- and above-ground utilities, such as water and sewer lines, gas lines, telephone lines, and optical cable lines, etc.;
- Overhead power lines and other utilities;
- Vehicle and heavy equipment traffic around the excavations;
- Falling loads from lifting or digging equipment;

- Water accumulation within excavations;
- Hazardous atmospheres, such as oxygen deficiency, flammable gases, and toxic gases;
- Falling into or driving equipment into unprotected or unmarked excavations; and,
- Cave-in of loose rocks and soil at the excavation face.

OSHA requirements for trenching and excavations are contained in 29 Code of Federal Regulations (CFR), Subpart P, 1926:650 through 1926.652. See **Attachment 3** for details on excavation and trenching safety requirements, which include the following basic minimum excavation requirements:

- Personnel entry into excavations should be minimized whenever possible and no entry will occur in pits greater than 4 feet below ground surface (bgs). Sloping, shoring or equivalent means should be utilized.
- Surface encumbrances such as structures, fencing, piping, stored material etc. that may interfere with safe excavations should be avoided, removed or adequately supported prior to the start of excavations. Support systems should be inspected daily.
- Underground utility locations should be checked and determined, and permits should be obtained prior to initiating excavations. Local utility companies will be contacted at least two days in advance, advised of proposed work, and requested to locate underground installations. When excavations approach the estimated location of utilities, the exact location should be determined by careful probing or hand digging and when it is uncovered, proper supports should be provided.
- A minimum safe distance of 15 feet should be maintained when working around overhead high-voltage lines or the line should be de-energized following appropriate lock-out and tag- out procedures by qualified utility personnel.
- Excavations five feet or more, if entered, will require an adequate means of exit, such as a ladder, ramp, or steps and located to require no more than 25 feet of lateral travel. Under no circumstances should personnel exit/enter an excavation using heavy equipment.
- Personnel working around heavy equipment, or who may be exposed to public vehicular traffic should wear high visibility clothes, especially at night.
- Heavy equipment or other vehicles operating next to or approaching the edge of an excavation will require that the operator have a clear view of the edge of the excavation, or that warning systems such as barricades, hand or mechanical signals, or stop logs be used. If possible, the surface grade should slope away from the excavation.
- Personnel should be safely located in and around the trench/excavation face and should not work underneath loads handled by lifting or digging equipment.
- Hazardous atmospheres, such as oxygen deficiency (atmospheres containing less than 19.5% oxygen), flammable gases (airborne concentrations greater than 20% of the lower explosive limit), and toxic gases (airborne concentrations above the OSHA Permissible Exposure Limit or other exposure limits) may occur in excavations. Monitoring should be conducted for hazardous atmospheres prior to entry and at regular intervals. Ventilation or respiratory protection may be provided to prevent personnel exposures to oxygen deficient or toxic atmospheres. Periodic retesting (at least each shift) of the excavation will be conducted to verify that the atmosphere is acceptable. A log or field book records should be maintained.
- Personnel should not work in excavations that have accumulated water or where water is accumulating unless adequate precautions have been taken. These precautions can include shield systems, water removal systems, or safety harnesses and lifelines.

Groundwater entering the excavation should be properly directed away and down gradient from the excavation.

- Safety harnesses and lifelines should be worn by personnel entering excavations that qualify as confined spaces.
- Excavations near structures should include support systems such as shoring, bracing, or underpinning to maintain the stability of adjoining buildings, walls, sidewalks, or other structures endangered by the excavation operations.
- Loose rock, soil, and spoils should be piled at least two and preferably 5 feet or more from the edge of the excavation. Barriers or other effective retaining devices may be used to prevent spoils or other materials from falling into the excavation.
- Walkways or bridges with standard guardrails that meet OSHA specifications will be provided where employees, the public, or equipment are required to cross over excavations.
- Adequate barrier physical protection should be provided, and excavations should be barricaded or covered when not in use or left unattended. Excavations should be backfilled as soon as possible when completed.
- Safety personnel should conduct inspections prior to the start of work and as needed throughout the work shift and after occurrence that increases the hazard of collapse (i.e., heavy rain, vibration from heavy equipment, freezing and thawing, etc.).
- Personnel working in excavations should be protected from cave-ins by sloping or benching of excavation walls, a shoring system or some other equivalent means in accordance with OSHA regulations. Soil type is important in the determination of the angle of repose for sloping and benching, and the design of shoring systems.

2.2.3 Biological Hazards

Biological hazards can result from encounters with mammals, insects, snakes, spiders, ticks, plants, parasites, and pathogens. Mammals can bite or scratch when cornered or surprised. The bite or scratch can result in local infection with systemic pathogens or parasites. Insect and spider bites can result in severe allergic reactions in sensitive individuals. Exposure to poison ivy, poison oak or poison sumac results in skin rash. Ticks are a vector for several serious diseases. Dead animals, organic wastes, and contaminated soil and water can harbor parasites and pathogens. These hazards are reduced if work is conducted during the late fall and winter months. The following are highlighted because they represent more likely concerns for the site-specific tasks and location:

Bees, Ants, Wasps and Hornets. Sensitization by the victim to the venom from repeated stings can result in anaphylactic reactions. If a stinger remains in the skin, it should be removed by teasing or scraping, rather than pulling. An ice cube placed over the sting will reduce pain. An analgesic corticosteroid lotion is often useful. People with known hypersensitivity to such stings should consult with their doctor about carrying a kit containing an antihistamine and aqueous epinephrine in a pre-filled syringe when in endemic areas. Nests and hives for bees, wasps, hornets and yellow jackets often occur in the ground, trees and brush. Before any nests or hives are disturbed, an alternate sampling location should be selected. If the sample location cannot be relocated, site personnel who may have allergic reactions shall not work in these areas.

Ticks. The incidence of Lyme disease is correlated to outdoor workers in areas where the disease is widespread and heightened risk of encountering ticks infected with B. burgdorferi, which varies from state to state, within states, and even within counties. Preventing tick bites is of utmost importance in preventing Lyme disease and other tickborne illnesses. Tick bite prevention strategies include avoidance or clearing of tick-infested habitats and use of personal protective measures (e.g., repellents and protective clothing). Tick checks should be done regularly, and ticks should be removed promptly. If a worker in a high-risk area develops flu-like symptoms (fever, chills, muscle aches, joint pains, neck stiffness, headache) or a bulls-eye rash, they should seek medical attention even if there is no recall of a tick bite. Workers who have experienced a tick bite should remove the tick and seek medical attention if signs and symptoms of tick-borne diseases occur.

Storm Conditions. When lightning is within 10 miles of the work site, all personnel should evacuate to a safe area.

Sun. When working in the sun, personnel should apply appropriate sun screening lotions (30 sunscreen or above), and/or wear long sieve clothing and hats.

2.2.4 Activity Hazard Analysis

Table 1 presents a completed activity hazard analysis for the performance of an RI.

Table 1. Activity Hazard Analysis

PRINCIPAL STEPS	POTENTIAL SAFETY/HEALTH HAZARDS	RECOMMENDED CONTROLS
RI soil/groundwater investigation	Potential exposure to low levels of metals, PAHs, petroleum products and solvents	1. Use of administrative controls (site control and general safety rules), work cloths, dust suppression 2. Use of real-time monitoring and action levels 3. Use Physical Hazards SOPs 4. Wear gloves when handling soil and groundwater 5. Actions levels for dust and vapors
EQUIPMENT TO BE USED	**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**
Excavation and other heavy equipment, Backhoe or Geoprobe	1. Daily inspection of equipment 2. Continuous safety oversight	1. Safety plan review 2. Routine safety briefings 3. PID and Dust Monitor

3.0 MONITORING

The purpose of air monitoring for potential airborne contaminants is to verify that protection levels are suitable. Monitoring will be performed for dust/particulates and volatile organic compounds during excavation activities. Daily background and calibration readings will be recorded prior to the start of field activities. All monitoring equipment used during this investigation will be maintained and calibrated and records of calibration and maintenance will be kept in accordance with 29 CFR 1910.120(b)4(11)E.

3.1 Particulate Monitoring

Real-time air monitoring readings are obtained from upwind and downwind locations in accordance with DER-10 for community air-monitoring. Daily field reports will be completed that document activities performed, equipment and manpower onsite, screening and monitoring results, general Site conditions, and weather conditions.

~~3.2 Air Monitoring for Worker Protection~~

~~Real time air monitoring will be conducted whenever site soil is disturbed during sampling, excavation, grading, etc. A real time personal aerosol monitor (i.e., TSI SidePak AM5 10 Personal Aerosol monitor or equivalent) will be used. This monitor is a laser photometer that measures data as both real-time aerosol mass-concentration and 8-hour time weighted average (TWA). The monitor will be used to measure real-time concentrations in milligrams per meter cubed (mg/m^3). Action levels are based on potential exposure to calcium carbonate and will be as follows:~~

- ~~15 mg/m^3 total dust~~
- ~~5 mg/m^3 respirable fraction for nuisance dusts~~

~~Dust suppression techniques should be employed prior to exceeding the action levels. However, if these levels are exceeded, then work will be halted, and additional dust suppression techniques employed until safe levels are reached.~~

3.2 Total Volatile Organics Monitoring

Monitoring of VOCs will be conducted using a PID. If a sustained reading of 5 ppm above background occurs, then work will be halted, and personnel will evacuate the work area. Levels will be allowed to stabilize, and another reading will be taken in the breathing zone. If background levels continue to be exceeded, then work will not continue at that location and the project manager will be notified of the situation. Action levels will remain the same.

4.0 SAFE WORKING PRACTICES

The following general safe work practices always apply to a construction site:

- Eating, drinking, chewing gum or tobacco and smoking are prohibited within the work area.
- Contact with potentially contaminated substances should be avoided.
- Puddles, pools, mud, etc. should be avoided if possible.
- Kneeling, leaning, or sitting on equipment or on the ground should be avoided if possible.
- Upon leaving the work area, hands, face and other exposed skin surfaces should be thoroughly washed.

- Unusual site conditions shall be promptly conveyed to the project manager, health and safety officer, or site superintendent for resolution.
- A first-aid kit shall be available at the site.
- Field personnel should use all their senses to alert themselves to potentially dangerous situations (i.e., presence of strong, irritating, or nauseating odors).
- If severe dusty conditions are present, then the soil will be dampened to mitigate dust.
- All equipment will be cleaned before leaving the work area.
- Field personnel must attend safety briefings and should be familiar with the physical characteristics of the investigation, including:
    - Accessibility to personnel, equipment, and vehicles.
    - Areas of known or suspected contamination.
    - Site access.
    - Routes and procedures to be used during emergencies.
- Personnel will perform all investigation activities with a “buddy” who is able to:
    - Provide his or her partner with assistance.
    - Notify management or emergency personnel if needed.
- Excavation activities shall be terminated immediately in the event of thunder or electrical storm.
- The use of alcohol or drugs at the site is strictly prohibited.

5.0 PERSONAL SAFETY EQUIPMENT AND SITE CONTROL

5.1 Personal Safety Equipment

As required by OSHA in 29 CFR 1920.132, this plan constitutes a workplace hazard assessment to select PPE to perform the site investigation. The PPE to be donned by on-site personnel during this investigation are those associated with the industry standard of Level D. Protective clothing and equipment to initiate the project will include:

- Work clothes, pants and long sleeves
- Work boots with steel toe
- Work gloves as necessary
- Hard hat if work is conducted near equipment
- Safety glasses
- Hearing protection as necessary

Modifications may include chemically resistant gloves, booties, and overalls. If air monitoring indicates levels are encountered that require respiratory protection (sustained readings at or above action levels above a daily established background), then work will be halted, and an adequate resolution of PPE will be made by the health and safety manager, field manager, and project manager.

5.2 Site Control

Site control will be established near each work zone by the Contractor. The purpose is to control access to the immediate work areas from individuals not associated with the project. All work zones will be fenced off with controlled access and appropriately designated as an exclusion area.

Each excavation or drilling area where heavy equipment is being utilized will be set up as a work zone and include an exclusion area and support zone. The exact configuration of each zone is dependent upon location, weather conditions, wind direction and topography. The Contractor's safety manager will establish the control areas daily at each excavation.

An area of 10 feet (as practical) around each excavation will be designated as the exclusion area. This is the area where potential physical hazards are most likely to be encountered by field personnel. The size of the exclusion area may be altered to accommodate site conditions and the drilling/excavation location. If levels of protection higher than Level D are used, this plan will be modified to include decontamination procedure. The Site excavation contractor will be required to have eye/face wash equipment/means available on-site.

A support area will be defined for each field activity where support equipment will be located. Normal work clothes are appropriate within this area. The location of this area depends on factors such as accessibility, wind direction (upwind of the operation.), and resources (i.e., roads, shelter, utilities). The location of this zone will be established daily. Excavation areas will be filled or secured (fencing) to prevent access from the public.

6.0 EMERGENCY INFORMATION

In the event of an emergency, the field personnel or the health and safety manager will employ emergency procedures. A copy of emergency information will be kept in the field and will be reviewed during the initial site briefing. Copies of emergency telephone numbers and directions to the nearest hospital will be prominently posted in the field.

6.1 MEDICAL TREATMENT AND FIRST AID

A first aid kit adequate for anticipated emergencies will be maintained in the field. If any injury should require advanced medical assistance, emergency personnel will be notified, and the victim will be transported to the hospital. The Contractor will establish his own first aid station and details will be provided in his HASP.

In the event of an injury or illness, work will cease until the field safety and oversight inspector has examined the cause of the incident and taken appropriate corrective action. Any injury or illness, regardless of extent, is to be reported to the project manager and health and safety officer.

6.2 EMERGENCY CONTACTS

Emergency telephone numbers will be posted in the field and are listed below:

- Ambulance, Fire, Police 911
- Poison Control Center 800-222-1222
- NYSDEC Spills Hotline 800-457-7362
- Jason M. Brydges, BE3 716-830-8636
- TBD, NYSDEC PM 716 851-7220
- TBD, NYSDOH 518-402-7860
- Buffalo General Hospital 100 High Street, Buffalo - **(716) 859-5600** See **Attachment 4**.

Verbal communications between workers or use of a vehicle horn repeatedly at intervals of three short beeps shall be used to signal all on-site personnel to immediately evacuate the area and report to the vehicle parking area.

6.3 Emergency Standard Operating Procedures

The following standard operating procedures are to be implemented by on-site personnel in the event of an emergency. The health and safety manager and Contractor's field manager shall manage response actions.

1. Upon notification of injury to personnel, the designated emergency signal shall be sounded. All personnel are to terminate their work activities and assemble in a safe location. The emergency facility listed above shall be notified. If the injury is minor, but requires medical attention, the Contractor's field manager or the health and safety manager shall accompany the victim to the hospital and help in describing the circumstances of the accident to the attending physician.
2. Upon notification of an equipment failure or accident, the Contractor's field manager or the health and safety manager shall determine the effect of the failure or accident on site operations. If the failure or accident affects the safety of personnel or prevents completion of the scheduled operations, all personnel are to leave the area until the situation is evaluated, and appropriate actions taken.
3. Upon notification of a natural disaster, such as tornado, high winds, flood, thunderstorm or earthquake, on-site work activities are to be terminated and all personnel are to evacuate the area.

6.4 Emergency Response Follow-Up Actions

Following activation of an emergency response, the health and safety officer shall notify the project manager, and the Contractor's field manager shall submit a written report documenting the incident to the project manager.

6.5 Medical Treatment

The Contractor's field manager shall be informed of any site-related injury, exposure or medical condition resulting from work activities. All personnel are entitled to medical evaluation and treatment in the event of a site accident or incident.

6.6 Site Medical Supplies and Services

The Contractor's field manager or a trained first aid crew member shall evaluate all injuries at the site and render emergency first-aid treatment, as appropriate. If an injury is minor but requires professional medical evaluation, the field manager shall escort the employee to the appropriate emergency room. For major injuries occurring at the site, emergency services shall be requested. A first-aid kit shall be readily accessible, fully supplied, and maintained at specified locations used for on-site operations.

6.7 Precautions

Universal precautions shall be followed on-site that consist of treating all human blood and certain body fluids as being infected with Human Immune Deficiency Virus (HIV), Hepatitis B virus (HBV), or other blood borne pathogens. Clothing and first-aid materials visibly contaminated with blood or other body fluids will be collected and placed into a biohazard bag. Individuals providing first aid or cleanup of blood- or body-fluid contaminated items should wear latex gloves. If providing CPR, a one-way valve CPR device should be used. Biohazard bags, latex gloves, and CPR devices will be included in the site first-aid kits.

Work areas visibly contaminated with blood or body fluids shall be cleaned using a 1:10 dilution of household bleach. If equipment becomes contaminated with blood or body fluids, and cannot be sufficiently cleaned, the equipment shall be placed in a plastic bag and sealed. Any personnel servicing the equipment shall be made aware of the contamination, so that proper precautions can be taken.

7.0 RECORDKEEPING

The Contractor's field manager and health and safety officer are responsible for site record keeping. Prior to the start of work, they will review this Plan along with the Contractor's HASP. A Site safety briefing will be completed prior to the initiation of field activities. This shall be recorded in the field logbook. An accident report should be completed by the Field Manager if an accident occurs and forwarded to the project manager.

8.0 PERSONNEL TRAINING REQUIREMENTS

8.1 Initial Site Briefing

Prior to site entry, the Contractor's health and safety manager shall provide all personnel (including site visitors) with site-specific health and safety training. A record of this training shall be maintained. This training shall consist of the following:

- Discussion of the elements contained within this plan
- Discussion of responsibilities and duties of key site personnel
- Discussion of physical, biological and chemical hazards present at the site
- Discussion of work assignments and responsibilities
- Discussion of the correct use and limitations of the required PPE
- Discussion of the emergency procedures to be followed at the site
- Safe work practices to minimize risk
- Communication procedures and equipment
- Emergency notification procedures

8.2 Daily Safety Briefings

The Contractor's health and safety manager will determine if a daily safety briefing is required. The briefing shall discuss the specific tasks scheduled for that day and the following topics:

- Specific work plans
- Physical, chemical or biological hazards anticipated
- Fire or explosion hazards
- PPE required

- Emergency procedures, including emergency escape routes, emergency medical treatment, and medical evacuation from the site
- Weather forecast for the day
- Buddy system
- Communication requirements
- Site control requirements
- Material handling requirements

9.0 COMMUNITY AIR MONITORING PROGRAM (CAMP)

A Community Air Monitoring Program (CAMP) requires real-time monitoring for VOCs and particulates (i.e., dust) at the upwind and downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The program 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 and on-site workers not directly involved with work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. A New York State Department of Health (NYSDOH) generic CAMP obtained from NYSDEC DER-10 is presented in the **Appendix B** of the RIWP that will be followed and adhered to for work activities that could generate dust from an impacted area.

A program for suppressing fugitive dust and particulate matter monitoring will also be conducted in accordance *NYSDEC DER-10* titled *Appendix 1B Fugitive Dust and Particulate Monitoring,* which is also provided in **Appendix B**. The fugitive dust suppression and particulate monitoring program will be employed at the site during building demolition, IRM site remediation and other intrusive activities which warrant its use.

Both the CAMP and the fugitive dust and particulate monitoring program will be administered by the environmental engineer/consultant. Monitoring results of the CAMP will be reported to the New York State Department of Health daily for review.

