

REMEDIAL ACTION WORK PLAN

THE CROSSROADS AT GENESEE
19 DOAT STREET AND 9 LANSDALE PLACE
BUFFALO, NEW YORK 14211
NYSDEC SITE # C915338

Prepared for:

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February 2020

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1.0 INTRODUCTION

The Crossroads at Genesee LLC is the “Applicant” for the Crossroads at Genesee BCP Site (NYSDEC Site #C915338) located at 19 Doat Street, Buffalo, New York 14211 (Site) has entered into a Brownfield Cleanup Program (BCP) Agreement with the NYSDEC under the Voluntary section of the “Brownfield Cleanup Program Act”. The Crossroads at Genesee LLC has contracted BE3 to conduct a Remedial Investigation (RI), prepare an Alternatives Analysis Report (AAR) and prepare a Remedial Action Work Plan (RAWP) as required by the BCP Agreement. This document presents details of a work plan (RAWP) designed to support the implementation of a remedial action at the 19 Doat Street. **Figure 1** shows the location of the Site.

The Remediation Action (RA) includes: excavation/removal of impacted fill/soils and off-site landfill disposal; removing building basement floor slab and impacted soil; and backfilling excavations with clean off-site fill material or hardscape all to meet Part 375 Unrestricted Use (Track 1) requirements. However, if excavation within the building to meet unrestricted SCOs is determined too costly or may compromise the integrity of the building and/or soil vapor intrusion (SVI) concerns are not mitigated, then a track 4 restricted residential remedy will be the default option beneath the building and a Track 2 - Residential alternative external to the building that will necessitate remediation of all soil/fill external to the building where concentrations exceed Residential SCOs. With the latter option alternative an Environmental Easement (EE) with a Site Management Plan (SMP) will also be required.

Several environmental studies/investigations (refer to Section 2) completed at the Site have concluded that there are impacted fill/soils at the Site as well as building sub-slab soil vapors. The impacted media are due to releases and past uses of the Site.

Site fill/soils have been primarily impacted with semi-volatile organic compounds (SVOCs) in the form of polycyclic aromatic hydrocarbons (PAHs) and inorganic compounds (metals). Metal compounds were detected in each of the GW samples with only the metal Total Mercury exceeding its TOGs guideline (MW-3 – 2.65 ppb versus 0.7 ppb TOGs guidance value). It should be noted that the laboratory placed a qualifier “L” on all Mercury results which states that the laboratory control sample recovery was outside accepted QC limits. The qualifier places the Total Mercury results in question. MW-3 will be re-sampled to ascertain if the mercury value was truly an anomaly. The sub-slab vapor analytical results reveal that TCE was detected in all six (6) Sub-slab samples at elevated concentrations that when applied to the Indoor Air Decision Matrices requires mitigation to reduce TCE concentrations.

The remaining sections of the work plan discuss:

- Section 2.0 - Environmental conditions/past investigations
- Section 3.0 - Summary of remedial goals and remedy
- Section 4.0 - Remedial construction requirements/submittals
- Section 5.0 – Remedial Approach
- Section 6.0 - Confirmation soil sampling
- Section 7.0 – Groundwater monitoring program
- Section 8.0 - Oversight and reporting
- Section 9.0 - Work Plan PE certification

- Appendix A - Health and Safety Plan (HASP)
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- Appendix D - Citizens Participation Plan (CPP)

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1.1 SITE HISTORY AND DESCRIPTION

The 19 Doat Street Site encompasses both the 19 Doat Street parcel and the 9 Landsdale Place parcel and both together are approximately 1.9 acres in size. Industrial and manufacturing uses have occurred on the properties since the early 1900s. Uses onsite include textile manufacturing and dyeing when the property was owned by the Monarch Knitting Company (1912) and then the Butterworth Dyeing and Bleach Works (1925). In 1929 the property was purchased by the Spencer Lens Company and the production of optical lenses took place on the properties. According to historical maps, Bond Clothing Store occupied the property from 1946 to approximately 1950, where uses were associated with clothing manufacturing and retail. From the 1950s to the early 2000s, the property was occupied by the Royal Bedding Company and other small retail tenants. In 2009, uses switched to automotive repair and tire sales. Operations on site have recently stopped but equipment and material associated with the automotive uses remains onsite. The Site is zoned D-C (district commercial), but most of the surrounding area is a mixture of district and neighborhood.