ATTACHMENT 1

TABLE OF POTENTIAL HAZARDS AND OSHA STANDARDS

Potential Hazards and OSHA Standards for Consideration during IRMs

Site Exposure/Control	Potentially Applicable OSHA Standard*	
	1910 General Industry	1926 Construction
Hazard Assessmen & Employee Training	29 CFR 1910.132(d)	29 CFR 1926.21(b)
Chemical Exposure	29 CFR 1910.1000	29 CFR 1926.55
Noise Exposure	29 CFR 1910.95	29 CFR 1926.52
Sanitation	29 CFR 1910.141	29 CFR 1926.51
Wiring Methods (temporary wiring)	29 CFR 1910.305(a)(2) 29 CFR 1910.333	29 CFR 1926.405(a)(2)
Electrical Hazards		29 CFR 1926.416
Emergency Action Planning	29 CFR 1910.38	29 CFR 1926.35
Excavation	covered by 1926	29 CFR 1926 Subpart P
Confined Space Entry	29 CFR 1910.146	29 CFR 1926.21(b)(6)29 CFR 1926.353(b)
Material Handling	29 CFR Subpart N	29 CFR Subpart N29 CFR 1926.600-60229 CFR 1926.604
Building Demolition	covered by 1926	29 CFR 1926 Subpart T
Site ContaminantAbatement	29 CFR 1910.1000-1029 29 CFR 1910.1043-1052	29 CFR 1926.5529 CFR 1926.6229 CFR 1926.1101-1152
Elevated Work Surfaces	29 CFR 1910 Subpart D 29 CFR 1910 Subpart F	29 CFR 1926 Subpart L29 CFR 1926 Subpart M29 CFR 1926.552
Chemical Storage	29 CFR 1910 Subpart H29 CFR 1910.1200	29 CFR 1926.5929 CFR 1926 Subpart F
Personal Protective Equipment	29 CFR 1910 Subpart I	29 CFR 1926 Subpart E
Heavy Equipment Operation	29 CFR 1910.9529 CFR 1910 Subpart N	29 CFR 1926.5229 CFR 1926 Subpart 0
Tasks-Long Duration	29 CFR 1910.141-142	29 CFR 1926.51

The Federal General Industry and Construction citations are provided above

ATTACHMENT 2

HEAT STRESS MANAGEMENT PROGRAM AND PROCEDURES

INTRODUCTION

Panamerican employees engage in a variety of activities with potential exposure to excessive ambient temperatures and humidity, with the overall result being Aheat stress@. This procedure establishes the Panamerican Heat Stress Management Program. It establishes responsibilities and basic requirements for personnel who may be required to work in situations where the ambient temperature exceeds 21^o C (70^o F) while wearing protective equipment (e.g., hazardous waste site investigations) or when the ambient temperature exceeds 29^o (85^o F) while wearing normal clothing. Because heart stress is one of the most common and potentially serious illnesses at job sites and particularly hazardous waste sites, regular monitoring and other preventive measures are warranted.

There are no regulations addressing heat stress. However, it should be noted that OSHA does recognize heat stress as a potentially serious health hazard and can site employers under the Ageneral duty clause@ of the Occupational Safety Health Act if heat-related illness is occurring or likely to occur.

PROGRAM ADMINISTRATION AND RESPONSIBILITIES

The Heat Stress Management Program is administered by Panamerican Managers and Health and Safety personnel.

These Individuals:

- Oversee the implementation of the Heat Stress Management Program;
- Periodically audit and evaluate program implementation;
- Evaluate this procedure on an ongoing basis to see that it reflects current practice and regulations;
- Assist field crews in their implementation of this procedure.

Project Managers (PM) and Safety Personnel are responsible for:

- Implementing this Procedure in all field operations:
- Providing guidance to staff regarding heat stress management as described in the Procedure; and
- Providing feedback to management regarding program effectiveness.

Staff Members are responsible for:

- Complying with this Procedure as it applies to their activities; and
- Providing feed back to their supervisor regarding program effectiveness.

HEAT STRESS HAZARDS AND RISK FACTORS

Heat Stress is defined as the total net load on the body with contributions from both exposure to external sources, such as sunshine and hot surfaces, and from internal metabolic heat production. A person=s exposure to the increased ambient temperatures and humidity produces physiological responses referred to as heat stress which are characterized by an increase in the: a) Acore@ or Adeep body temperature@. b) heart rate, c) blood flow to the skin, and d) water and salt loss due to sweating. Conditions of excessive heat stress may occur either when the physical work is too heavy or the environment is too hot in relation to the work being performed. If work is performed under hot environmental conditions, the work load effort must be reviewed and the heat exposure limit maintained at or below the levels to protect the worker from the risk of acute heat illness.

In general, there are four types of physiological disorders associated with heat stress. They include:

- Heat Rash - a skin reaction occurring as a result of obstructed sweat glands, often associated with impermeable clothing.

- Heat Cramps - painful muscle spasms of extremities and abdomen, resulting from inadequate balance of electrolytes which are lost from sweating.

- Heat Exhaustion - a mild form of heat stroke due to depletion of body fluids and electrolytes. Blood vessels dilate despite decreased volume of blood. Symptoms include weakness, dizziness, nausea, rapid pulse, and a small increase in body temperature.

- Heatstroke - a potentially fatal disorder resulting from failure of the body=s thermoregulatory system. The classical description of heatstroke includes (1) a major disruption of central nervous function (unconsciousness of convulsions), (2) a lack of sweating (3) hot, dry, red or mottled skin, and (4) a core temperature in excess of 41° C (105.8° F). Heatstroke is a serious medical condition which calls for emergency medical action.

Seven factors play significant roles in the development of or predisposition to, heat stress disorders. These factors include:

- Acclimatization - Heat acclimatization leads to increased and quicker sweating, cooler skin due to an increase in evaporative cooling and a lower, more stable core body temperature. Maximal sweating rates in unacclimatized persons are lower, but salt concentrations in their perspiration are higher, requiring a higher rate of salt replacement.

- Age - Older individuals are generally more susceptible to heat stress than younger individuals. However, older healthy workers are able to perform well in hot jobs if permitted to proceed at a self-regulated pace.

- Gender - The average woman has a lower aerobic capacity than a similar-sized man. Nevertheless, when working at similar proportions of their maximum aerobic capacity, women perform similarly or only slightly less well than men.

- Body Fat - The lower level of physical fitness, decreased maximum work capacity and decreased cardiovascular capacity frequently associated with obesity predispose individuals to heat disorders.

- Water and Electrolyte Balance - Sustained, effective work performance in heat requires a replacement of body water and electrolytes lost through sweating. If this water is not replaced by drinking, continued sweating will draw on water reserves from both tissues and body cells leading to dehydration.

- Use of Alcohol and Medication - Not withstanding the potential hazards from impaired coordination and judgment, the ingestion of alcohol before or during work in the heat should not be permitted because it reduces heat tolerance and increases the risk of heat illness, Many drugs, including diuretics and antihypertensives, can interfere with the body=s thermoregulation.

- Physical Fitness - Physical conditioning enhances heat tolerance by increasing the functional capacity of the cardiovasculatory system, and reduces the time required to develop heat acclimatization by about 50% over those not physically fit.

The factors listed above are to be taken into account by all project personnel when planning or executing a project subject to heat stress conditions. The factors should be taken into consideration for:

- the development of the project schedule;
- the ordering of supplies/equipment;
- the support facilities to be made available at the site;
- the execution of work tasks; and
- the after work hours activities.

The following is a summary of signs and symptoms of heat stress:

Heat Rash may result from continuous exposure to heat or humid air .

Heat cramps are caused by heavy sweating with inadequate electrolyte replacement. Signs and symptoms include:

- Muscle Spasms
- Pain in the hands, feet and abdomen.

Heat Exhaustion occurs from increased stress on various body organs, including inadequate blood circulation due to cardiovascular insufficiency or dehydration. Signs and symptoms include:

- Pale, cool and moist skin
- Heavy sweating
- Dizziness, fainting and nausea

Heat stroke is the most serious form of heat stress. Temperature regulation fails, and the body temperature rises to critical levels. Immediate action must be taken to cool the body before serious injury or death occurs. Competent medical help must be obtained. Signs and symptoms are:

- Red, hot and unusually dry skin
- Lack of or reduced perspiration
- Dizziness and confusion

- Strong, rapid pulse and coma.

HEAT AND STRESS PREVENTION

Preventive measures should be taken to prevent personnel from experiencing heat stress illness. Prevention of heat stress is also important because if an individual has experienced a heat illness incident, he has an increased likelihood of future occurrences. Preventive measures include: favorable work scheduling, acclimatization of workers to hot environments, drinking sufficient quantities of fluids, providing cool, sheltered work and rest areas, and utilizing cooling devices as appropriate of feasible. Heat stress monitoring/work rest regimens are discussed below.

<u>Work Schedules and Activity</u>

If possible, work should be scheduled during the coolest part of the day. Early morning and evening work can be considerably more effective than working midday when the additional time for breaks and heat stress monitoring are taken into account.

Employees should also be encourages to maintain a certain level of activity during the work shift. Prolonged standing in hot environments can lead to heat illness because the blood pools in the lower extremities. Workers should periodically walk about to encourage blood circulation from the feet and legs.

<u>Acclimatization of Workers</u>

A properly designed and applied heat acclimatization program will dramatically increase the ability of workers to work at a hot job and will decrease the risk of heat-related illnesses and unsafe acts. Heat acclimatization can usually be induced in 5 to 7 days of exposure to the hot job. For workers who have had previous experience with the job, the acclimatization regimen should be exposure for 50% on day 1, 60% on day 2, 80% on day 3 and 100% on day 4. For workers new to job the schedule should be 20% on day 1 with a 20% increase in each additional day.
Acclimatization can be induced by sustained elevations of the skin and core body temperatures above levels for the same work in cool environments for an hour or more per day. Acclimatization needs periodic reinforcement such as occurs daily during the work week. Persons may show some loss of acclimatization on the first day of the new shift after being idle for two days or over a weekend. After vacations of two weeks or longer he loss of acclimatization is substantial, several days at work will be needed before heat tolerance is fully restored.

<u>Drinking Sufficient Quantities of Fluids</u>

Under hot conditions where sweat production may reach 6 to 8 liters per day, voluntary replacement of the water lost is usually incomplete. The normal thirst mechanism is not sensitive enough to urge us to drink enough water to prevent dehydration. Individuals are seldom aware of the exact amount of seat they produce of how much water is needed to replace that lost in sweat; 1 liter/hour is not an uncommon rate of water loss. Every effort should be made to encourage individuals to drink water, low-sodium noncarbonated beverages or electrolyte replacement fluids (e.g., Gatorade). Lightly salted water (1 gram/liter of water (0.1%) or one level teaspoon per 15 quarts of water), should be provided to unacclimated workers. The salt should be dissolved completely and the water kept cool. Salt tablets as dietary supplements are not generally recommended.

Workers should drink at least 500 ml (one pint) of water before beginning work. The fluid should be maintained at temperatures of 10º to 15º (50 to 59º F). If possible, small quantities of fluids should be consumed at frequent intervals (e.g., 150 to 250 milliliters (ml), or at least a quarter pint, every 20 minutes) rather than the intake of 750 ml (3 cups) or more once per hour. Individuals vary, but water intake should total 4 to 8 liters (quarts) per day. When heat stress is considered a potential problem, a minimum of 1 liter/hour/person of water are to be maintained onsite. Individual paper or plastic cups will be provided in order to prevent the spread of communicable disease.

Alcohol and diuretics such as caffeine (contained in coffee, tea and soft drinks) can increase dehydration. Therefore employees with potential exposure to heat stress should be discouraged from the consumption of these types of fluids during and after working hours.

Cool, sheltered Work and Rest Areas

Exposure to direct sunlight significantly increases the overall thermal loading of the body, thereby increasing an individuals susceptibility to heat stress illnesses. Whenever possible work should be conducted under suspended tarps, in shady areas or in other sheltered areas in order to reduce thermal loading caused by the sun. Cool sheltered areas should be provided also for rest breaks. A rest area should be situated so that part of it is in the contamination reduction area so that workers can take breaks without being required to undertake a full decontamination procedure. Canopies or tarps and open air tents, are types of cool shelters which can provide shaded rest areas.

Cooling Devices

Auxiliary cooling devices can be successfully used to provide body cooling, especially to workers wearing protective garments at hazardous waste sites. Vortex coolers utilize high velocity air which is directed inside the protective clothing. Vortex coolers have been used successfully in some operations. Cooling vests utilizing Ablue ice@ type packs can provide some cooling to the torso, but add weight for the wearer and can inhibit body movements.

Newer, more sophisticated tube and refrigerant systems woven into undergarments are also available. However, some of these systems ,,may not be effective in situations where the work involves considerable motion, since bending and lifting can crimp the tubes, impending the flow of refrigerant.

Heat Stress Monitoring

Several heat stress monitoring systems have been devised to help manage heat stress in hot work environments. Panamerican performs heat stress monitoring when: 1) employees are wearing normal work clothing in ambient temperatures exceeding 29º C, (85º F) and 2) employees wearing chemical protective clothing (including paper coveralls) working in ambient temperatures exceeding 21º C (70º F). The temperature differential is related to the reduced ability of a person to maintain a core temperature of ± 37º C (98.6º F) when wearing chemical protective clothing.

It should be noted by personnel that there are no Afast and true@ methods of heat stress monitoring; likewise there are no regulations concerning heat stress monitoring. Individual susceptibility to heat stress is highly variable. Some individuals are highly susceptible to any increase in their internal body temperature while other individuals can work very well with internal body temperatures of 39ºC (102.2º F) or higher.

The heat stress monitoring systems should be used by Site Safety Officers as guidelines and not necessarily as hard, fast rules. Individuals working in elevated temperatures should be queried on a regular basis regarding their perceived state of heat stress. If the calculated heat stress index value indicates that work can continue but a person states that they believe they are experiencing heat stress, the work effect should be discontinued and a rest break taken.

Likewise, if the calculated heat stress index value indicates that a rest break should be taken but the workers believe they can work longer, they should be permitted to work longer providing that their heart rates do not exceed 110 beats per minute. If the individual's heart rate rates exceed 110 beats per minute a rest break will be taken. In all cases, individual workers should not be permitted or expected to perform excessive work which could result in heat stress. If a SSO has any concerns that an individual may be pushing himself/herself past the Abreaking point@ the calculated work/rest regimen will be followed.

For strenuous field activities that are part of ongoing site work activities in hot weather, the following procedures shall be used to monitor the body=s physiological response to heat, and to monitor the work cycle of each site worker. There are two phases to this monitoring: the initial work/rest cycle is used to estimate how long the first work shifts of the day should be. Heart rate monitoring of each worker will establish the length of the successive work periods. Both phases are to be used are to be used for heat stress monitoring. Failure to use either one could place workers at risk of heat-related disorders.

<u>Phase 1 - Determination of the Initial Work - Rest Regimen</u>

The determination of the initial work - rest regimen can be performed using either of two methods:

-The Modified Dry Bulb Index; or
-The Wet Bulb Globe Thermometer (WBGT) Index

After the initial work - rest regimen has been determined, environmental conditions must be monitored for changes which would require a modification to the work - rest regimen. This, coupled with the heart rate monitoring, determines the work cycles to be followed on a site.

The Modified Dry Bulb Index accounts for the effects caused by solar, load, air temperature, and chemical protective clothing, under a light work load (walking at approximately 3 mph). A mercury thermometer, shielded from direct sunlight, is used to measure ambient temperature. The percentages of (of time) of sunlight and cloud cover are then estimated to determine a sunshine quality factor (e.g., 100% sunshine - no cloud cover = 1.0; 50% sunshine - 50% cloud cover = 0.5; 0% sunshine - 100% cloud cover = 0.0). When these two sets of values have been obtained, they are inserted into the following equation to calculate the adjusted temperature:

$$T\ (^{o}C,\ \text{adjusted}) = T\ (^{o}C,\ \text{actual}) + (7.2 \times \text{sunshine quality factor})$$

-OR-

$$T\ (^{o}F,\ \text{adjusted}) = T\ (^{o}F,\ \text{actual}) + (13 \times \text{sunshine quality factor})$$

After the adjusted temperature has been calculated, the length of the first work shift can be determined using the following table:

Initial Break and Physiological Monitoring Cycles

ADJUSTED TEMPERATURE	NORMAL WORK CLOTHES	PROTECTIVE CLOTHING
90^0F (32.2^0 C) or above	After each 45 minutes of work	After each 15 minutes of work
87.5^0-90^0 F (30.8^0-32.2^0 C)	After each 60 minutes of work	After each 30 minutes of work
82.5^0-87.5^0 F (28.1^0-30.8^0 C)	After each 90 minutes of work	After each 60 minutes of work
77.5^0-82.5^0 F (25.3^0-28.1^0 C)	After each 120 minutes of work	After each 90 minutes of work
72.5^0-77.5^0 F (22.5^0-25.3^0 C)	After each 150 minutes of work	After each 120 minutes of work

NOTE: The standard rest period is 15 minutes

WET BULB GLOBE THERMOMETER INDEX

The Wet Bulb Globe Thermometer (WBGT) Index was developed by the U.S. Army in the 1950s to prevent heat stress in army recruits. The WBGT Index accounts for the effects caused by humidity, air movement, evaporation, air temperature and work rate. It does not, however, account for the effects of chemical protective clothing, non-acclimatized workers, age, or other factors which may affect the likelihood of heat stress. Because of this, it is necessary to make adjustments to the index and conduct Heart Rate Monitoring.

WBGT measurements are usually obtained through the use of are-contained electronic devices. Such devices are easy to set up and can provide the user with the capabilities to store data and download to print out a hard copy.

Heat produced by the body and the environmental heat together determine the total heat load. Therefore, after the WBGT Index has been obtained, the anticipated work load category of each job shall be determined and the initial-rest regimen established using the table below.

The work load category may be determined by ranking each job into light, medium and heavy categories on the basis of type of operation. Examples of each category are:

Light work:	sitting or standing to control machines, performing light hand work
Moderate work:	walking about with moderate lifting and pushing; and
Heavy work:	pick and shovel work.

PERMISSIBLE HEAT EXPOSURE			
WORK-REST REGIMEN	WORK LOAD		
	LIGHT	MODERATE	HEAVY
	30.0^0 C/86^0 F	26.7^0 C/80.1^0 F	25^0C/77^0F
75% Work-25% Rest Each Hour	30.6^0 C/87.1^0 F	28^0 C/82.4^0 F	25.9^0 C/78.6^0 F
50% Work-50% Rest Each Hour	31.4^0 C/88.5^0 F	29.4^0 C/85.0^0 F	27.9^0 C/82.2^0 F
25%Work-75 % Rest Each Hour	32.2^0 C/90.0^0 F	31.1^0 C/88.0^0 F	30.0^0 C/86.0^0 F

The table reads as follows:

Light, continuous work is possible at any WBGT reading up to 30^0 C (86^0F) but above that limit work breaks are needed to recover from the heat; light work at temperatures of between 30.0 and 30.6^0 C (86 to 87^0 F) can be conducted, but 15 minute breaks must be taken every hour, etc. It is important to note that this table is applicable primarily to healthy, acclimatized personnel; wearing standard work clothing.

NOTE: An additional 6 to 11^0 C (42.8 to 51.8^0 F) must be added to the calculated WBGT temperature for personnel wearing chemical protective clothing prior to determining the initial work - rest regimen from this table. Because the WBGT Index does not take into account unacclimatized workers, or individual susceptibilities, the addition to the WBGT value does not eliminate the requirement for Heart Rate Monitoring after work has begun.

Phase 2 - Heart Rate Monitoring

An increase in the heart rate is a significant indication of stress, whether induced by exposure to heat or through physical labor. Although baseline heart rates can vary significantly between individuals and during the day for an individual, a heart rate of 110 beats per minute or greater is an indication of physiological stress. To prevent heat stress illnesses, the heart rate (HR) should be measured by radial (wrist) or carotid (neck) pulse for 30 seconds as early as possible in the rest period. The HR at the beginning of the rest period should not exceed 110 beats/minute. If the HR is higher, the next work period should be shortened by 33 percent while the length of the rest period stays the same. If the pulse rate still exceeds 110 beats/minute at the beginning of the next rest period, the following work period should be further shortened by 33 percent while the length of the rest period stays the same.

ATTACHMENT 3

TRENCHING AND EXCAVATION HEALTH AND SAFETY REQUIREMENTS

BRYDGES ENGINEERING IN ENVIRONMENT AND ENERGY, DPC

REGULATORY AUTHORITY

Excavations will be performed in accordance with OSHA 29 CFR, subpart P, 1926:650-1926.652 and USACOE EM 385-1-1 section 25 requirements as they apply to project activities.

GENERAL

- **At all times the need for personnel to enter excavations will be minimized. Inspections or sample removal will be done from above the excavation, whenever possible.**

- **Personnel will only enter excavations after the requirements of this plan have been met.**

- **Personnel protective equipment including hard hat, safety glasses and steel-toe work boots may be required.**

SURFACE ENCUMBRANCES

Surface encumbrances such as structures, fencing, piping, stored material etc. which may interfere with safe excavations will be avoided, removed or adequately supported prior to the start of excavations. Support systems will be inspected daily.

UNDERGROUND UTILITIES

Underground utility locations will be checked and determined and permits as necessary will be in place prior to initiating excavations. Local utility companies will be contacted at least two days in advance, advised of proposed work, and requested to locate underground installations. When excavations approach the estimated location of utilities, the exact location will be determined by careful probing or hand digging and when it is uncovered, proper supports will be provided.

OVERHEAD OBSTACLES

A minimum safe distance of 20 feet will be maintained when working around overhead high-voltage lines or the line will be de-energized following appropriate lock-out and tag-out procedures by qualified utility personnel.

ENTRY/EXIT ROUTES

Excavations five feet or more deep will require an adequate means of exit, such as a ladder, ramp, or steps and located so as to require no more than 25 feet of lateral travel. Under no circumstances will

personnel be raised.

VEHICLE CONTROL/SAFETY

Personnel working around heavy equipment, or who may be exposed to public vehicular traffic will wear a traffic warning vest consisting of at least 400 square inches of red or orange material. At night, at least 400 square inches of florescent or other reflective material will be worn.

For excavation work on or adjacent to highways or streets, signs, signals, and barricades tat conform to the requirements of the current American National Standards Institute (ANSI) D6.1, Manual on Uniform Traffic Control Devices for Streets and Highways will be used to protect work areas. Signs, signals, and barricades will be adequately lighted at night. Flagmen will be provided when signs, signals and barricades do not provide adequate protection. Flagmen will use signals and procedures contained in the current issue of ANSI D6.1. At night, flagmen will be clearly illuminated so as to be easily seen by approaching traffic.

For mobile equipment operating next to or approaching the edge of an excavation, the operator will have a clear view of the edge of the excavation, or a warning system such as barricades, hand or mechanical signals, or stop logs will be used. If possible the surface grade will slope away from the excavation.

Personnel will be safely located in and around the trench and will not be permitted to work underneath loads handled by lifting or digging equipment. Personnel are required to stand away from vehicles being loaded and unloaded. Operators can remain in the cabs of vehicles being loaded or unloaded provided the vehicles are equipped to provide adequate protection to the operator.

HAZARDOUS ATMOSPHERES

Hazardous atmospheres, such as oxygen deficiency (atmospheres containing less than 19.5% oxygen), flammable gases or vapors (airborne concentrations greater than 20% of the lower explosive limit), and toxic gases or vapors (airborne concentrations above the OSHA Permissible Exposure Limit or other exposure limits) may occur in excavations, especially around landfills and hazardous waste sites.

In locations where oxygen deficiency or hazardous gaseous conditions are possible, the air in the excavation will be tested before personnel are permitted to enter an excavation deeper than 4 feet. When flammable gases are present, adequate ventilation will be provided and sources of ignition will be eliminated. Ventilation or respiratory protection will be provided to prevent personnel exposures to oxygen deficient or toxic atmospheres. Periodic retesting (at least each shift) of the excavation will be conducted to verify that the atmosphere is acceptable. A log or field book records will be maintained of all test results.

WATER ACCUMULATION HAZARDS

Personnel will not work in excavations that have accumulated water or where water is accumulating unless adequate precautions have been taken. These precautions can include special support or shield systems, water removal systems such as pumps, or safety harnesses and lifelines. Water removal systems will be operated and monitored by experienced personnel. Diversion ditches or dikes will be used to prevent surface water from entering the excavation and to provide adequate drainage of the area around the excavation. Adequate precautions, as described above, will be taken for excavating

subject to heavy rains.

STABILITY OF ADJACENT STRUCTURES

Support systems such as shoring, bracing, or underpinning will be provided to maintain the stability of adjoining buildings, walls, or other structures endangered by the excavation operations. Excavations below a foundation or retaining wall that could be reasonably expected to pose a hazard to personnel will not be permitted unless:

- **a support system is provided**
- **The excavation is in stable rock; or**
- **A Registered Professional Engineer has determined that the structure will not be effected by the excavation activity or that the excavation work will pose a hazard to employees. The Professional Engineer is required to demonstrate how the above determination was made on the basis of appropriate calculations.**

Sidewalks will not be undermined unless shored to protect from possible collapse.

PROTECTION FROM LOOSE ROCK, MATERIALS OR SPOILS

In excavations and trenches that personnel may be required to enter, loose rock, excavated or other material, and spoils will be effectively stored and retained at least two feet or more from the edge of the excavation.

As an alternative to the clearance prescribed above, barriers or other effective retaining devices may be used in order to prevent spoils or other materials from falling into the excavation.

Walkways, runways, and sidewalks will be kept clear of excavated material from other obstructions.

Scaling operations may be used to remove loose material and will be performed only by experienced crews under the direct supervision of a competent supervisor. The scalers will be provided with scaler=s lifelines, safety belts, boatswain chair, and other safety equipment necessary for their protection.

FALL PROTECTION

Walkways or bridges with standard guardrails that meet OSHA specifications will be provided where employees, the public, or equipment are required to cross over excavations.

Adequate barrier physical protection will be provided at all remotely located excavations. All excavations will be barricaded or covered.

EMERGENCY RESCUE

In the event of a cave-in, the Emergency Rescue Squad will be immediately notified. The caller should provide his name, location, nature of the accident (an excavation collapse), the dimensions of the excavation, and number of people trapped in the excavation. Personnel are not to enter a collapsed trench to attempt rescue. This may cause a further collapse of the trench. Under no circumstance is heavy equipment to be used to attempt rescue of personnel in a collapsed excavation; injury or decapitation could be the result. All heavy equipment and traffic in the area is to be shut down and

stopped to reduce vibration. Pumps should be started if water ensues.

INSPECTION PROGRAM

Safety personnel will conduct daily inspections of the excavation, the adjacent areas, and protective systems. Inspections will be conducted prior to the start of work and as needed throughout the work shift. Inspections will also be made after every rainstorm or other occurrence that increases the hazard of collapse (i.e., vibration from heavy equipment, freezing and thawing, etc.).

The excavation inspection will include a check for the following:

- **Evidence if situations that could result in possible cave-in (i.e. soil crumbling or sloughing, water saturated soils, freezing and thawing, unusual vibrations such as from heavy equipment, heavy rains, surface run off entering trench, etc.);**
- **Indications of failure of protective systems;**
- **Hazardous atmosphere (oxygen deficiency, flammable and toxic gases and vapors);**
- **Condition and support of exposed underground installations;**
- **Adequate means of egress;**
- **Signs, signals, and barricades for work area protection;**
- **Precautionary measures to control water accumulation;**
- **Stability and support of adjacent structures; and**
- **Adequate protection from loose rock and soil.**

PROTECTIVE SYSTEMS

Personnel working in excavations will be protected from cave-ins by sloping and/or benching of excavation walls, a shoring system or some other equivalent means except when:

- **The excavation is made entirely in stable rock; or**
- **Excavations are less than five feet deep and safety personnel have determined that there is no indication of potential cave-in. Depending on site and soil conditions protective measures may be taken for the excavations less than five feet in depth.**

The most important factor influencing the choice of protective systems is the soil type classification. Once the soil type has been classified, selection of the protective system, the determination of the angle of repose for sloping and benching, and the design of shoring systems will be made. Decisions will be based on careful evaluation of pertinent factors such as depth of cut; possible variation in water content of the material while the excavation is open; anticipated changes in materials from exposure to air, sun, water, or freezing; loading imposed structures equipment, overlying material, or stored material; and vibration from equipment, blasting traffic or other sources.

Soil Classification

Appendix A of the OSHA Excavation Standard describes a methjod to classify soils into four types:

1. Stable Rock - Solid mineral matter that can be excavated with vertical sides.

2. Type A - cohesive soils with an unconfined compressive strength of 1.5 ton per square foot (tsf) or greater. Examples include: clay; silty clay; sandy clay; clayey loam; and cemented soils such as caliche and hardpan. No soil is considered to be Type A if it is fissured, subject to vibration, previously disturbed, or part of a sloped, layered system.

3. Type B - cohesive soils with an unconfined compressive strength of greater than 0.5 tsf but less than 1.5 tsf. Examples include: angular gravel similar to crushed rock; silt; silty loam; and sandy loam; Type B soils also include : previously disturbed soils that are not type C; Type A soils that are fissured or subject to vibration; and dry rock that is not stable.

4. Type C - cohesive soils with an unconfined compressive strength of 0.5 tsf or less. Examples include: gravel; sand; loamy sand; submerged soil or soil from which water is seeping; submerged rock that is not stable.

The engineer, geologist, or safety personnel will conduct at least one visual and at least one manual test as described in the OSHA excavation standard in order to classify soils. Visual tests include looking for : particle size and soil cohesiveness (clumping); cracking in the excavation sides which suggests fissured material; underground installations ans previously disturbed soils; layered soil systems that slope toward the excavation; evidence of surface water and water seeping from the sides of the excavation; and sources of vibration that may affect the excavation stability. Manual tests include: plascticity; dry strength; tumb penetration; drying test; and strength tests using a pocket penetrometer or hand-operated shearvane.

<u>Sloping and Benching</u>

One of the following options for sloping and benching systems described in section 1926.652(b) of the OSHA Excavation Standard will be used in excavations of .5 foot or deeper or at the discretion of the safety personnel:

- **The walls of excavation will be sloped at an angle not steeper than 0ne-and one-half horizontal to one vertical. Sloping configurations will follow the slopes shown for Type C soils in Appendix B of the OSHA Excavation Standard.**

- **Maximum allowable slopes and sloping and benching configurations will be determined according to soil type as described in Appendices A and B of the OSHA Excavation Standard.**

- **Use of other written tabulated data and designs, such as tables and charts, to design sloping and benching systems. A copy of the tabulated data must be approved by a registered Professional Engineer. A copy of the tabulated data must be kept at the job site.**

Personnel are not allowed to work on the faces of sloped or benched excavations above other workers unless the workers at the lower levels are protected from falling material or equipment. Similar protection will be provided for personnel working in excavations below other workers.

<u>Support Systems, Shield Systems, and Other Protective Devices</u>

One of the following options described in OSHA (1926.652 (c)) will be followed.

- **Timber shoring, designed according to the conditions and requirements of Appendix C of the OSHA Excavation Standard or aluminum hydraulic shoring designed according to manufacturers tabulated data or Appendix D of the OSHA Excavation Standard. In order to use the information in Appendices C or D, the soil type must first be determined using the classification system in Appendix A. For each soil type the size and spacing of the cross braces, uprights, and walls that comprise the shoring system are then selected based on the depth and width of the trench.**

- **Use of the manufacturer=s written tabulated to design support systems, shielded systems, and other protective devices. Any deviation from this tabulated data must be approved by the manufacturer. A copy of the tabulated data as well as any approvals to deviate from the tabulated data must be kept at the job site.**

- **Use of other written tabulated data to design support systems, shield systems, and other protective devices. The tabulated data must be approved by a Registered Professional Engineer. A copy of the tabulated data must be kept at the job site.**

- **Use of a written support system, shield system, and other protective device design that has been approved by a Registered Professional Engineer. A copy of the written design must be kept at the job site.**

<u>Installation and Removal of Support</u>

Cross braces or trench jacks, uprights, and walls will be secured together to prevent sliding, falling or kickouts.

Additional precautions by way of shoring and bracing will be taken to prevent slides or cave-ins when excavations or trenches are made in locations adjacent to backfilled excavations, or where excavations are subjected to vibrations from railroad or highway traffic, the operation of machinery, or any other source.

If it is necessary to place or operate power shovels, derricks, trucks, materials, or other heavy objects on a level above or near any excavation, the side of the excavation will be sheetpiled, shored, and braced as necessary to resist the extra pressure due to such superimposed loads.

Backfilling and removal of trench supports will progress together from the bottom of the trench. Jacks or braces will be released slowly and , in unstable soil, ropes will be used to pull out the jacks or braces from above after employees have cleared the trench.

<u>Shield Systems</u>

Portable trench boxes or sliding trench shields may be used for protection of personnel in lieu of a shoring system or sloping. Where such trench boxes or shields are used, they will be designed, constructed and maintained in a manner which will provide protection equal to or greater than the sheeting or shoring required for the trench. Shields will be installed so as to restrict lateral or other hazardous movement. Personnel are not allowed inside shields when shields are being moved.

EXCAVATION SAFETY LIST

To be completed prior to each work shift, or prior to personnel entering a new trench for the first time, by the Site Safety Officer/Competent Person:

Project______________________Location____________________________________

Job Number____

Competent Person(CP)*__________________________Date__________________

		Yes	No	N/A
1.	**Has the site been cleared for utilities and other underground obstructions?**	____	____	____
2.	**If on public property, has the regional utility locating service been notified?**	____	____	____
3.	**Has the excavation equipment been safety checked by the operator?**	____	____	____
4.	**Are copies of relevant OSHA excavation regulations available on site?**	____	____	____
5.	**Will the excavation be 5 feet or more in depth?**	____	____	____
6.	**If 4 is yes, will personnel enter the excavation at any time?**	____	____	____
7.	**If 4a is yes, have provisions been made for shoring, sloping, or benching the excavation? Describe:** ____________________________________ ____________________________________ ____________________________________	____	____	____
8.	**Has an inspection of the site and excavation been conducted by the SSO?**	____	____	____
9.	**Has the Competent Person conducted visual and manual tests to classify the soil?**	____	____	____

*** According to Federal OSHA, A Competent Person is a person who is capable of identifying existing and predictable hazards in the surroundings; or working conditions which are unsanitary, hazardous, or dangerous to employees; and who has the authority to take prompt corrective measures to eliminate them.**

10. G Visual Test _____________________________(type)
G Manual Test_____________________________(type)
G Soil Classification_________________________(type)

11. Are there any conditions that might expose employees to injury from possible moving ground? ____ _____ ____

12. Is excavated material being placed at least 2 feet from the edge of the excavation? ____ ____ ____

13. Is work in the excavation at all times under the immediate supervision of the SSO or other competent person? ____ ____ ____

14. Is there a stairway, ladder, or ramp securely fastened in place to provide ingress and egress from the excavation? ____ ____ ____

15. If the excavation is 4 feet or more in depth, are safe means of access (see 8) provided so as to require no more than 25 feet of lateral travel to reach them? ____ ____ ____

16. If structural ramps are installed that are used for access/egress: were they designed by a qualified engineer? ____ ____ ____

17. Do the structural ramps have appropriate means to prevent slipping and are the ramps uniform in thickness? ____ ____ ____

18. Are walkways or bridges provided across the excavation to safe crossing? ____ ____ ____

19. If excavations are 71/2 or more feet in depth, do the walkways have guardrails and toeboards? ____ ____ ____

20. Are undermined structures adequately supported to safely carry all anticipated loads and protect workers? ____ ____ ____

21. Are there adequate means provided to prevent mobile equipment from inadvertently entering the excavation? ____ ____ ____

22. Is the excavation well marked and barricaded to prevent personnel from falling IN? ____ ____ ____

23. Are means available to prevent surface water from entering the excavation and to provide ____ ____ ____

adequate drainage of the area adjacent to the trench?

24.	**Where it is reasonable to expect hazardous atmospheres, including oxygen deficiency, to exist in the excavation, is appropriate atmosphere testing equipment available.**	____	____	____
25.	**Has the testing equipment been calibrated, and the calibrations recorded, today?**	____	____	____
26.	**Are employees trained in proper use of this equipment?**	____	____	____
27.	**Has a harness and lifeline been provided whenever an employee is required to enter a confined footing excavation?**	____	____	____
28.	**Is appropriate personal protective equipment (hardhat, safety boots, eye protection, etc.) available and in use?**	____	____	____

Notes:____
____
____
____

______________________ ______________________________

CPs Name (Print) **Signature**

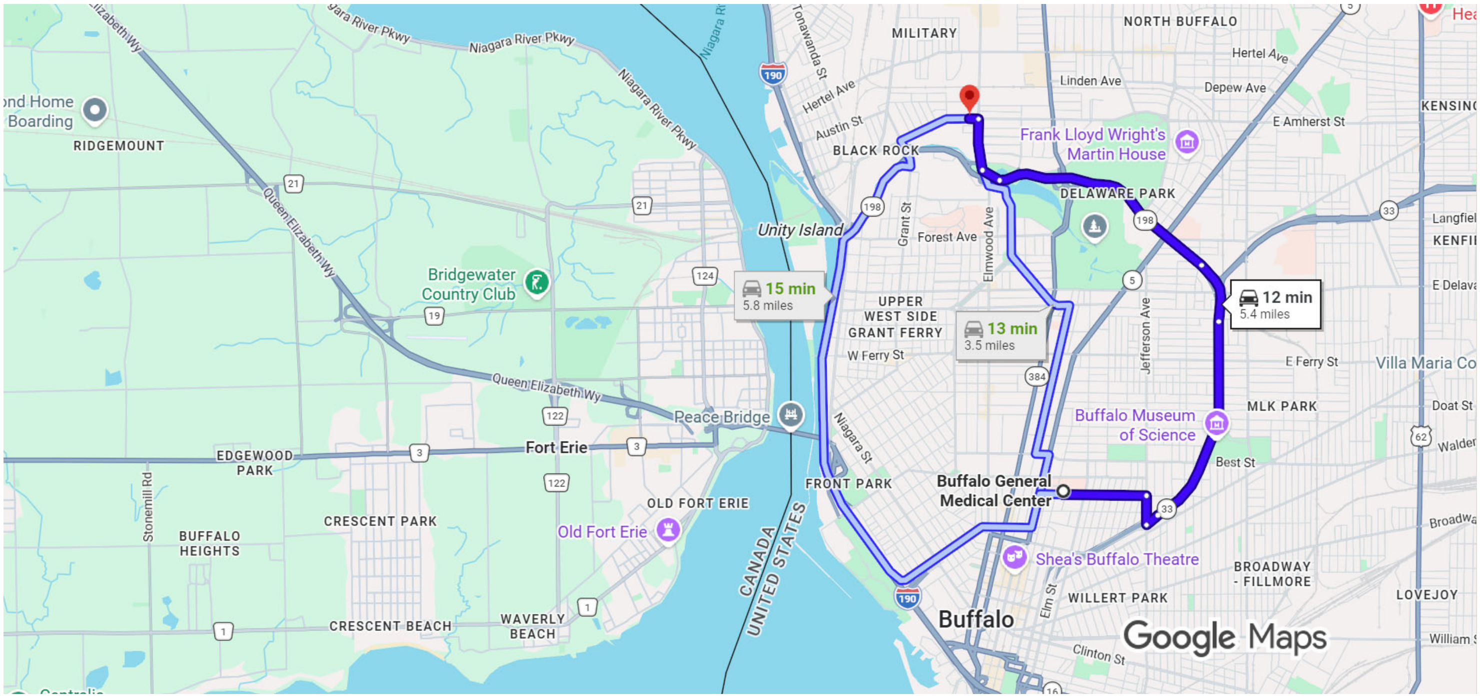
ATTACHMENT 4

MAP TO HOSPITAL

Google Maps

Buffalo General Medical Center to 666 Amherst St, Buffalo, NY 14207

Drive 5.4 miles, 12 min



Imagery ©2026 , Map data ©2026 Google   1 mi

via NY-33 E and NY-198 W	12 min
Fastest route, the usual traffic	5.4 miles
via Linwood Ave	13 min
	3.5 miles
via I-190 N	15 min
	5.8 miles

Explore nearby 666 Amherst St

Restaurants

Hotels

Gas stations

Parking Lots

More

Appendix B

Community Air Monitoring Plan

COMMUNITY AIR MONITORING PROGRAM

VOELKERS LANES APARTMENTS

1624, 1628, 1634 ELMWOOD AVENUE; 666, 668, 670, 680
AMHERST STREET; 155 MARION STREET
BUFFALO, ERIE COUNTY, NEW YORK

Prepared for:

SAA | EVI
110 Elmwood Avenue
Buffalo, NY 14201

Prepared by:

BRYDGES ENGINEERING IN ENVIRONMENT AND ENERGY, DPC
960 Busti Avenue, Suite B-150
Buffalo, New York 14213

May 2026

Table of Contents

Attachments

1.0 COMMUNITY AIR MONITORING PROGRAM (CAMP)

A Community Air Monitoring Program (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the upwind and downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The program 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 and on-site workers not directly involved with work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. A NYSDOH generic CAMP obtained from NYSDEC DER-10 is presented in Attachment 1 that will be followed and adhered to for work activities that could release potential contaminants from an impacted area.