The main site features include an L-shaped, four-story, 91,000 square-foot brick industrial building with the remainder of the site covered with a gravel/asphalt lot. The building takes up most of the south and western portion of the property with the gravel and asphalt lot covering the north and eastern sections. Currently multiple storage containers, tire piles, and vehicle storage areas exist on the eastern side of the property, however, these will be removed by the current owner after the requestor has closed on the property. See **Figure 2** for details of major infrastructure, utilities, and buildings that currently exist at the Site.

The Site is generally flat with no major changes of topography. The Site is mostly covered by concrete, asphalt, buildings, or other impervious surfaces. The surrounding area has been significantly developed as dense urban commercial/residential area since at least the late 1800s with current soils predominantly backfill material from redevelopment. Bedrock beneath the target site consists of Onondaga limestone buried beneath glacial deposits with no rock outcrops visible at ground surface. There are no streams or naturally occurring water sources (including wetlands and floodplains) near the Site, and two centuries of construction and development within the heavily urbanized area have altered any natural drainage.

1.2 CONTEMPLATED USE OF THE SITE

The proposed redevelopment of 19 Doat Street is The Crossroads at Genesee, which is planned to be a new mixed-use; approximate 70-unit, affordable apartment building and health care facility. A mix of one, two, and three-bedroom apartments, 1,600 square feet of residential community support space, and 400 square feet for Matt Urban Human Services Center offices are planned. Also, an 8,100 square foot one story structure will be constructed to provide a new full-service health center operated by Jericho Road.

2.0 ENVIRONMENTAL CONDITIONS/PAST INVESTIGATIONS

The following is a list of investigation reports completed on the properties:

- Phase I Environmental Site Assessment - 19 Doat Street and 9 Lansdale Place Properties; City of Buffalo, Erie County, New York; completed by PEI for Regan Development Corporation in October 2017.
- Phase II Environmental Site Assessment – 19 Doat Street and 9 Lansdale Place Properties; Buffalo, New York; completed by PEI for Regan Development Corporation in March 2018.
- Supplemental Phase II Environmental Site Assessment – 19 Doat Street - 9 Lansdale Place; Buffalo, New York; completed by PEI for Regan Development Corporation in June 2018.
- Remedial Investigation/Alternatives Analysis Report (RI/AAR) – The Crossroads at Genesee, 19 Doat Street and 9 Lansdale Place; City of Buffalo, Erie County, New York; completed by BE3 for The Crossroads at Genesee, LLC.; October 2019.

The following are the key findings of the above ESAs/Investigations.

October 2017 – Phase I Environmental Site Assessment Report

The Phase I ESA identified the previous uses of the property and the history of petroleum use and storage, which included the following:

- 1929 permit for Spencer Lens Company to install a 550-gallon gasoline tank.
- 1950 permit for Royal Bedding to install a 1,000-gallon gasoline tank.
- 1966 permit for Royal Bedding Company to install a 1,000-gallon gasoline tank “to replace a leaker”. Fire Bureau drawing shows it on the north corner of the one-story shipping portion of the building in the “yard”.
- 1972 Bureau of Fire Record indicating a 5,000-gallon fuel oil tank located in the yard.
- 2010 and 2013 - various violations of City ordinances especially regarding tire storage on floors 1-3.