A program for suppressing fugitive dust and particulate matter monitoring will also be conducted in accordance NYSDEC DER-10 titled Appendix 1B Fugitive Dust and Particulate Monitoring, which is also provided in Attachment 1. The fugitive dust suppression and particulate monitoring program will be employed at the site during building demolition, site investigations/remediation and other intrusive activities which warrant its use.

Both the CAMP and the fugitive dust and particulate monitoring program will be administered by the environmental engineer/consultant. Monitoring results of the CAMP will be reported to the New York State Department of Health daily for review.

NYSDEC and NYSDOH are to be provided CAMP data on a daily basis when collected. When sample excursions occur, identify the reason for the excursions and measures to address the excursions.

ATTACHMENT 1

NYSDOH Generic CAMP
and
Fugitive Dust and Particulate Monitoring

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. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate DEC/NYSDOH staff.

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

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. "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 mcg/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 mcg/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 mcg/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.

December 2009

Appendix 1B
Fugitive Dust and Particulate Monitoring

A program for suppressing fugitive dust and particulate matter monitoring at hazardous waste sites is a responsibility on the remedial party performing the work. These procedures must be incorporated into appropriate intrusive work plans. The following fugitive dust suppression and particulate monitoring program should be employed at sites during construction and other intrusive activities which warrant its use:

1. Reasonable fugitive dust suppression techniques must be employed during all site activities which may generate fugitive dust.

2. Particulate monitoring must be employed during the handling of waste or contaminated soil or when activities on site may generate fugitive dust from exposed waste or contaminated soil. Remedial activities may also include the excavation, grading, or placement of clean fill. These control measures should not be considered necessary for these activities.

3. Particulate monitoring must be performed using real-time particulate monitors and shall monitor particulate matter less than ten microns (PM10) with the following minimum performance standards:

(a) Objects to be measured: Dust, mists or aerosols;
(b) Measurement Ranges: 0.001 to 400 mg/m3 (1 to 400,000 :ug/m3);
(c) Precision (2-sigma) at constant temperature: +/- 10 :g/m3 for one second averaging; and +/- 1.5 g/m3 for sixty second averaging;
(d) Accuracy: +/- 5% of reading +/- precision (Referred to gravimetric calibration with SAE fine test dust (mmd= 2 to 3 :m, g= 2.5, as aerosolized);
(e) Resolution: 0.1% of reading or 1g/m3, whichever is larger;
(f) Particle Size Range of Maximum Response: 0.1-10;
(g) Total Number of Data Points in Memory: 10,000;
(h) Logged Data: Each data point with average concentration, time/date and data point number
(i) Run Summary: overall average, maximum concentrations, time/date of maximum, total number of logged points, start time/date, total elapsed time (run duration), STEL concentration and time/date occurrence, averaging (logging) period, calibration factor, and tag number;
(j) Alarm Averaging Time (user selectable): real-time (1-60 seconds) or STEL (15 minutes), alarms required;
(k) Operating Time: 48 hours (fully charged NiCd battery); continuously with charger;
(l) Operating Temperature: -10 to 50° C (14 to 122° F);
(m) Particulate levels will be monitored upwind and immediately downwind at the working site and integrated over a period not to exceed 15 minutes.

4. In order to ensure the validity of the fugitive dust measurements performed, there must be appropriate Quality Assurance/Quality Control (QA/QC). It is the responsibility of the remedial party to adequately supplement QA/QC Plans to include the following critical features: periodic instrument calibration, operator training, daily instrument performance (span) checks, and a record keeping plan.

5. The action level will be established at 150 ug/m3 (15 minutes average). While conservative,

this short-tenn interval will provide a real-time assessment of on-site air quality to assure both health and safety. If particulate levels are detected in excess of 150 ug/m3, the upwind background level must be confirmed immediately. If the working site particulate measurement is greater than 100 ug/m3 above the background level, additional dust suppression techniques must be implemented to reduce the generation of fugitive dust and corrective action taken to protect site personnel and reduce the potential for contaminant migration. Corrective measures may include increasing the level of personal protection for on-site personnel and implementing additional dust suppression techniques (see paragraph 7). Should the action level of 150 ug/m3 continue to be exceeded work must stop and DER must be notified as provided in the site design or remedial work plan. The notification shall include a description of the control measures implemented to prevent further exceedances.

6. It must be recognized that the generation of dust from waste or contaminated soil that migrates off-site, has the potential for transporting contaminants off-site. There may be situations when dust is being generated and leaving the site and the monitoring equipment does not measure PM10 at or above the action level. Since this situation has the potential to allow for the migration of contaminants off-site, it is unacceptable. While it is not practical to quantify total suspended particulates on a real-time basis, it is appropriate to rely on visual observation. If dust is observed leaving the working site, additional dust suppression techniques must be employed. Activities that have a high dusting potential--such as solidification and treatment involving materials like kiln dust and lime--will require the need for special measures to be considered.

7. The following techniques have been shown to be effective for the controlling of the generation and migration of dust during construction activities:

(a) Applying water on haul roads;
(b) Wetting equipment and excavation faces;
(c) Spraying water on buckets during excavation and dumping;
(d) Hauling materials in properly tarped or watertight containers;
(e) Restricting vehicle speeds to 10 mph;
(f) Covering excavated areas and material after excavation activity ceases; and
(g) Reducing the excavation size and/or number of excavations.

Experience has shown that the chance of exceeding the 150ug/m3 action level is remote when the above-mentioned techniques are used. When techniques involving water application are used, care must be taken not to use excess water, which can result in unacceptably wet conditions. Using atomizing sprays will prevent overly wet conditions, conserve water, and provide an effective means of suppressing the fugitive dust.

8. The evaluation of weather conditions is necessary for proper fugitive dust control. When extreme wind conditions make dust control ineffective, as a last resort remedial actions may need to be suspended. There may be situations that require fugitive dust suppression and particulate monitoring requirements with action levels more stringent than those provided above. Under some circumstances, the contaminant concentration and/or toxicity may require additional monitoring to protect site personnel and the public. Additional integrated sampling and chemical analysis of the dust may also be in order. This must be evaluated when a health and safety plan is developed and when appropriate suppression and monitoring requirements are established for protection of health and the environment.

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). Depending upon the nature of contamination, chemical-specific colorimetric tubes of sufficient sensitivity may be necessary for comparing the exposure point concentrations with appropriate pre-determined response levels (response actions should also be pre-determined). 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/m^3, work activities should be suspended until controls are implemented and are successful in reducing the total particulate concentration to 150 mcg/m^3 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 C

Quality Assurance/Quality Control Plan

BRYDGES ENGINEERING
IN ENVIRONMENT AND ENERGY, DPC

QUALITY ASSURANCE/QUALITY CONTROL PLAN

VOELKERS LANES APARTMENTS

1624, 1628, 1634 ELMWOOD AVENUE; 666, 668, 670, 680
AMHERST STREET; 155 MARION STREET
BUFFALO, ERIE COUNTY, NEW YORK

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May 2026

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1.0 INTRODUCTION

This Quality Assurance/Quality Control (QA/QC) Plan provides an overview of QA/QC procedures required for the project. It also provides methods for laboratory testing of environmental samples obtained from the Site, which helps to ensure the quality of the data produced. The organizational structure for this project is presented in the Work Plan, which identifies the names of key project personnel. The project manager is responsible for verifying that QA procedures are followed in the field so that quality, representative samples are collected. The Project Manager is in contact with the analytical laboratory to monitor laboratory activities so that holding times and other QA/QC requirements are met. The anticipated quantity of field samples collected, and corresponding analytical parameters/methods are provided below.

TABLE 1
ANALYTICAL SUMMARY TABLE

PARAMETER	EPA METHOD	QUANTITY (GW)[A]	Soil	Air
Part 375 VOCs + TICs	8260	7	47	
Part 375 SVOCs + TICs	8270	7	51	
Part 375 Metals	6010/7470/7471	7	51	
Part 375 Cyanide	9012		51	
Part 375 Cyanide	9010	7		
Part 375 PCBs	8082	7	51	
Part 375 Pesticides	8081	7	51	
PFAS Contaminants	1633	7	51	
1,4 Dioxane	8270SIM	7	51	
VOCs	TO-15			8

Note, soil totals include 1 sample for a duplicate per 20 samples. Holding Times: 8260-14 days and 8270, 8081, and 8082-7 days
A = 1 MS/1MSD and 1 trip blank

All samples analyzed for VOCs and/or SVOCs will report TICs as specified in DER-10 Section 2.1(a)1.i. Sampling for emerging contaminants be conducted in accordance with the NYSDEC Guidance for Sampling and Analysis of PFAS (April 2023). As detailed in the guidance document, PFAS compounds should be analyzed under EPA Method 1633. The analytical laboratory proposed for use for the analysis of samples will be a certified NYSDOH ELAP laboratory. The QA Manager of the laboratory will be responsible for performing project-specific audits and for overseeing the quality control data generated. The field geologist/technician coordinates all personnel involved with field sampling, verifies that all sampling is conducted per the FSP, and communicates regularly with the Project Manager. The ultimate responsibility for maintaining quality throughout the project rests with the Project Manager, including field and laboratory QA/QC.

2.0 DATA QUALITY OBJECTIVES

2.1 BACKGROUND

Data quality objectives (DQOs) are qualitative and quantitative statements, which specify the quality of data required supporting the investigation for the site. DQOs focus on the identification of the end use of the data to be collected. The project DQOs are achieved utilizing the definitive data category as outlined in *Guidance for the Data Quality Objectives Process,* EPA QA/G-4 (September 1994). All sample analyses will provide definitive data, which are generated using rigorous analytical methods such as reference methods approved by the United States Environmental Protection Agency (USEPA). The purpose of this investigation is to determine the nature and extent of contamination at the site.

Within the context of the purpose stated above, the project DQOs for data collected during this investigation are:

- To assess the nature and extent of contamination in soil, groundwater, and soil vapor;
- To maintain the highest possible scientific/professional standards for each procedure;
- To develop sufficient data to assess whether the levels of contaminates identified in the media sampled exceed regulatory guidelines.

2.2 QA Objectives for Chemical Data Measurement

Sample analytical methodology for the media sampled and data deliverables are required to adhere to the requirements in NYSDEC Analytical Services Protocol. Laboratories are instructed to complete Sample Preparation and Analysis Summary forms and submit them with the data packages. The laboratory is instructed that matrix interferences must be fixed to the extent practicable. To achieve the definitive data category described above, the data quality indicators of precision, accuracy, representativeness, comparability, and completeness are measured during analysis.

2.2.1 Precision

Precision examines the distribution of the reported values about their mean. The distribution of reported values refers to how different the individual reported values are from the average reported value. Precision may be affected by the natural variation of the matrix or contamination within that matrix and by errors made in field or laboratory handling procedures. Precision is evaluated using analyses of a laboratory matrix spike/matrix spike duplicate (for organics) and matrix duplicates (for inorganics), which indicate analytical precision through the reproducibility of the analytical results. Relative Percent Difference (RPD) is used to evaluate precision and it must meet the method requirements.

2.2.2 Accuracy

Accuracy measures the analytical bias in a measurement system. Sources of error are the sampling process, field contamination, preservation, handling, sample matrix, sample preparation, and analysis techniques. This data helps to assess the potential concentration contribution from various outside sources. The laboratory objective for accuracy is to equal or exceed the accuracy demonstrated for the applied analytical methods on samples of the same matrix. The percent recovery criterion is used to estimate accuracy based on recovery in the matrix spike/matrix spike duplicate and matrix spike blank samples. The spike and spike duplicate, which will give an indication of matrix effects that may be affecting target compounds is also a good gauge of method efficiency.

2.2.3 Representativeness

Representativeness expresses the degree to which the sample data accurately and precisely represents the characteristics of a population of samples, parameter variations at a sampling point, or environmental conditions. Representativeness is a qualitative parameter, which is most concerned with the proper design of the sampling program or sub-sampling of a given sample. Objectives for representativeness are defined for sampling and analysis tasks and are a function of the investigative objectives. The sampling procedures described in the Field Sampling Plan have been selected with the goal of obtaining representative samples for the media of concern.

2.2.4 Comparability

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. A DQO for this program is to produce data with the greatest possible degree of comparability. This goal is achieved through using standard techniques to collect and analyze representative samples and reporting analytical results in appropriate units. Complete field documentation will support the assessment of comparability. Comparability is limited by the other parameters (e.g., precision, accuracy, representativeness, completeness, comparability), because only when precision and accuracy are known can data sets be compared with confidence. For data sets to be comparable, it is imperative that contract-required methods and procedures be explicitly followed.

2.2.5 Completeness

Completeness is defined as a measure of the amount of valid data obtainable from a measurement system compared to the amount that was expected to be obtained under normal conditions. It is important that appropriate QA procedures be maintained to verify that valid data are obtained to meet project needs. For the data generated, a goal of 90% is required for completeness (or usability) of the analytical data. If this goal is not met, then project personnel will determine whether the deviations might cause the data to be rejected.

3.0 SAMPLING LOCATIONS, CUSTODY, AND HOLDING TIMES

Sampling locations are discussed in the Work Plan. Procedures addressing field and laboratory sample chain-of-custody and holding times details are presented in the Field Sampling Plan. The laboratory must meet the method required detection limits which are referenced within the methods.

4.0 CALIBRATION PROCEDURES AND FREQUENCY

To obtain a high level of precision and accuracy during sample processing procedures, laboratory instruments must be calibrated properly. Several analytical support areas must be considered so the integrity of standards and reagents is upheld prior to instrument calibration. The following sections describe the analytical support areas and laboratory instrument calibration procedures.

4.1 ANALYTICAL SUPPORT AREAS

Prior to generating quality data, several analytical support areas must be considered; these are detailed in the following paragraphs.

Standard/Reagent Preparation – Primary reference standards and secondary standard solutions shall be obtained from National Institute of Standards and Technology (NIST), or other reliable commercial sources to verify the highest purity possible. The preparation and maintenance of standards and reagents will be accomplished according to the methods referenced. All standards and standard solutions are to be formally documented (i.e., in a logbook) and should identify the supplier, lot number, purity/concentration, receipt/preparation date, preparers name, method of preparation, expiration date, and any other pertinent information. All standard solutions shall be validated prior to use. Care shall be exercised in the proper storage and handling of standard solutions (e.g., separating volatile standards from nonvolatile standards). The laboratory shall continually monitor the quality of the standards and reagents through well documented procedures.

Balances – The analytical balances shall be calibrated and maintained in accordance with manufacturer specifications. Calibration is conducted with two Class AS" weights that bracket the expected balance use range. The laboratory shall check the accuracy of the balances daily and they must be properly documented in permanently bound logbooks.

Refrigerators/Freezers – The temperature of the refrigerators and freezers within the laboratory shall be monitored and recorded daily. This will verify that the quality of the standards and reagents is not compromised, and the integrity of the analytical samples is upheld. Appropriate acceptance ranges (2 to 6°C for refrigerators) shall be clearly posted on each unit in service.

Water Supply System – The laboratory must maintain a sufficient water supply for all project needs. The grade of the water must be of the highest quality (analyte-free) to eliminate false positives from the analytical results. Ultraviolet cartridges or carbon absorption treatments are recommended for organic analyses and ion-exchange treatment is recommended for inorganic tests. Appropriate documentation of the quality of the water supply system(s) will be performed on a regular basis.

4.2 LABORATORY INSTRUMENTS

Calibration of instruments is required to verify that the analytical system is operating properly and at the sensitivity necessary to meet established quantitation limits. Each instrument for organic and inorganic analyses shall be calibrated with standards appropriate to the type of instrument and linear range established within the analytical method(s). Calibration of laboratory instruments will be performed according to specified methods.

In addition to the requirements stated within the analytical methods, the contract laboratory will be required to analyze an additional low-level standard at or near the detection limits. In general, standards will be used that bracket the expected concentration of the samples. This will require the use of different concentration levels, which are used to demonstrate the instrument's linear range of calibration.

Calibration of an instrument must be performed prior to the analysis of any samples and then at periodic intervals (continuing calibration) during the sample analysis to verify that the instrument is still calibrated. If the contract laboratory cannot meet the method required calibration requirements, corrective action shall be taken. All corrective action procedures taken by the contract laboratory are to be documented, summarized within the case narrative, and submitted with the analytical results.

5.0 INTERNAL QUALITY CONTROL CHECKS

Internal QC checks are used to determine if analytical operations at the laboratory are in control, as well as determining the effect sample matrix may have on data being generated. Two types of internal checks are performed and are described as batch QC and matrix-specific QC procedures. The type and frequency of specific QC samples performed by the contract laboratory will be according to the specified analytical method and project specific requirements. Acceptable criteria and target ranges for these QC samples are presented within the referenced analytical methods.

QC results which vary from acceptable ranges shall result in the implementation of appropriate corrective measures, potential application of qualifiers, and/or an assessment of the impact these corrective measures have on the established data quality objectives. Quality control samples including any project-specific QC that will be analyzed are discussed below.

5.1 BATCH QC

Method Blanks – A method blank is defined as laboratory-distilled or deionized water that is carried through the entire analytical procedure. The method blank is used to determine the level of laboratory background contamination. Method blanks are analyzed at a frequency of one per analytical batch.

Matrix Spike Blank Samples – A matrix spike blank (MSB) sample is an aliquot of water spiked (fortified) with all the elements being analyzed for calculation of precision and accuracy to verify that the analysis that is being performed is within control limits. An MSB will be performed for each matrix and organic parameter only.

5.2 MATRIX-SPECIFIC QC

Matrix Spike Samples – An aliquot of a matrix is spiked with known concentrations of specific compounds as stipulated by the methodology. The matrix spike (MS) and matrix spike duplicate (MSD) are subjected to the entire analytical procedure to assess both accuracy and precision of the method for the matrix by measuring the percent recovery and relative percent difference of the two spiked samples. The samples are used to assess matrix interference effects on the method, as well as to evaluate instrument performance. MS/MSDs are analyzed at a frequency of one each per 20 samples per matrix.

Matrix Duplicates – The matrix duplicate (MD) is two representative aliquots of the same sample which are prepared and analyzed identically. The collection of duplicate samples provides for the evaluation of precision both in the field and at the laboratory by comparing the analytical results of two samples taken from the same location. Obtaining duplicate samples from a soil matrix requires homogenization (except for volatile organic compounds) of the sample aliquot prior to filling sample containers, to best achieve representative samples. Every effort will be made to obtain replicate samples; however, due to interferences, lack of homogeneity, and the nature of the soil samples, the analytical results are not always reproducible.

Rinsate (Equipment) Blanks – A rinsate blank is a sample of laboratory demonstrated analyte-free water passed through and over the cleaned sampling equipment. A rinsate blank is used to indicate potential contamination from ambient air and from sample instruments used to collect and transfer samples. This water must originate from one common source within the laboratory and must be the same water used by the laboratory performing the analysis. The rinsate blank should be collected, transported, and analyzed in the same manner as the samples acquired that day. Rinsate blanks for nonaqueous matrices should be performed at a rate of 10 percent of the total number of samples collected throughout the sampling event. Rinse blanks will not be performed on samples (i.e., groundwater) where dedicated disposable equipment is used.

Trip Blanks – Trip blanks are not required for nonaqueous matrices. Trip blanks are required for aqueous sampling events. They consist of a set of sample bottles filled at the laboratory with laboratory demonstrated analyte free water. These samples then accompany the bottles that are prepared at the lab into the field and back to the laboratory, along with the collected samples for analysis. These bottles are never opened in the field. Trip blanks must return to the lab with the same set of bottles they accompanied to the field. Trip blanks will be analyzed for volatile organic parameters. Trip blanks must be included at a rate of one per volatile sample shipment.

6.0 CALCULATION OF DATA QUALITY INDICATORS

6.1 PRECISION

Precision is evaluated using analyses of a field duplicate or a laboratory MS/MSD that indicate analytical precision through the reproducibility of the analytical results. RPD is used to evaluate precision by the following formula:

$$RPD = \frac{(X_1 - X_2)}{[(X_1 + X_2)/2]} \times 100\%$$

where:

X_1 = Measured value of sample or matrix spike
X_2 = Measured value of duplicate or matrix spike duplicate

Precision will be determined using MS/MSD (for organics) and matrix duplicates (for inorganics) analyses.

6.2 ACCURACY

Accuracy is defined as the degree of difference between the measured or calculated value and the true value. The closer the numerical value of the measurement comes to the true value or actual concentration, the more accurate the measurement is. Analytical accuracy is expressed as the percent recovery of a compound or element that has been added to the environmental sample at known concentrations before analysis. Analytical accuracy may be assessed using known and unknown QC samples and spiked samples. It is presented as percent recovery. Accuracy will be determined from matrix spike, matrix spike duplicate, and matrix spike blank samples, as well as from surrogate compounds added to organic fractions (i.e., volatiles, semivolatiles, PCB), and is calculated as follows:

$$Accuracy\ (\%R) = \frac{(X_s - X_u)}{K} \times 100\%$$

where:

X_s - Measured value of the spike sample
X_u - Measured value of the unspiked sample
K - Known amount of spike in the sample

6.3 COMPLETENESS

Completeness is calculated on a per matrix basis for the project and is calculated as follows:

$$\text{Completeness } (\%C) = \frac{(X_v - X_n)}{N} \times 100\%$$

where:

X_v - Number of valid measurements
X_n - Number of invalid measurements
N - Number of valid measurements expected to be obtained

7.0 CORRECTIVE ACTIONS

Laboratory corrective actions shall be implemented to resolve problems and restore proper functioning to the analytical system when errors, deficiencies, or out-of-control situations exist at the laboratory. Full documentation of the corrective action procedure needed to resolve the problem shall be filed in the project records, and the information summarized in the case narrative. A discussion of the corrective actions to be taken is presented in the following sections.

7.1 INCOMING SAMPLES

Problems noted during sample receipt shall be documented by the laboratory. The Project Manager shall be contacted immediately for problem resolution. All corrective actions shall be documented thoroughly.

7.2 SAMPLE HOLDING TIMES

If any sample extraction or analyses exceed method holding time requirements, the Project Manager shall be notified immediately for problem resolution. All corrective actions shall be documented thoroughly.

7.3 INSTRUMENT CALIBRATION

Sample analysis shall not be allowed until all initial calibrations meet the appropriate requirements. All laboratory instrumentation must be calibrated in accordance with method requirements. If any initial/continuing calibration standards exceed method QC limits, recalibration must be performed and, if necessary, reanalysis of all samples affected back to the previous acceptable calibration check.

7.4 REPORTING LIMITS

The laboratory must meet the method required detection limits listed in NYSDEC ASP, 10/95 criteria. If difficulties arise in achieving these limits due to a sample matrix, the laboratory must notify BE3 project personnel for problem resolution. To achieve those detection limits, the laboratory must utilize all appropriate cleanup procedures to retain the project required detection limits. When any sample requires a secondary dilution due to high levels of target analytes, the laboratory must document all initial analyses and secondary dilution results. Secondary dilution will be permitted only to bring target analytes within the linear range of calibration. If samples are analyzed at a secondary dilution with no target analytes detected, the Project Manager will be immediately notified so that appropriate corrective actions can be initiated.

7.5 METHOD QC

All QC method-specified QC samples shall meet the method requirements referenced in the analytical methods. Failure of method-required QC will result in the review and possible qualification of all affected data. If the laboratory cannot find any errors, the affected sample(s) shall be reanalyzed or re-extracted/redigested, then reanalyzed within method-required holding times to verify the presence or absence of matrix effects. If matrix effect is confirmed, the corresponding data shall be flagged accordingly using the flagging symbols and criteria. If matrix effect is not confirmed, then the entire batch of samples may have to be reanalyzed or re-extracted/redigested, then reanalyzed at no cost. The Project Manager shall be notified as soon as possible to discuss possible corrective actions should unusually difficult sample matrices be encountered.

7.6 CALCULATION ERRORS

All analytical results must be reviewed systematically for accuracy prior to submittal. If upon data review calculation or reporting errors exist, the laboratory will be required to reissue the analytical data report with the corrective actions appropriately documented in the case narrative.

8.0 DATA REDUCTION, VALIDATION, AND USABILITY

8.1 DATA REDUCTION

Laboratory analytical data are first generated in raw form at the instrument. These data may be either in a graphic or printed tabular format. Specific data generation procedures and calculations are found in each of the referenced methods. Analytical results must be reported consistently. Identification of all analytes must be accomplished with an authentic standard of the analyte traceable to NIST or USEPA sources. Individuals experienced with an analysis and knowledgeable of requirements will perform data reduction.

8.2 DATA VALIDATION

Data validation is a systematic procedure of reviewing a body of data against a set of established criteria to provide a specified level of assurance of validity prior to its intended use. All analytical results from soil and groundwater samples will have ASP Category B deliverables and DUSRs. The data validation will be in accordance with DER-10 Section 2.2 with ASP - Category B data deliverables provided by the laboratory and a DUSR provided for validation. Where possible, discrepancies will be resolved by the project manager.

- Technical holding times will be in accordance with NYSDEC ASP, 7/2005 edition.
- Organic calibration and QC criteria will be in accordance with NYSDEC ASP, 7/2005 edition. Data will be qualified if it does not meet NYSDEC ASP, 7/2005 criteria.

Note that analytical results from the PCB Survey will also complete DUSRs and be submitted to EQuIS, in accordance with the Quality Assurance/Quality Control Plan (QA/QC Plan).

9.0 REFERENCES

-Comprehensive Environmental Response Compensation and Liability Act (CERCLA) Quality Assurance Manual, Final Copy, Revision I, October 1989.

-National Enforcement Investigations Center of USEPA Office of Enforcement. *NEIC Policies and Procedures.* Washington: USEPA.

-New York State Department of Environmental Conservation (NYSDEC) 2005. *Analytical Services Protocol*, (ASP) 7/2005 Edition. Albany: NYSDEC.

-NYSDEC "DER-10 Technical Guidance for Site Investigation and Remediation (DER-10)," dated May 3, 2010, Appendix 2B.

-NYSDEC Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS), Under NYSDEC's Part 375 Remedial Programs, April 2023.

TABLE 2
ANALYTE LIST

Part 375 Metals (ICP)
EPA 6010C
Analyte
Arsenic
Barium
Beryllium
Cadmium
Chromium
Copper
Lead
Manganese
Nickel
Selenium
Silver
Zinc
Mercury EPA 7471B
Cyanide, Total EPA 9014

PCBs EPA 7471B
PCB-1016
PCB-1221
PCB-1232
PCB-1242
PCB-1248

Chlorinated Pesticides
EPA 8081B/ Herbicides EPA 8151
4,4-DDD
4,4-DDE
4,4-DDT
Aldrin
alpha-BHC
beta-BHC
cis-Chlordane
delta-BHC
Dieldrin
Endosulfan I
Endosulfan II
Endosulfan Sulfate
Endrin
Endrin Aldehyde
Endrin Ketone
gamma-BHC (Lindane)
Heptachlor
Heptachlor Epoxide
Methoxychlor
Toxaphene
trans-Chlordane
2,4,5-TP Acid (Silvex)

Semi-Volatile Organics (Acid/Base Neutrals)
EPA 8270D
1,1-Biphenyl
1,2,4,5-Tetrachlorobenzene
1,2,4-Trichlorobenzene
1,2-Dichlorobenzene
1,3-Dichlorobenzene
1,4-Dichlorobenzene
2,2-Oxybis (1-chloropropane)
2,3,4,6-Tetrachlorophenol
2,4,5-Trichlorophenol
2,4,6-Trichlorophenol
2,4-Dichlorophenol
2,4-Dimethylphenol
2,4-Dinitrophenol
2,4-Dinitrotoluene
2,6-Dinitrotoluene
2-Chloronaphthalene
2-Chlorophenol
2-Methylnapthalene
2-Methylphenol
2-Nitroaniline
2-Nitrophenol
3&4-Methylphenol
3,3'-Dichlorobenzidine
3-Nitroaniline
4,6-Dinitro-2-methylphenol
4-Bromophenyl phenyl
4-Chloro-3-methylphenol
4-Chloroaniline
4-Chlorophenyl phenyl ether
4-Nitroaniline
4-Nitrophenol
Acenaphthene
Acenaphthylene
Acetophenone
Anthracene
Atrazine
Benzaldehyde
Benzo (a) anthracene
Benzo (a) pyrene
Benzo (b) fluoranthene
Benzo (g,h,i) perylene
Benzo (k) fluoranthene
Bis (2-chloroethoxy) methane
Bis (2-chloroethyl) ether
Bis (2-ethylhexyl) phthalate
Butylbenzylphthalate
Caprolactam
Carbazole
Chrysene
Dibenz (a,h) anthracene
Dibenzofuran
Diethyl phthalate
Dimethyl phthalate
Di-n-butyl phthalate
Di-n-octylphthalate
Fluoranthene
Fluorene
Hexachlorobenzene
Hexachlorobutadiene
Hexachlorocyclopentadiene
Hexachloroethane
Indeno (1,2,3-cd) pyrene
Isophorone
Naphthalene
Nitrobenzene
N-Nitroso-di-n-propylamine
N-Nitrosodiphenylamine
Pentachlorophenol
Phenanthrene
Phenol
Pyrene

Volatile Organics
EPA 8260C
1,1,1-Trichloroethane
1,1,2,2-Tetrachloroethane
1,1,2-Trichloroethane
1,1-Dichloroethane
1,1-Dichloroethene
1,2,3-Trichlorobenzene
1,2,4-Trichlorobenzene
1,2,4-Trimethylbenzene
1,2-Dibromo-3-Chloropropane
1,2-Dibromoethane
1,2-Dichlorobenzene
1,2-Dichloroethane
1,2-Dichloropropane
1,3,5-Trimethylbenzene
1,3-Dichlorobenzene
1,4-Dichlorobenzene
1,4-dioxane
2-Butanone
2-Hexanone
4-Methyl-2-pentanone
Acetone
Benzene
Bromochloromethane
Bromodichloromethane

TABLE 2 (Continued)

Volatile Organics
(Continued)

Bromomethane
Carbon disulfide
Carbon Tetrachloride
Chlorobenzene
Chloroethane
Chloroform
Chloromethane
cis-1,2-Dichloroethene
cis-1,3-Dichloropropene
Cyclohexane
Dibromochloromethane
Dichlorodifluoromethane
Ethylbenzene
Freon 113
Isopropylbenzene
m,p-Xylene
Methyl acetate
Methyl tert-butyl Ether
Methylcyclohexane
Methylene chloride
Naphthalene
n-Butylbenzene
n-Propylbenzene
o-Xylene
p-Isopropyltoluene
sec-Butylbenzene
Styrene
tert-Butylbenzene
Tetrachloroethene
Toluene
trans-1,2-Dichloroethene
trans-1,3-Dichloropropene
Trichloroethene
Trichlorofluoromethane
Vinyl chloride

PFAS ANALYTE LIST

Group	Chemical Name	Abbreviation	CAS Number
Perfluoroalkyl sulfonates	Perfluorobutanesulfonic acid	PFBS	375-73-5
	Perfluorohexanesulfonic acid	PFHxS	355-46-4
	Perfluoroheptanesulfonic acid	PFHpS	375-92-8
	Perfluorooctanessulfonic acid	PFOS	1763-23-1
	Perfluorodecanesulfonic acid	PFDS	335-77-3
Perfluoroalkyl carboxylates	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	PFUA/PFUdA	2058-94-8
	Perfluorododecanoic acid	PFDoA	307-55-1
	Perfluorotridecanoic acid	PFTriA/PFTrDA	72629-94-8
	Perfluorotetradecanoic acid	PFTA/PFTeDA	376-06-7
Fluorinated Telomer Sulfonates	6:2 Fluorotelomer sulfonate	6:2 FTS	27619-97-2
	8:2 Fluorotelomer sulfonate	8:2 FTS	39108-34-4
Perfluorooctane-sulfonamides	Perfluroroctanesulfonamide	FOSA	754-91-6
Perfluorooctane-sulfonamidoacetic acids	N-methyl perfluorooctanesulfonamidoacetic acid	N-MeFOSAA	2355-31-9
	N-ethyl perfluorooctanesulfonamidoacetic acid	N-EtFOSAA	2991-50-6

TABLE 3 - ANALYTICAL METHODS & PROCEDURES SUMMARY

Groundwaters

Analyte(s)	Method	Preservation	Holding Time	Container
Volatile Organics	8260	HCl to pH <2, cool to ≤6ºC	14 days	2 - 40 ml septum sealed vials
Semivolatile Organics	8270	cool to ≤6ºC	Samples extracted within 7 days and extracts analyzed within 40 days following extraction	1 liter amber with Teflon lined cap
Organochlorine Pesticides	8081	cool to ≤6ºC		1 liter amber with Teflon lined cap
Chlorinated Herbicides (silvex)	8151	cool to ≤6ºC		1 liter amber with Teflon lined cap
PCBs	8082	cool to ≤6ºC	none	1 liter amber with Teflon lined cap
ICP Metals	6010	HNO3 to pH <2	6 months	250 ml. plastic
Mercury	7470	HNO3 to pH <2	28 days	250 ml. plastic
Hexavalent Chromium	7196	cool to ≤6ºC	24 hours	125 ml. plastic
Cyanide, Total	9010	NaOH to pH >12, cool to ≤6ºC	14 days	250 ml. plastic
PFAS	1633	cool to ≤6ºC	Samples extracted within 14 days and extracts analyzed within 28 days following extraction	250 ml. HDPE
1,4-Dioxane	8270 SIM	cool to ≤6ºC	Samples extracted within 7 days and extracts analyzed within 40 days following extraction	1 liter amber with Teflon lined cap

Soils

Analyte(s)	Method	Preservation	Holding Time	Container
Volatile Organics	8260	cool to ≤6ºC	14 days	4 oz. widemouth glass with Teflon lined cap
Semivolatile Organics	8270	cool to ≤6ºC	Samples extracted within 14 days and extracts analyzed within 40 days following extraction	4 oz. widemouth glass with Teflon lined cap
Organochlorine Pesticides	8081	cool to ≤6ºC		4 oz. widemouth glass with Teflon lined cap
Chlorinated Herbicides (silvex)	8151	cool to ≤6ºC		4 oz. widemouth glass with Teflon lined cap
PCBs	8082	cool to ≤6ºC	none	4 oz. widemouth glass with Teflon lined cap
ICP Metals	6010	none	6 months	4 oz. widemouth glass with Teflon lined cap
Mercury	7471	cool to ≤6ºC	28 days	4 oz. widemouth glass with Teflon lined cap
Hexavalent Chromium	3060/7196	cool to ≤6ºC	30 days to extraction 7 days from extraction to analysis	4 oz. widemouth glass with Teflon lined cap
Cyanide, Total	9012	cool to ≤6ºC	14 days	4 oz. widemouth glass with Teflon lined cap
PFAS	1633	cool to ≤6ºC	Samples extracted within 14 days and extracts analyzed within 40 days following extraction	250 ml.HDPE
1,4-Dioxane	8270 SIM	cool to ≤6ºC	Samples extracted within 7 days and extracts analyzed within 40 days following extraction	4 oz. widemouth glass with Teflon lined cap

Appendix D

Field Sampling Plan

BRYDGES ENGINEERING
IN ENVIRONMENT AND ENERGY, DPC

FIELD SAMPLING PLAN

VOELKERS LANES APARTMENTS

1624, 1628, 1634 ELMWOOD AVENUE; 666, 668, 670, 680
AMHERST STREET; 155 MARION STREET
BUFFALO, ERIE COUNTY, NEW YORK

Prepared For:

SAA | EVI
110 Elmwood Avenue
Buffalo, NY 14201

Prepared By:

BRYDGES ENGINEERING IN ENVIRONMENT AND ENERGY, DPC

960 Busti Ave. Suite B-150
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May 2026

Table of Contents

1.0 INTRODUCTION

This Field Sampling Plan (FSP) provides procedures for the field activities designed in the Work Plan where soil, groundwater, and vapor sampling are required at the Site. The field procedures presented in this manual should be followed by all field personnel, as adherence can help to ensure the quality and usability of the data collected. The FSP should be used collectively with and comply with the following documents:

- The HASP.
- The QA/QC Plan.
- The RI Work Plan.

Sampling for emerging contaminants will be conducted in accordance with the NYSDEC Guidance Sampling, Analysis, and Assessment of Per-And Polyfluoroalkyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs – April 2023. 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. Field sampling for PFAS performed 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).

As detailed in the guidance document, 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. . The analytical laboratory proposed for use for the analysis of samples will be a certified NYSDOH ELAP laboratory.

All field equipment requiring calibration will be calibrated per, and at the frequency, recommended by the equipment manufacturer.

2.0 SOIL SAMPLING

Soil samples are obtained as outlined in the Work Plan, considering the following general protocol:

1. Inspect newly created test pit or boring core stratigraphy once obtained in/from the subsurface.
2. Sample soil, and record depth and any physical characteristics (e.g., contamination, odor, discoloration, debris, etc.) in the logbook.
3. Quickly place the calibrated PID into the exposed soil and record the instrument readings in the logbook.
4. Samples should be collected at locations and frequency per the Work Plan and QA/QC Plan.
5. Decontaminate sampling implements after use and between sample locations. In most cases, dedicated sampling equipment is utilized thereby eliminating equipment decontamination. If dedicated equipment is not used, "dry" decontamination will be applied and "wet" as necessary.

6. Label each sample container with the appropriate sample identification and place samples in a cooler (cooled to 4 degrees C.) for shipment to the laboratory.
7. Initiate chain-of-custody procedures.

2.1 Test Pit Procedures

Test pit sampling is a standard method of soil sampling to obtain representative samples for identification as well as to serve as a means of obtaining a significant information about the subsurface. The following steps describe the procedures for test pit operations.

2.1.1 Field Preparation

1. Verify underground utilities have been found.
2. Review scope of work, safety procedures and communication signals with site personnel.
3. Pre-clean the sampling equipment prior to use, as necessary.
4. Mark and review trench locations. Specific locations are determined in the field and are selected based on areas of visible or potential surface contamination or debris, pre-determined locations representing specific Site areas, and field obstructions.

2.1.2 Excavation and Sample Collection

1. Position backhoe/equipment into appropriate area considering direction of excavation, obstructions, safety concerns, etc.
2. Commence excavation with the backhoe upwind of the excavation, as possible.
3. Ensure continuous air monitoring has been activated.
4. Screen soil regularly for VOCs as excavation progresses and soil is stockpiled.
5. As directed by field technician for each test trench, topsoil, or cover soil (if any) is excavated and placed on poly/plastic sheeting.
6. Soil/material below the topsoil is excavated to the depth as directed by field technician and placed on poly/plastic sheeting separate from the topsoil/cover soil.
7. Segregate ‘clean’ material from impacted material, as possible, using visual observations and PID screening.
8. Record geologic log as trenches are excavated visually inspecting subsurface material for discoloration or staining and documenting pit/trench with photos. The following information will be recorded for each test pit log:
   - Depth, length, and width of the excavation.
   - Description of each lithological unit including depth and thickness of distinct soil, fill, or rock layers.
   - Description of any man-made impacts or apparent contamination.
   - Depth to groundwater and bedrock, if encountered.
9. Collect soil samples using dedicated stainless-steel spoons directly from the bucket of the backhoe at ground surface. No personnel shall enter the excavation to collect samples unless provisions in the HASP have been addressed for entering an excavation.
10. Place each soil sample directly into appropriate sample bottles/jars.
11. Clearly label the sample bottles and jars.
12. Place each jar in an ice-filled cooler.
13. Ship samples to the laboratory as soon as possible, but no later than 24 hours after collection.
14. Document the types and numbers of samples collected on Chain-of-Custody.

15. Record time and date of sample collection and a description of the sample and any associated air monitoring measurements in the field logbook.
16. After sampling, backfill and compact (e.g., bucket and equipment tracks/wheels) the excavated material from each trench or pit prior to moving to next location.
17. Backfill with indigenous soil in the order in which the material was removed with the topsoil/cover soil placed last to cover the trench, placing impacted material at bottom of pit/trench and covering with ‘clean’ material.
18. Decontaminate sampling and excavation equipment between sampling locations (i.e., if not dedicated) and at completion over top of excavation area using dry methods initially and steam cleaning, as needed.

2.2 GEOPROBE PROCEDURES

Geoprobe direct push sampling is a standard method of soil sampling to obtain representative samples from the subsurface. Field preparation, sample collection, and data logging activities for Geoprobe sampling are identical to that of test pitting/trenching listed above. The following procedures detail activities, as directed by the field technician, for the execution of Macro Core drilling operations:

1. Startup drill rig and raise mast.
2. Use star bit with rig in rotary setting to penetrate pavement (if applicable).
3. Excavate a hole large enough to set a road box before you advance the borehole (if applicable).
4. Unthread the shoe from the bottom of the sample tube and inset a sample liner and rethread the shoe on the bottom of the sample tube.
5. Thread the drive cap on the top of the sample tube.
6. Align the sample tube so it is plumb in both directions to ensure a straight borehole is drilled.
7. Drive the top of the sample tube into ground surface to a depth of 4-feet for the first 4-foot sample.
8. Unthread the drive cap from the top of the sample tube and thread the pull cap in its place.
9. Pull the sample tube from the ground using caution to not pinch your hand between the drill rods, pull cap, or rig.
10. Unthread the cutting shoe and pull the sample liner from the bottom of the sample tube. Use pliers to reach in the sample tube and grab the liner, if needed.
11. Cut the sample liner lengthwise in two places and present the sample on a table or plastic sheeting (or similar) to ensure all sample material is contained. Quickly screen the soil for volatile organic vapors using a PID. Describe the soil and collect any necessary samples into appropriate containers and label the containers.
12. Insert a new liner and thread on the cutting shoe and repeat steps from #4 to #11 with the addition of a 4-foot long drill rod onto the top of the sample tube to advance a second 4-foot interval.
13. Proceed with this procedure until the desired depth or refusal is reached.
14. Upon completion of probing, decontaminate all equipment in contact with the soil/fill in a decontamination area using Alconox and water.
15. Backfill borings with indigenous soil in the order in which the material was removed with the topsoil/sand/cover soil placed last to cover the hole. Soil samples that exhibit detectable vapors or exhibit grossly other contaminated characteristics shall not be placed back into the borehole but shall be containerized for proper disposal.

Reference: American Society for Testing Material (ASTM), 1992, ASTM D1586-84, Standard Method for Penetration Test and Split Barrel Sampling of Soils.

2.3 HOLLOW-STEM AUGER DRILLING AND SAMPLING PROCEDURES

Drilling with Hollow Stem Augers (HSAs) is a standard method for collecting undisturbed soil samples at depths that can exceed 100 feet below ground surface (bgs). This drilling and sampling method uses auger flights with a hollow center that can be used for sample collection during the drilling program. For environmental soil investigations, augers are typically 5-feet in length with a 4 1/4-inch hollow center section.

While drilling with HSAs, a plug is placed at the base of the auger string to prevent soil from entering the augers. When the sampling depth is reached, the center plug is removed and replaced with a 2-foot-long split-spoon soil sampler. A 140-pound hammer, mounted on the drill rig, is then used to drive the soil sampler and connect drill rods 2 feet into the undisturbed soil at the base of the augers. Removal of the soil sampler from the augers allows description and sampling of the collected soil. To sample the next lower 2-foot soil sample, the center plug is again placed at the base of the auger string and drilling and then sampling is continued. Continuous soil samples can be collected using HSAs to any drillable depths.

Field procedures.

1. HSAs, drill rods and the drilling rig will be thoroughly decontaminated prior to initial borehole installation, and between each borehole, at the centralized decontamination area. All decontamination liquids and solids will be collected and placed in DOT approved 55-gallon drums.
2. The drill rig will be inspected for oil leaks and any other leaks prior to starting drilling operations.
3. Lower the center plug to the bottom of the augers. Advance the boring by rotating and advancing the HSAs to the desired depth. The boring will be advanced incrementally to permit continuous or intermittent subsurface soil sampling, as required.
4. Remove the center plug from the HSAs and lower the 2-foot-long split-spoon sampler to the base of the augers. Use the rigs 140 hammer to drive the split-spoon sampler 2-feet into the undisturbed soil. Record the number of hammer blows (blow counts) for each 6-inches of sampler penetration.
5. Remove the split-spoon sampler from the borehole, open the split-spoon and quickly scan the soil for VOCs with a PID or FID. Describe the soil, collect the project required samples, place in the proper containers, label the containers and place on ice.
6. Continue the above drilling and sampling steps until the final desired depth is reached.
7. If a monitoring well will not be constructed in the borehole, backfill the borehole with either uncontaminated soil cuttings or grout, as specified by the project work plan.

Reference: American Society for Testing Material (ASTM), ASTM D5784, Standard Guide for Use of Hollow-Stem Augers for Geoenvironmental Exploration and the Installation of Subsurface Water Quality Monitoring Devices

3.0 GROUNDWATER SAMPLING

3.1 WELL INSTALLATION PROCEDURES

The following procedure outlines a NYSDEC-approved method of constructing groundwater wells within unconsolidated material to monitor groundwater elevation and acquiring groundwater samples for laboratory testing. The well screen is 4" Schedule 40 pipe with 0.010 slot size. The following is a step-by-step method for installing a groundwater well once a boring or augured hole has been drilled to a desired depth within the subsurface:

1. Thread a cap on the bottom section of well screen. If more than one section of well screen is required, thread the last section.
2. Lower the screen into the borehole with the riser section ready.
3. Add the riser sections to the screen. Do not drop the screen in the borehole.
4. Add riser sections as required until the bottom screen section touches the bottom of the borehole.
5. If completing the well with a road box, mark the riser two inches below the lid of the road box and then cut the riser.
6. Place a slip cap over the top of the rise section.
7. Place sand in the space between the borehole and the PVC screen and riser to the required depth. Place the sand in very slowly so it does not bridge in the well bore.
8. Place bentonite and cement above the sand-pack.
9. Grout in the road box with concrete mix.

3.2 WELL DEVELOPMENT PROCEDURES

At least 24 hours after completion of drilling and installation, well development is completed through pumping or bailing until the discharged water is relatively sediment free and the indicator parameters (e.g., pH, temperature, specific conductivity, etc.) have reached steady-state. Development removes sediment and can improve the hydraulic properties of the sand pack. The effectiveness of this process is monitored to minimize the volume of discharged waters to obtain sediment-free samples. As approved by the regulatory agency, well development water can be discharged onto the ground surface downgradient of the well. Otherwise, this water must be containerized and sampled prior to discharge or disposal.

1. Select an appropriate well development method based upon water depth, well productivity, and sediment content of the water. Well development options include: (a) bailing; (b) manual pumping; and (c) submersible pumps. These options utilized with surging of the well screen using an appropriately sized surge block.
2. Decontaminate, as needed, and assemble equipment in the monitoring well based upon the method selected. Care should be taken not to introduce contaminants into the equipment or well during installation.
3. Proceed with development by repeated removal of water from the well until the discharged water is relatively sediment-free (i.e., < 50 NTUs). Volume of water removed, pH, temperature and conductivity measurements are recorded on the Well Development/Purging Logs.

3.3 WELL PURGING PROCEDURES

To collect representative samples, groundwater wells must be adequately purged prior to sampling. Purging will require removing three to five volumes of standing water in rapidly recharging wells and at least one volume from wells with slow recharge rate. In addition to the required well volumes, water quality parameters (pH, temperature, specific conductivity and turbidity) should have stabilized prior to sampling. Sampling should commence as soon as adequate recharge has occurred. Although not required, it is recommended that purging and sampling occur at least 24 hours after development.

1. Remove well cover ensuring no foreign material enters the well.
2. Monitor the interior of the riser pipe for organic vapors using a PID. If reading of greater than 5 ppm is recorded, the well will be vented until levels are below 5 ppm before pumping is started.
3. Measure the water level below top of casing using an electronic water level indicator.
4. Determine the volume of water within the well by knowing the total depth of the well.
5. Wash the end of the probe with soap and rinse with deionized water between wells.
6. Calibrate field instruments for measuring water quality parameters (e.g., pH, specific conductance, turbidity, etc.)
7. In all wells, a peristaltic pump will be used to purge the required water volume (i.e., until stabilization of pH, temperature specific conductivity and turbidity). If depths to water exceed about 25 feet below ground, bailers and/or submersible pumps may be used.
8. Utilize dedicated, new polyethylene bailers and tubing for sampling. If sampling for emerging contaminants such a PFAS, HDPE bailers and tubing must be used.
9. Purge until the required volume is removed. If the well purges to dryness and recharges within 15 minutes, purging can continue as it recharges. If the well purges to dryness and recharge is greater than 15 minutes, purging is terminated and sampling can occur as soon as the well recharges.
10. Calculate well volumes and record measurements for pH, temperature, turbidity, and conductivity during the purging along with physical observations.

3.4 WELL SAMPLING PROCEDURES

1. Perform well sampling within 24 hours of purging if well has recovered sufficiently to sample. If sufficient volume for analytical testing cannot be obtained from a well or if recharge exceeds 24 hours, then DEC should be consulted on analytical priorities and validity of the sample.
2. Collect sample using appropriate containers.
3. Label sample bottles using a waterproof permanent marker per procedures outlined below.
4. Use verifiably clean sample bottles (containing required preservatives) and place samples on ice in coolers for transport to the analytical laboratory, who will certify bottles are analyte-free.
5. Initiate chain-of-custody.
6. Record well sampling data field notebook and on the Well Development/Purging Log.

4.0 SAMPLE DOCUMENTATION

Each soil and groundwater sample is logged in a bound field notebook by the technician or geologist. Field notes should include, but are not limited to the following:

- descriptions of subsurface material encountered during sampling,
- sample numbers and types of samples recovered, and
- date and time of sampling event.

The technician or geologist also completes a daily drilling or sampling record and chains-of-custody for all samples collected that are being transported to the laboratory. Once sampling program is complete, the geologist or technician transfers field notes/logs onto standard forms (e.g., boring logs, sampling logs, daily reports, etc.) to be included with the formal investigation report.

5.0 SAMPLING CONTAINER SELECTION

The selection of sample containers is based on the media being sampled and the required analysis. Container selection should be completed in advance of mobilizing into the field with close communications with the laboratory.

6.0 SAMPLE LABELING

The following procedure helps to prevent misidentification of samples and to clarify the location and purpose of environmental samples collected during the investigation:

1. Fix a non-removable (when wet) label to each container.
2. Wrap each sample bottle within 2-inch cellophane tape.
3. Write the following information with permanent marker on each label:
    A. Site name
    B. Sample identification
    C. Project number
    D. Date/time
    E. Sampler's initials
    F. Sample preservation
    G. Analysis required

Each sample is assigned a unique identification alpha-numeric code, such as RR-ss1 or WS-TP1 (2-3’), where the abbreviations represent RR – River Road (site), surface sample 1 and Waste Site, test pit 1, obtained at 2-3’ bgs. Other common abbreviations include the following:

- BH = Geoprobe Borehole
- SW = Surface Water
- SED = Sediment
- SB = Soil Boring
- MSB = Matrix Spike Blank
- NSS = Near Surface Soil (1' - 2' depth)
- EB = Equipment Rinse Blank
- HW = Hydrant Water (Decon/Drilling Water)
- GW = Groundwater
- TB = Trip Blank

- RB = Rinse Blank
- MS/MSD =Matrix Spike/Matrix Spike Duplicate

7.0 SAMPLE SHIPPING

Proper documentation of sample collection and the methods used to control these documents are referred to as chain-of-custody procedures. Chain-of-custody procedures are essential for (1) presenting analytical results in a legal or regulatory forum (e.g., evidence in litigation or administrative hearings), (2) minimizing loss or misidentification of samples, and (3) ensuring that unauthorized persons do not tamper with collected samples.

The following chain-of-custody guidelines should be utilized during sample collection as outlined in and prepared by the National Enforcement Investigations Center (NEIC) Policies and Procedures of the USEPA Office of Enforcement:

1) Complete chain-of-custody record with all relevant information.
2) Send original chain with the samples in a sealed, waterproof bag taped inside the sample cooler.
3) Place adequate inert cushioning material (e.g., corrugated plastic, polypropylene foam wrap, etc.) in bottom of cooler.
4) Place bottles in cooler so they do not touch (use cushioning material for dividers).
5) Place VOA vials in sealed/waterproof bags in the center of the cooler.
6) Pack cooler with ice in sealed/waterproof plastic bags.
7) Pack cooler with cushioning material.
8) Place any additional paperwork in sealed bag with original chain.
9) Tape cooler drain shut.
10) Wrap cooler with packing tape at two locations to secure lid. Do not cover labels.
11) Place lab address on top of cooler.
12) Ship samples via overnight carrier the same day that they are collected.
13) Label cooler with "This side up" on all sides and "Fragile" on at least two sides.
14) Fix custody seals on front right and left of cooler and cover with packaging tape.

8.0 SOIL VAPOR INTRUSION SAMPLING

Soil vapor intrusion (SVI) investigation consist of sampling contaminant vapors that may exist beneath the building slabs, inside the buildings, and outside the buildings. Sample collection includes the following procedures per New York State Department of Health *Guidance for Evaluating Soil Vapor Intrusion in the State of New York*.

8.1 SUB-SLAB AIR SAMPLING PROCEDURES

8.1.1 Sampling Locations

Select the sub-slab sample collection points by observing the condition of the building floor slab for apparent penetrations such as concrete floor cracks, floor drains, or sump holes. The floor conditions will be noted, and potential locations of subsurface probes will be selected. The locations will ideally be away from the foundation walls, apparent penetrations, and buried pipes.

8.1.2 Sampling Probes

Drill a 5/8-inch diameter hole approximately one inch deep into the concrete floor using a 5/8-inch diameter drill bit and a hammer drill. Extend the hole through the remaining thickness of the slab and about three inches below the base of the slab using a ½-inch diameter drill bit. Remove the concrete cuttings using the ½-inch drill bit in an up-down motion. Clean out the shallow 5/8-inch drilled hole using a round steel wire brush. Carefully clean the surface of the concrete adjacent to the 5/8-inch hole using a flat wire brush to remove any residual concrete dust from the floor's surface. Dabbing the surface with clay can also remove the dust. These steps will allow the clay seal (see below) to better adhere to the concrete surface.

Insert one end of a 1.5-foot length of ¼-inch diameter (OD) Teflon or HDPE tubing through the center hole of a 5/8-inch diameter rubber stopper. About two inches of the tubing should extend beyond and below the narrow end of the stopper. Insert the tubing into the 5/8-inch diameter borehole so that the bottom of the stopper rests on top of the 1/2-inch diameter drilled hole. Pack the annulus of the 5/8-inch diameter hole with Sculpy modeling clay and extend the clay about 1.5-inches above the floor adhering tightly to the tubing. The clay should be in a volcano-like shape with a wide base adhering to the concrete floor and narrowing at the upper end of contact with the tubing. This shape allows the tubing to move without disturbing the contact of the clay with the floor and the tubing. The clay should cover and adhere to a minimum of one-half inch of the concrete surface beyond the borehole.

8.1.3 Helium Tracer Gas Testing

Place a 1-quart (or similar size) container over the sample probe after threading the sample tube through a hole in the top of the bucket. Seal the tube to the bucket with clay. The bucket should also have another hole drilled in the top for the injection of helium, and a hole in the side near the floor for the measurement of helium gas concentrations.

Connect a helium (99.999% pure) cylinder tubing to the top port of bucket enclosure and seal with clay or other sealing material. Insert a helium detector probe in the bottom port of the bucket. Release enough helium to displace any ambient air in the bucket until the concentration of helium reaches a minimum of 90%. Maintain this minimum concentration by testing with a helium detector. The Helium cylinder should be open during the purge time to cause a slight positive pressure within the enclosure.

Connect the sample tubing to a GilAir vacuum pump or equivalent using 3/8-inch O.D. silicone tubing. Connect a 1-liter Tedlar bag to the outlet of the pump using silicone tubing and collect a 1-liter sample. Purging flow rates must not exceed 0.2 liters per minute (L/min). Analyze the Tedlar bag for helium using a helium detector and record the results on the Summa Canister Data Sheet. A concentration of helium 10% or greater indicates a poor seal of the sample probe and it must be reinstalled and retested. After purging, remove the bucket enclosure from over the sample probe.

8.1.4 Sample Collection

Assign sample identification to the Summa canister sample identification tag and record on chain of custody (COC), and the Summa Canister Data Sheet. Also record the Summa canister and flow controller (regulator) serial numbers on the COC and Summa Canister Data Sheet. Attach a pre-calibrated/certified 8-hour or 24-hour flow controller, and particulate filter to the

Summa canister. Attach the sample tube to the Summa canister using a ¼-inch Swagelok nut with appropriate ferrules, to the end of the flow controller/particulate filter assembly. The sampling period will be 8 hours for most commercial facilities and 24 hours for mixed use residential/commercial.

Open canister valve to initiate sample collection and record sample start time, date, and initial canister vacuum on the canister identification tag and on the Summa Canister Data Sheet. If the canister does not show sufficient vacuum (generally less than 25"Hg), do not use. Take a digital photograph of canister setup and surrounding area. Include in the photograph a dry erase board or similar display which presents sample ID, location, and date.

After 8 or 24 hours, record sample end time and canister pressure on the Summa Canister Data Sheet, and close valve. Disconnect the Teflon tubing and remove flow controller/particulate filter assembly from canister. Seal canister with laboratory supplied brass plug. Ship the samples, with COCs, overnight, to the selected laboratory for standard TO-15 analysis.

8.2 Indoor/Outdoor Air Sampling Procedures

Place the indoor air Summa canister/flow controller inlet at breathing height in the approximate center of the space being sampled, or, for the outdoor air sample, elevated on a table or other object in a location upwind of the building being sampled. The breathing height is defined as four to six feet above the floor or ground. As an option, a length of Teflon tubing can be attached to the Summa canister/flow controller inlet and raised to breathing zone height.

Record the canister and flow controller serial numbers on the canister identification tag, COC and the Summa Canister Data Sheet. Assign sample identification to the canister identification tag, and record on the COC and the Summa Canister Data Sheet. Remove brass plug from canister fitting and save.

Attach a pre-calibrated/certified 8 or 24-hour flow controller and particulate filter to the Summa canister. For the outside air sample, also connect the laboratory supplied "candy cane" fitting to the flow controller. Open canister valve to initiate sample collection and record start time, date, and gauge vacuum reading on the canister identification tag and on the Summa Canister Data Sheet. Take a photograph of canister setup and surrounding area.

After 8 or 24 hours, record the gauge vacuum reading, close the Summa canister valve completely and record the end time on the Summa Canister Data Sheet. There should still be a slight vacuum in the Summa canister. If no vacuum remains in the canister, or the canister does not show a significant net loss in vacuum after sampling, the sample should be re-collected using a new Summa canister and flow controller. Disconnect any tubing and candy cane fittings from the Summa canister and remove the flow controller. Replace the brass plug on the canister. Ship canister, with COCs, overnight, to the selected laboratory

8.3 Quality Control

The number of Quality Control samples (duplicates) to be taken during sub-slab sampling may be found in the QA/QC Plan. The duplicate sample rate is usually 10 percent. Field duplicates for sub-slab, indoor air and outdoor air samples will be collected by attaching the T-fitting supplied by the laboratory to two Summa canisters with attached regulators. For sub-slab samples, the inlet of the T-fitting will then be attached to the sub-slab sample tubing using a

Swagelok fitting. For indoor and outdoor air samples, any tubing used to raise the sampling height will also be attached to the inlet of the T fitting. For sampling, both Summa canister valves are opened and closed simultaneously.

8.4 Sample Labeling

Each sub-slab sample should have the following information at a minimum placed on the laboratory supplied sample label:

- Site name
- Sample identification – see below
- Date/time
- Sampler's initials
- Analysis required – TO-15

The serial number of the canister and regulator used during sampling is also noted on the Summa canister identification tag and on the COC. Each sub-slab, indoor air and outdoor air sample will be assigned a unique alpha-numeric code. An example of this code and a description of its components are presented below. Field duplicate samples will be assigned a unique identification alphanumeric code that specifies the date of collection, the letters FD (for field duplicate) and an ascending number that records the number of duplicate samples collected that day. For example, the first field duplicate collected on February 22, 2023 would be assigned the sample number in the format YYYYMMDD-FD-1 = 20230222-FD-1.

Subsequent duplicates collected on the same day will be assigned FD-2, FD-3 etc. Field sampling crew will record the duplicate sample information on the Summa Canister Data Sheets and in the field book.

8.5 Field Documentation

Field notebooks are used during all on-site work. A dedicated field notebook is maintained by the field technician overseeing the site activities. Sub-slab sampling procedures should be photo-documented. The field sampling team will maintain sampling records that include the following data:

- Sample Identification
- Date and time of sample collection
- Identity of samplers
- Sampling methods and devices
- Purge volumes (soil vapor)
- Volume of soil vapor sample extracted
- The Summa canister vacuum before and after samples collected
- Chain of Custody and shipping information

The proper completion of the following forms/logs is considered correct procedure for documentation during the indoor air-sampling program:

1. Field Logbook - weather-proof hand-bound field book
2. Summa Canister Data Sheet
3. Chain of Custody Form

8.6 SAMPLE SHIPPING

Proper documentation of sample collection and the methods used to control these documents are referred to as chain-of-custody procedures. Chain-of-custody procedures are essential for presentation of sample analytical chemistry results as evidence in litigation or at administrative hearings held by regulatory agencies. Chain-of-custody procedures also serve to minimize loss or misidentification of samples and to ensure that unauthorized persons do not tamper with collected samples.

The following chain-of-custody guidelines should be utilized during sample collection as outlined in and prepared by the National Enforcement Investigations Center (NEIC) Policies and Procedures of the USEPA Office of Enforcement:

- Complete the chain-of-custody (COC) record with all relevant information.
- Ship original COC with the samples in a sealed waterproof plastic bag and place inside the box containing a Summa canister.
- Retain a copy of the COC for field records.
- Ship Summa canisters in the same boxes the laboratory used for shipping.
- Place the lab address on top of sample box/cooler.
- Fix numbered custody seals across box lid flaps and cooler lid.
- Cover seals with wide, clear tape.
- Ship samples via overnight carrier within three days of sample collection if possible.

Appendix E

Fish & Wildlife Resources Analysis Decision Key

Appendix 3C Voelkers Lanes Apartments **Fish and Wildlife Resources Impact Analysis Decision Key**	If YES Go to:	If NO Go to:
1. Is the site or area of concern a discharge or spill event?	13	2
2. Is the site or area of concern a point source of contamination to the groundwater which will be prevented from discharging to surface water? Soil contamination is not widespread, or if widespread, is confined under buildings and paved areas.	13	3
3. Is the site and all adjacent property a developed area with buildings, paved surfaces and little or no vegetation?	4	9
4. Does the site contain habitat of an endangered, threatened or special concern species?	Section 3.10.1	5
5. Has the contamination gone off-site?	6	14
6. Is there any discharge or erosion of contamination to surface water or the potential for discharge or erosion of contamination?	7	14
7. Are the site contaminants PCBs, pesticides or other persistent, bioaccumulable substances?	Section 3.10.1	8
8. Does contamination exist at concentrations that could exceed ecological impact SCGs or be toxic to aquatic life if discharged to surface water?	Section 3.10.1	14
9. Does the site or any adjacent or downgradient property contain any of the following resources? i. Any endangered, threatened or special concern species or rare plants or their habitat ii. Any DEC designated significant habitats or rare NYS Ecological Communities iii. Tidal or freshwater wetlands iv. Stream, creek or river v. Pond, lake, lagoon vi. Drainage ditch or channel vii. Other surface water feature viii. Other marine or freshwater habitat ix. Forest x. Grassland or grassy field xi. Parkland or woodland xii. Shrubby area xiii. Urban wildlife habitat xiv. Other terrestrial habitat	11	10
10. Is the lack of resources due to the contamination?	3.10.1	14
11. Is the contamination a localized source which has not migrated and will not migrate from the source to impact any on-site or off-site resources?	14	12
12. Does the site have widespread surface soil contamination that is not confined under and around buildings or paved areas?	Section 3.10.1	12
13. Does the contamination at the site or area of concern have the potential to migrate to, erode into or otherwise impact any on-site or off-site habitat of endangered, threatened or special concern species or other fish and wildlife resource? (See #9 for list of potential resources. Contact DEC for information regarding endangered species.)	Section 3.10.1	14
14. No Fish and Wildlife Resources Impact Analysis needed.		

Appendix F

Phase II Investigation Analytical Results Tables

TABLE 1

SUMMARY OF 2019 SOIL SAMPLE ANALYTICAL RESULTS PHASE II ENVIRONMENTAL INVESTIGATION REPORT

ELMWOOD AVENUE AND AMHERST STREET PARCELS BUFFALO, NEW YORK

PARAMETER[1]	CP-51 SCLs [2]	Unrestricted Use SCOs[3]	Commercial Use SCOs [3]	Property 1 - Sample Location (Depth - ft)				Property 2 - Sample Location (Depth - ft)					Property 3 - Sample Location (Depth - ft)					
				P1SB-2 (1-2)	P1SB-3 (2-4)	P1SB-4 (1-2)	P1SB-4 (4-5)	P2SB-7 (0.5-1.5)	P2SB-8 (0.5 - 1.5)	P2SB-10 (0.5-2)	P2SB-11 (8-10)	P2SB-12 (0.5-2)	P3SB-1 (0-2)	P3TP-1 (0-2)	P3TP-3 (0-2)	P3TP-3 (6-7)	P3TP-5 (1-2)	P3TP-7 (1-2)
				6/19/2019									6/20/2019					
Volatile Organic Compounds (VOCs) - mg/Kg [4]																		
1,2,4-Trimethylbenzene	**3.6**	**3.6**	**190**	ND	ND	1.6	ND	--	--	--	ND	--	--	--	--	0.69	--	--
1,3,5-Trimethylbenzene	**8.4**	**8.4**	**190**	ND	ND	5.3	ND	--	--	--	ND	--	--	--	--	0.23	--	--
2-Butanone (MEK)	**--**	**0.12**	**500**	0.0029 J	ND	ND	ND	--	--	--	ND	--	--	--	--	ND	--	--
Acetone	**--**	**0.05**	**500**	0.027	0.025	ND	0.012	--	--	--	0.028	--	--	--	--	ND	--	--
Bromomethane (Methyl bromide)	**--**	**--**	**--**	ND	ND	ND	ND	--	--	--	ND	--	--	--	--	0.038 J	--	--
cis-1,2-Dichloroethene	**--**	**0.25**	**500**	ND	ND	0.15 J	ND	--	--	--	ND	--	--	--	--	ND	--	--
Cyclohexane	**--**	**--**	**--**	ND	ND	ND	ND	--	--	--	ND	--	--	--	--	0.56 J	--	--
Ethylbenzene	**1**	**1**	**390**	ND	ND	ND	ND	--	--	--	ND	--	--	--	--	0.032 J	--	--
Isopropylbenzene (Cumene)	**2.3**	**--**	**--**	ND	ND	ND	ND	--	--	--	ND	--	--	--	--	0.025 J	--	--
Methyl acetate	**--**	**--**	**--**	ND	0.014	ND	0.0011 J	--	--	--	ND	--	--	--	--	ND	--	--
Methyl tert butyl ether (MTBE)	**0.93**	**0.93**	**500**	ND	ND	ND	ND	--	--	--	0.00028 J	--	--	--	--	ND	--	--
Methylcyclohexane	**--**	**--**	**--**	ND	ND	ND	ND	--	--	--	ND	--	--	--	--	2.4	--	--
n-Butylbenzene	**12**	**12**	**500**	ND	ND	1.2	ND	--	--	--	ND	--	--	--	--	0.11	--	--
n-Propylbenzene	**3.9**	**3.9**	**500**	ND	ND	ND	ND	--	--	--	ND	--	--	--	--	0.099	--	--
p-Isopropyltoluene	**--**	**--**	**--**	ND	ND	4.5	ND	--	--	--	ND	--	--	--	--	0.049 J	--	--
sec-Butylbenzene	**11**	**11**	**500**	ND	ND	2.8	ND	--	--	--	ND	--	--	--	--	0.044 J	--	--
Tetrachloroethene	**1.3**	**1.3**	**150**	ND	ND	0.19 J	ND	--	--	--	ND	--	--	--	--	ND	--	--
m&p-Xylene	**0.26**	**0.26**	**500**	ND	ND	ND	ND	--	--	--	ND	--	--	--	--	0.11 J	--	--
o-Xylenes	**0.26**	**0.26**	**500**	ND	ND	ND	ND	--	--	--	ND	--	--	--	--	0.039 J	--	--
Total Xylenes	**0.26**	**0.26**	**500**	ND	ND	ND	ND	--	--	--	ND	--	--	--	--	0.149 J	--	--
Polycyclic Aromatic Hydrocarbons (PAHs) - mg/Kg [4]																		
Acenaphthene	**20**	**20**	**500**	--	--	ND	--	--	0.23	0.052 J	ND	2.2 J	ND	7.7	0.2	0.045 J	0.62	ND
Acenaphthylene	**100**	**100**	**500**	--	--	ND	--	--	ND	0.089 J	ND	3.9 J	ND	ND	0.32	ND	1.2	ND
Anthracene	**100**	**100**	**500**	--	--	0.044 J	--	--	0.42	0.18	ND	14	ND	17	0.88	0.053 J	1.4	ND
Benzo(a)anthracene	**1**	**1**	**5.6**	--	--	0.15	--	--	0.82	0.66	0.029 J	**44**	0.034 J	**42**	**2.5**	0.15	**2.9**	ND
Benzo(a)pyrene	**1**	**1**	**1**	--	--	0.15 J	--	--	0.73	0.76	ND	**44**	ND	**39**	**2.6**	0.18	**2.4**	ND
Benzo(b)fluoranthene	**1**	**1**	**5.6**	--	--	0.18	--	--	0.89	0.92	0.037 J	**49**	0.036 J	**52**	**3.4**	0.25	**5.9**	ND
Benzo(ghi)perylene	**100**	**100**	**500**	--	--	0.085 J	--	--	0.39	0.58	ND	20	ND	20	1.5	0.11 J	2.1	ND
Benzo(k)fluoranthene	**0.8**	**0.8**	**56**	--	--	0.06 J	--	--	0.29	0.32	ND	**16**	ND	**18**	**1**	0.088 J	**1.7**	ND
Chrysene	**1**	**1**	**56**	--	--	0.13	--	--	0.86	0.67	0.028 J	**40**	0.047 J	**36**	**2.2**	0.13	**3.6**	ND
Dibenzo(a,h)anthracene	**0.33**	**0.33**	**0.56**	--	--	ND	--	--	0.091 J	0.098 J	ND	**4.8**	ND	**5.5**	**0.41**	0.028 J	**0.59**	ND
Fluoranthene	**100**	**100**	**500**	--	--	0.29	--	--	1.9	1.3	0.062 J	89	0.041 J	85	4.5	0.26	6.5	0.024 J
Fluorene	**30**	**30**	**500**	--	--	ND	--	--	0.23	0.06 J	--	4.4 J	ND	7.2	0.32	0.051 J	0.38	ND
Indeno(1,2,3-cd)pyrene	**0.5**	**0.5**	**5.6**	--	--	0.093 J	--	--	0.42	0.48	ND	**22**	ND	**24**	**1.6**	0.16	**2.2**	ND
Naphthalene	**12**	**12**	**500**	--	--	--	--	--	0.26	0.059 J	ND	3.1 J	0.37	5.4 J	0.24	0.06 J	2.5	0.032 J
Phenanthrene	**100**	**100**	**500**	--	--	0.15	--	--	2.2	0.68	0.036 J	51	0.17	60	2.8	0.21	3.8	0.058 J
Pyrene	**100**	**100**	**500**	--	--	0.25	--	--	1.8	1.2	0.055 J	81	0.049 J	66	3.9	0.25	5.8	0.024 J
Total PAHs	**--**	**--**	**--**	--	--	1.582 J	--	--	11.531 J	8.108 J	0.247 J	484 J	0.747 J	477.6 J	28.05 J	1.974 J	43.21	0.138 J
RCRA Metals - mg/Kg																		
Arsenic	**--**	**13**	**16**	--	--	5.66	--	--	8.98	9.34	--	5.3	4.37	**20.2**	5.01	--	**17.8**	4.29
Barium	**--**	**350**	**400**	--	--	154	--	--	96.5	152	--	49.8	28.6	126	120	--	39.2	15.4
Cadmium	**--**	**2.5**	**9.3**	--	--	1	--	--	1.08	0.775	--	0.511 J	0.463	1.92	0.553	--	2.46	0.757
Chromium	**--**	**30**	**1500**	--	--	18.5	--	--	8.52	15.1	--	13.3	4.6	22.2	16.5	--	18.2	4.46
Lead	**--**	**63**	**1000**	--	--	**349**	--	--	47.5	**266**	--	39.7	9.91	**352**	51.3	--	**113**	16.6
Mercury	**--**	**0.18**	**2.8**	--	--	ND	--	--	0.073	0.132	--	ND	0.062 J	0.174	ND	--	ND	ND
Selenium	**--**	**3.9**	**1500**	--	--	1.37	--	--	1.32	0.968 J	--	0.676 J	0.653 J	1.3	1.27	--	2.73	0.931 J
Silver	**--**	**2**	**1500**	--	--	0.646	--	--	ND	0.192 J	--	ND	ND	0.629	0.152 J	--	0.166 J	ND
Polychlorinated biphenyls (PCBs) - mg/Kg																		
Total PCBs	**0.1**	**0.1**	**1**	--	--	--	--	ND	--	--	--	--	--	--	--	--	--	ND

Notes:

1. Only those parameters detected at a minimum of one sample location are presented in this table; other compounds were reported as non-detect.
2. Values per NYSDEC CP-51 Soil Cleanup Levels (SCLs) for gasoline/fuel oil impacted sites.
3. Values per NYSDEC Part 375 Unrestricted Soil Cleanup Objectives (SCOs).
4. Sample results were reported by the laboratory in ug/kg and converted to mg/kg for comparisons to SCOs.

Definitions:

ND = Parameter not detected above laboratory detection limit.

"--" = No value available for the parameter; Parameter not analyzed for.

J = Estimated value; result is less than the sample quantitation limit but greater than zero.

Analyte exceeds its CP-51 SCL and/or Part 375 USCO.

Analyte exceeds its Part 375 CSCO.

TABLE 2

SUMMARY OF 2019 GROUNDWATER ANALYTICAL RESULTS
PHASE II ENVIRONMENTAL INVESTIGATION ELMWOOD AVENUE AND AMHERST STREET PARCELS BUFFALO, NEW YORK

PARAMETER[1]	GWQS[2]	Sample ID			
		Property 1 SB-4W	Property 2 SB-6W	Property 2 SB-7W	Property 2 SB-11W
		6/20/2019	6/21/2019		
Volatile Organic Compounds (VOCs) - ug/L					
1,3,5-Trimethylbenzene	**5**	2 J	ND	ND	ND
2-Butanone (MEK)	**50**	ND	2.1 J	ND	2 J
Acetone	**50**	ND	22	**64**	25
Cyclohexane	**--**	ND	ND	0.29 J	ND
n-Butylbenzene	**5**	0.88 J	ND	ND	ND
p-Isopropyltoluene	**5**	1.2 J	ND	ND	ND
sec-Butylbenzene	**5**	0.8 J	ND	ND	ND
Tetrachloroethene	**5**	0.56	ND	ND	ND

Notes:
1. Only those parameters detected at a minimum of one sample location are presented in this table; other compounds were reported as non-detect.
2. Regulatory limits are NYSDEC Class "GA" Groundwater Quality Standards (GWQS) and Guidance Values and Groundwater Effluent Limitations.

Definitions:
ND = Parameter not detected above laboratory detection limit.
"--" = No value available for the parameter.
J = Estimated value; result is less than the sample quantitation limit but greater than zero.
Bold = Result exceeds NYSDEC Groundwater Quality Standards.

TABLE 3

SUMMARY OF 2024 SOIL ANALYTICAL RESULTS

Parameter Tested	BE3 Phase II Report April 2024 - Sample Identification, Sample Depth in feet below ground surface (bgs), and Sample Date							NYSDEC Soil Cleanup Objectives (SCOs)
	BH-1 0-1	BH-2 2-4	BH-3 1-3	BH-4 1-3	BH-5 1-3	BH-6 1-3	BH-7 1-3	Restricted Residential
	3/25/2024							
METALS/INORGANICS								
Arsenic	5.6	7	3.4	6.2	3.3	3.5	4.1	16
Barium	104	113	76.2	108	59	112	116	410
Beryllium	0.73	0.74	0.49	0.79	0.42	0.77	0.84	43
Cadmium	0.13 J B	ND	0.24 B	0.31 B	0.21 J	0.15 J	0.2 JB	2.5
Chromium	26.9	39.7	15.9	27.5	14.7	28.3	19.8	110
Copper	33.5	46.7	21.0	26.7	12.8	12.5	11	280
Lead	127	359	50	123	38.7	49.9	35.6	400
Manganese	302 B	416 B	216 B	494 B	218 B	208 B	294 B	2000
Mercury	0.11	0.26	0.065	0.2	0.059	0.065	0.089	0.3
Nickel	20	21.6	11.8	27.6	12.4	16.4	107	320
Zinc	88.2	83.3	60.7	113	49	63.8	58.3	6600
SEMI-VOLATILE ORGANIC COMPOUNDS (SVOCs)								
Acenaphthene	ND	ND	ND	1.1 J	ND	ND	ND	100
Anthracene	ND	ND	ND	1.9 J	ND	ND	ND	100
Benzo(a)anthracene	0.068 J	0.11 J	0.14 J	4.7	ND	0.036 J	0.24 J	1.4
Benzo(a)pyrene	0.053 J	0.13 J	0.15 J	4.6	ND	0.042 J	0.51 J	1
Benzo(b)fluoranthene	0.075 J	0.14 J	0.16 J	4.7	ND	0.06 J	0.76 J	1.4
Benzo(g,h,i)perylene	0.032 J	0.077 J	ND	2.2	ND	0.031 J	0.63 J	4.9
Benzo(k)fluoranthene	0.03 J	0.061 J	ND	2.6	ND	ND	0.3 J	4.9
Chrysene	0.0785 J	0.12 J	ND	4.4	ND	0.055 J	0.46 J	4.9
Dibenz(a,h)anthracene	ND	ND	ND	0.73 J	ND	ND	ND	0.33
Dibenzofuran	ND	ND	ND	0.54 J	ND	ND	ND	18
Fluoranthene	0.14 J	0.21 J	0.24 J	10	5.5 J	0.11 J	0.77 J	100
Fluorene	ND	ND	ND	0.81	ND	ND	ND	100
Indeno(1,2,3-cd)pyrene	0.034 J	0.075 J	ND	2.3	ND	0.03 J	0.49 J	1.4
Naphthalene	ND	ND	ND	0.3 J	ND	ND	ND	100
Phenanthrene	0.1 J	0.085 J	0.14 J	7.7	3.9 J	0.054 J	0.3 J	4.9
Pyrene	0.1 J	0.2 J	0.22 J	8.5	4.1 J	0.09 J	0.58 J	100
VOLATILE ORGANIC COMPOUNDS (VOCs)								
Acetone	ND	ND	ND	ND	0.014 J	ND	0.006 J	100

ND Analyte not detected
- Not Applicable or sample not tested for this analyte
J Estimated Concentration
B Anaalyte detected in method blank
K Result is reported as Benzo(b)fluoranthene
E Results exceeded calibration range
T Result is Tentatively Identifies Compound and an estimated value
(red shading) Reported concentration greater than or equal to the NYSDEC Restricted Residential SCO

TABLE 3
SUMMARY OF 2024 SOIL ANALYTICAL RESULTS

Parameter Tested	BE3 Phase II Report April 2024 - Sample Identification, Sample Depth in feet below ground surface (bgs), and Sample Date						NYSDEC Soil Cleanup Objectives (SCOs)
	BH-8 1-2	BH-9 1-2	BH-10 0-1	BH-11 4-5	BH-12 1-3	BH-13 1-2	Restricted Residential
	3/25/2024						
METALS/INORGANICS							
Arsenic	12.8	5	6.5	4.9	4.7	9.5	16
Barium	217	123	109	104	82.4	89	410
Beryllium	0.89	0.68	0.08	0.68	1.7	0.93	43
Cadmium	0.67 B	0.18 J B	0.33 B	0.13 J B	0.21 JB	ND	2.5
Chromium	27.3	26.6	23.0	22.6	11.9	31.5	110
Copper	54.7	28.6	112.0	17	8.7	8.7	280
Lead	456	219	121	332	41.6	130	400
Manganese	1240 B	212 B	377 B	292 B	441 B	230 B	2000
Mercury	0.26	0.087	0.260	0.069	0.56	0.047	0.3
Nickel	25.1	17.1	28.8	16	10.1	18.9	320
Selenium	0.55 J	ND	ND	ND	ND	ND	110
Zinc	243	97.5	145	58	41.1	67.3	6600
SEMI-VOLATILE ORGANIC COMPOUNDS (SVOCs)							
Acenaphthylene	7.2	ND	ND	ND	ND	ND	100
Anthracene	6.4	ND	ND	ND	ND	ND	100
Benzo(a)anthracene	31	0.55 J	0.13 J	0.045 J	ND	0.27 J	1.4
Benzo(a)pyrene	55	0.62 J	0.12 J	0.043 J	ND	0.25 J	1
Benzo(b)fluoranthene	62	0.85 J	0.14 J	0.056 J	ND	0.32 J	1.4
Benzo(g,h,i)perylene	13	0.25 J	0.081 J	0.029 J	ND	0.17 J	4.9
Benzo(k)fluoranthene	24	0.4 J	0.083 J	ND	ND	0.19 J	4.9
Chrysene	56	0.77 J	0.13 J	ND	ND	0.32 J	4.9
Dibenz(a,h)anthracene	4.8	ND	ND	ND	ND	ND	0.33
Dibenzofuran	6.6	ND	ND	ND	ND	ND	18
Fluoranthene	130	1.9	0.26	0.085 J	3.3 J	0.86 J	100
Fluorene	15	ND	ND	ND	ND	ND	100
Indeno(1,2,3-cd)pyrene	15	0.28 J	0.06 J	ND	ND	ND	1.4
Naphthalene	1.4 J	ND	ND	ND	ND	ND	100
Phenanthrene	120	1.2	0.16 J	0.047 J	ND	0.56 J	4.9
Pyrene	110	1.3	0.22	0.077 J	2.7 J	0.63 J	100

ND Analyte not detected
- Not Applicable or sample not tested for this analyte
J Estimated Concentration
B Anaalyte detected in method blank
K Result is reported as Benzo(b)fluoranthene
E Results exceeded calibration range
T Result is Tentatively Identifies Compound and an estimated value
[red box] Reported concentration greater than or equal to the NYSDEC Restricted Residential SCO

Table 4 - Summary of 2024 Vapor/Indoor Air Analytical Results

Contaminants	Type of Sample, Sample Identification, Date Analyzed and Analysis Method									NYSDOH Indoor Air Guideline Values	Table C2. EPA 2001 Indoor Air Mean Value	Decision Matrix Guidance Values (Soil Vapor) (µg/m3)
	Sub-slab	Indoor Air	NYSDOH Matrix Recommended Action	Sub-slab	Indoor Air	NYSDOH Matrix Recommended Action	Sub-slab	Indoor Air	NYSDOH Matrix Recommended Action			
	SS-1	IA-1		SS-2	IA-2		SS-3	IA-3				
	3/27/2024											
	Volatile Organic Compounds (TO-15)											
1,1,1-Trichloroethane	ND	ND	No Further Action	ND	0.45	No Further Action	0.91	ND	No Further Action	-	16.2	
1,1-Dichloroethane	ND	ND	No Further Action	ND	ND	No Further Action	ND	ND	No Further Action		0.2	
1,2,4-Trimethylbenzene	0.67	0.37	No Further Action	0.83	1.6	No Further Action	0.75	0.77	No Further Action	-	4.8	60
1,3,5-Trimethylbenzene	ND	ND	No Further Action	ND	0.5	No Further Action	ND	0.25	No Further Action	-	1.6	60
2-Hexanone (MBK)	ND	ND	-	ND	ND	-	ND	0.42	-	-	-	
4-Ethyltoluene	ND	ND	-	ND	0.28	-	ND	0.2	-	-	1.7	
Acetone	22	7	-	15	ND	-	ND	14	-	-	54	
Benzene	1.8	0.93	No Further Action	1.8	3	No Further Action	6.1	1.5	No Further Action	-	4.5	60
Bromomethane	ND	ND	-	ND	ND	-	ND	0.16	-	-	-	
Carbon Disulfide	20	2.3	-	ND	ND	-	72	ND	-	-	1.9	
Carbon Tetrachloride	ND	0.39	No Further Action	ND	0.39	No Further Action	ND	0.25	No Further Action	-	0.5	6
Chloroethane	ND	ND	-	ND	ND	-	ND	0.15	-	-	-	
Chloroform	1.7	ND	-	ND	ND	-	1.5	ND	-	-	0.5	
Chloromethane	0.46	0.92	-	1.2	1.1	-	0.58	1.3	-	-	2.9	
cis-1,2-Dichloroethylene	ND	ND	No Further Action	ND	ND	No Further Action	1.9	ND	No Further Action	-	0.6	
Cyclohexane	4.7	0.39	No Further Action	0.73	2	No Further Action	21	0.97	No Further Action	-	-	60
Dichlorodifluoromethane (Freon 12)	54	49	-	39	19	-	4.9	3.7	-	-	-	
Ethanol	15	9	-	32	9.4	-	39	17	-	-	89.3	
Ethyl Acetate	ND	ND	-	120	ND	-	ND	ND	-	-	-	
Ethylbenzene	0.48	0.49	No Further Action	0.78	1.5	No Further Action	0.89	0.78	No Further Action	-	2.8	60
Heptane	4.3	0.64	No Further Action	1.9	3.1	No Further Action	28	1.6	No Further Action	-	1.7	200
Hexane	ND	ND	No Further Action	ND	5.6	No Further Action	26	ND	No Further Action	-	6.3	200
Isopropanol	ND	ND	-	ND	ND	-	ND	8	-	-	-	
m&p-Xylene	1.3	1.7	No Further Action	2.5	4.7	No Further Action	2.5	2.6	No Further Action	-	10.8	200
Methylene Chloride	ND	ND	No Further Action	ND	ND	No Further Action	ND	ND	No Further Action	60	21.2	100
Naphthalene	ND	ND	No Further Action	ND	0.19	No Further Action	ND	ND	No Further Action	-	6.6	60
o-Xylene	ND	0.55	No Further Action	1.3	1.7	No Further Action	0.89	1.1	No Further Action	-	3.8	60
Propene	ND	ND	-	ND	3.2	-	ND	ND	-	-	-	
Styrene	ND	ND	-	ND	0.25	-	0.51	ND	-	-	1.5	
Tetrachloroethylene	ND	ND	No Further Action	ND	0.35	No Further Action	45	0.26	No Further Action	30	6	100
Tetrahydrofuran	ND	ND	-	ND	1.5	-	ND	1.1	-	-	-	
Toluene	2.5	2.3	No Further Action	4.7	8.9	No Further Action	8.9	4.9	No Further Action	-	25.1	300
Trichloroethylene	ND	ND	-	ND	ND	-	20	ND	-	2	2.6	6
Vinyl Acetate	ND	ND	-	ND	7.1	-	29	4	-	-	-	
Vinyl Chloride	ND	ND	No Further Action	ND	ND	No Further Action	ND	ND	No Further Action	0.2	0.5	6

Notes: All units in micrograms per liter (µg/m3)

NO FURTHER ACTION: No additional actions are recommended to address human exposures.

IDENTIFY SOURCE(S) AND RESAMPLE OR MITIGATE: It is recommended that reasonable and practical actions be taken to identify the source(s) affecting the indoor air quality and that actions be implemented to reduce indoor air concentrations to within background ranges.

MONITOR: It is recommended that monitoring , including but not necessarily limited to sub-slab vapor, basement air and outdoor air sampling, to determine whether concentrations in the indoor air or sub-slab vapor have changed and/or to evaluate temporal influences.

MITIGATE: Mitigation is recommended to minimize current or potential exposures associated with soil vapor intrusion.

Elevated concentrations detected in the subsurface above indoor air guidance values (NYSDOH Table C2.) but below levels that would require mitigation

ND Not detected
0.69 Analyte detected
\- Not applicable
J Estimated concentration

Table 4 - Summary of 2024 Vapor/Indoor Air Analytical Results

Contaminants	Type of Sample, Sample Identification, Date Analyzed and Analysis Method										NYSDOH Indoor Air Guideline Values	Table C2. EPA 2001 Indoor Air Mean Value
	Sub-slab	Indoor Air	NYSDOH Matrix Recommended Action	Sub-slab	Indoor Air	NYSDOH Matrix Recommended Action	Soil Vapor	Soil Vapor	Soil Vapor	Outdoor Air		
	SS-4	IA-4		SS-5	IA-5		SV-1	SV-2	SV-3	OA-1		
	3/27/2024											
	Volatile Organic Compounds (TO-15)											
1,1,1-Trichloroethane	ND	0.77	No Further Action	640	0.33	No Further Action	ND	ND	ND	ND		16.2
1,1-Dichloroethane	ND	ND	No Further Action	4.6	ND	No Further Action	ND	ND	ND	ND		0.2
1,1-Dichloroethylene	ND	ND	-	0.63	ND	-	ND	ND	ND	ND	-	0.5
1,2,4-Trimethylbenzene	ND	1.8	No Further Action	ND	1.1	No Further Action	ND	ND	0.66	ND	-	4.8
1,3,5-Trimethylbenzene	ND	0.48	No Further Action	ND	0.39	No Further Action	ND	ND	ND	ND	-	1.6
1,3-Butadiene	ND	0.63	-	ND	0.55	-	ND	ND	ND	ND	-	1.4
2-Hexanone (MBK)	ND	0.42	-	ND	ND	-	ND	ND	0.58	0.17	-	-
4-Ethyltoluene	ND	0.41	-	ND	0.35	-	ND	ND	ND	ND	-	1.7
4-Methyl-2-pentanone (MIBK)	ND	ND	-	ND	ND	-	ND	ND	ND	0.55	-	3.1
Acetone	15	ND	-	40	ND	-	37	9.6	140	7.7	-	54
Benzene	1.1	2.6	No Further Action	3.1	2.7	No Further Action	0.91	0.59	2.1	0.51	-	4.5
Carbon Disulfide	23	ND	-	81	ND	-	ND	ND	ND	ND	-	1.9
Carbon Tetrachloride	ND	0.32	No Further Action	ND	0.43	No Further Action	ND	ND	ND	0.43	-	0.5
Chlorobenzene	ND	ND	No Further Action	ND	ND	No Further Action	ND	ND	ND	ND	-	0.4
Chloroform	ND	ND	-	2.3	ND	-	ND	ND	ND	ND	-	0.5
Chloromethane	ND	0.98	-	ND	1.1	-	1.3	1.1	1.7	1.1	-	2.9
cis-1,2-Dichloroethylene	ND	ND	No Further Action	ND	ND	No Further Action	ND	ND	ND	ND	-	0.6
cis-1,3-Dichloropropene	ND	ND	No Further Action	ND	ND	No Further Action	ND	ND	ND	ND	-	0.9
Cyclohexane	3.2	1.6	No Further Action	24	1.7	No Further Action	ND	0.67	1.3	ND	-	-
Dichlorodifluoromethane (Freon 12)	9.2	7.4	-	7.1	5.5	-	2.3	2.2	2.6	2.3	-	-
Ethanol	18	13	-	25	25	-	18	ND	29	13	-	89.3
Ethylbenzene	0.58	1.4	No Further Action	0.55	1.4	No Further Action	ND	ND	0.44	0.16	-	2.8
Heptane	2.4	2.3	No Further Action	15	3.8	No Further Action	0.8	1.2	2	0.32	-	1.7
Hexane	ND	ND	No Further Action	ND	5	No Further Action	ND	ND	ND	ND	-	6.3
Isopropanol	ND	ND	-	ND	ND	-	ND	ND	ND	3.5	-	-
m&p-Xylene	1.4	4.6	No Further Action	1.8	4.5	No Further Action	ND	ND	1.4	0.39	-	10.8
Methyl tert-Butyl Ether (MTBE)	ND	ND	No Further Action	ND	ND	No Further Action	0.37	ND	ND	ND	-	3.3
Methylene Chloride	ND	ND	No Further Action	ND	ND	No Further Action	ND	ND	ND	ND	60	21.2
Naphthalene	ND	0.78	No Further Action	ND	ND	No Further Action	ND	ND	ND	ND	-	6.6
o-Xylene	0.59	2	No Further Action	0.76	1.9	No Further Action	ND	ND	0.57	0.22	-	3.8
Propene	ND	2.9	-	ND	2.9	-	ND	45	9.2	ND	-	-
Styrene	ND	0.24	-	ND	0.19	-	ND	ND	ND	ND	-	1.5
Tetrachloroethylene	0.69	0.38	No Further Action	4.8	0.34	No Further Action	ND	0.79	ND	ND	30	6
Tetrahydrofuran	ND	1.2	-	ND	ND	-	ND	ND	ND	ND	-	-
Toluene	3.8	7.8	No Further Action	5.7	9.6	No Further Action	1.7	0.52	4.4	0.92	-	25.1
Trichloroethylene	ND	ND	-	ND	ND	-	ND	ND	ND	ND	2	2.6
Trichlorofluoromethane (Freon 11)	ND	1.3	No Further Action	ND	1.3	No Further Action	ND	ND	ND	1.1	-	19.4
Vinyl Acetate	ND	5.7	-	14	6	-	ND	ND	ND	ND	-	-
Vinyl Chloride	ND	ND	No Further Action	ND	ND	No Further Action	ND	ND	ND	ND	0.2	0.5

Notes: All units in micrograms per liter (µg/m3)

NO FURTHER ACTION: No additional actions are recommended to address human exposures.

IDENTIFY SOURCE(S) AND RESAMPLE OR MITIGATE: It is recommended that reasonable and practical actions be taken to identify the source(s) affecting the indoor air quality and that actions be implemented to reduce indoor air concentrations to within background ranges.

MONITOR: It is recommended that monitoring , including but not necessarily limited to sub-slab vapor, basement air and outdoor air sampling, to

MITIGATE: Mitigation is recommended to minimize current or potential exposures associated with soil vapor intrusion.

Elevated concentrations detected in the subsurface above above indoor air guidance values (NYSDOH Table C2.)

ND Not detected

0.69 Analyte detected

\- Not applicable

TABLE 5
SUMMARY OF 2026 SOIL ANALYTICAL RESULTS

Analyte	Sample Identification, Sample Depth and Sample Collection Date										NYSDEC Part 375 Soil Cleanup Objectives (SCOs)				
	BH-1	BH-10	BH-2	BH-3	BH-4	BH-5	BH-6	BH-7	BH-8	BH-9	Unrestricted	Residential	Restricted Residential	Commercial	Industrial
	2-3'	1-2'	2-3'	1-3'	1-2'	2-3'	2-3'	1-2'	2-3'	1-2'					
	1/28/2026														
METALS (ppm)															
Mercury	ND	0.1	3.7	0.14	0.28	0.015 J	0.43	0.041	0.21	0.19	0.18	0.3	0.3	1.1	1.1
Arsenic	5.6	3.9	8.6	7.1	6.7	3.2	14.1	5.1	5.6	6.3	13	16	16	16	16
Barium	14.9	169	147	187	127	90.7	216	108	121	99.5	410	410	410	410	10000
Beryllium	0.24 B	1.3 B	0.82 B	1.4 B	0.43 B	0.63 B	0.41 B	0.88 B	0.81 B	0.88 B	4.4	8.8	43	670	750
Cadmium	2.2	0.14 J	0.99	0.97	0.63	0.14 J	20.3	0.18 J	0.28	0.51	2.5	2.5	2.5	3.7	4.4
Chromium	5	26.2	24.8	29.3	9.9	18.3	18.4	20.5	12.6	19.5	30	30	110	1700	2000
Copper	5.2	20.9	193	258	175	14.8	55.6	19.4	32.6	114	50	280	280	280	10000
Lead	27.9	35	468	278	292	13.8	948	17.9	121	108	63	400	400	1000	3900
Manganese	547	196	421	465	188	422	262	454	574	520	1600	2000	2000	10000	10000
Nickel	6.8	31.8	28.2	34.2	13	17.4	11.5	24.6	16.9	28.6	30	87	320	320	5900
Selenium	ND	ND	ND	ND	1.2 J	ND	ND	ND	ND	ND	3.9	22	110	1700	2000
Silver	ND	ND	ND	0.31 J ^5-	ND	ND	0.47 J ^5-	ND	ND	ND	2	22	110	1700	2000
Zinc	103	115	429	628 F2	164	47.9	253	69.3	125	240	109	1300	6600	10000	10000
SEMIVOLITALE ORGANIC COMPOUNDS (SVOCS) (ppm)															
Acenaphthene	ND	ND	ND	0.27 J	ND	ND	1.2 J	4.4	2.3	ND	20	100	100	500	1000
Acenaphthylene	ND	ND	ND	ND	ND	ND	0.56 J	ND	0.46 J	ND	100	100	100	500	1000
Anthracene	ND	ND	0.2 J	0.78 J	0.74 J	ND	3.5	9.5	8.3	0.19 J	100	100	100	500	1000
Benzo[a]anthracene	0.25 J	0.062 J	0.83 J	2.1	2.4	ND	7	13	15	0.84 J	1	1	1.4	37	37
Benzo[a]pyrene	ND	0.056 J	0.81 J	1.8	2.1	ND	6.1	10	11	0.81J	1	1	1	3.7	3.7
Benzo[b]fluoranthene	0.37 J	0.078 J	1.2	2.3	2.7	ND	8.3	12	14	1.1	1	1	1.4	37	37
Benzo[g,h,i]perylene	ND	0.048 J	0.71 J	1.3	1.5 J	ND	4	5.2	6.9	0.59 J	0.64	1.2	4.9	47	78
Benzo[k]fluoranthene	ND	ND	0.53 J	1.1	1.3 J	ND	2.8	5	5.7	0.52 J	0.8	1.2	4.9	47	78
Chrysene	ND	0.061 J	0.93 J	2.1	2.3	ND	7.1	11	13	0.85 J	1	1.2	4.9	47	78
Dibenz(a,h)anthracene	ND	ND	0.24 J	0.44 J	0.46 J	ND	1.3 J	1.7 J	2.3	0.22 J	0.33	0.33	0.33	3.7	3.7
Dibenzofuran	ND	ND	ND	0.33	ND	ND	1.4 J	3	2.7	ND	2.1	4.2	18	180	290
Fluoranthene	0.71 J	0.12 J	1.9	4.9	5.1	ND	18	30	37	1.6	85	100	100	500	1000
Fluorene	ND	ND	ND	0.27 J	ND	ND	1.5 J	5.2	3.1	ND	30	100	100	500	1000
Indeno[1,2,3-cd]pyrene	ND	0.047 J	0.57 J	1.1	1.3 J	ND	3.5	4.6	6.3	0.57 J	0.5	0.5	1.4	37	37
Naphthalene	ND	ND	ND	0.48 J	ND	ND	1.4 J	2.1	0.56 J	ND	12	84	100	500	1000
Phenanthrene	0.52 J	0.083 J	1	3.7	3.3	ND	17	30	37	0.83 J	1.1	1.2	4.9	47	78
Pyrene	0.51 J	0.094 J	1.6	3.9	4.3	ND	15	24	29	1.4	64	100	100	500	1000

ACRONYMS:

ND Analyte not detected
- Not Applicable or sample not tested for this analyte
J Estimated Concentration
Anaalyte detected in method blank
F1 MS and/or MSD recorver exceeds control limits
F2 MS/MSD RPD exceeds control limits
vs Reported analyte may be biased low
^5- Linear Range Check (LRC) is outside acceptable limits, low biased
^5+ Linear Range Check (LRC) is outside acceptable limits, high biased

NOTES:

1) All values are presented in parts per million (ppm) or milligram per kilogram (mg/kg)

Above Industrial
Above Commercial and Below Industrial
Above Restricted Residential and Below Commercial
Above Residential and Below Restricted Residential
Above Unrestricted and Below Residential