The Phase I deemed the Site as medium risk in terms of environmental impairment based on its past manufacturing use, petroleum storage/USTs and the observation of various drums and containers with unknown contents. Lead-based paint and asbestos containing materials may be associated with the building. Other potentially hazardous materials such as PCBs may be associated with light ballasts, motors and former transformer areas. The report assessed the need for a vapor intrusion assessment (VIA) for potential chemicals of concern that can migrate as vapors into existing or planned structures due to impacted soil and groundwater. Although no environmental liens or activity and use limitations were identified, the following potential recognized environmental conditions were identified:

- Historic use of portions of the property for textile manufacturing, textile dyeing and bleaching, optical glass and instrument manufacturing, and vehicle and tire repair, which typically create environmental impairment.
- Records indicate at least four different USTs were associated with the property. One permit record suggests a history of leaks from one of the UST. There were no spill reports or documentation of removal of any of these USTs.
- Several drums and containers of unknown content were observed within the basement of the building and outside on the southern and eastern portions of the property. It is important to note that the property transfer agreement includes a stipulation that the current owner will remove contents and leave the facility “broom clean”.
- Two gasoline service stations were historically located on adjacent northern property across Doat

Street.

- The transformers should be checked for PCB containing lubricants.

March 2018 – Phase II Environmental Site Assessment Report

The purpose of this assessment was to identify potential contamination in the surface and subsurface soils at 19 Doat Street based on the Phase I ESA RECs and visual observations. These concerns included (1) industrial and commercial historical use dated from first development of the vacant site in early 1900s, (2) possible UST or USTs located in 3 or 4 locations based upon historical use and no records of removal, (3) site reconnaissance indicated several drums and a transformer area, and (4) historical violations associated with tire sale/auto garage.

The Phase II ESA indicated that there is widespread contamination in the surface and subsurface soils. Metal concentrations exceeding Part 375 contaminants were observed at all 12 locations, and 8 of the 12 sampling locations were observed to have pesticide exceedances. SVOC exceedances were noted in 9 of the 12 sampling locations with each location possessing contamination higher than restricted residential SCOs. Most of these exceedances are typical of urban fill; however, laboratory results for VOCs indicate 4 of the 9 subsurface samples potentially associated with a petroleum spill. Elevated PCB levels were also observed near the transformer house. Refer to the **Phase 2 ESAs Tables 1 January 2018** for detailed results on metals, VOCs, SVOCs, PCBs and pesticides.

June 2018 – Supplemental Phase II Environmental Site Assessment Report

The purpose of this supplemental investigation was to collect additional surface soil samples along the eastern property line of the Site. The four (4) supplemental surface soil samples collected reflected similar contamination as noted in the March 2018 assessment. Refer to the **Phase 2 ESAs Table 1 May 25, 2018** for detailed results and **Phase 2 ESA Figure 3** for sampling locations for both the March and June Phase 2 ESAs.

October 2019 – RI/AAR – The Crossroads at Genesee, 19 Doat Street and 9 Lansdale Place.

The RI tasks were completed in accordance with a defined scope of work and approved RIWP. The following provides a summary of the investigation activities:

- Assessment of fill/native soil material exterior to the building by installing 17 soil borings across the Site and collecting a total of 30 soil samples;
- Assessment of building sub-surface soil material by installing five (5) borings through the basement floor slab and collecting a total of six (6) soil samples;
- Assessment of groundwater conditions by installing five (5) on-site exterior overburden groundwater monitoring wells and collecting a total of five (5) groundwater samples;
- Performed laboratory analysis on all soil/water samples. Analysis included Part 375 metals, TCL VOCs plus TICs, TCL SVOCs plus TICs, pesticides/PCBs and 1,4-Dioxane/PFAS compounds;
- Assessment of sub-slab vapor intrusion in the site building by collecting six (6) sub-slab vapor samples with six (6) paired indoor air samples and one (1) outdoor air sample. Performed laboratory analysis on all air samples for TO-15 VOCs; and,
- Performed a building materials assessment (asbestos, lead based paint and PCBs).

Summary of Results by Medium

Soil

The results of the RI and Phase 2 ESA soils investigations indicate that a number of SVOCs (PAHs), some metals and pesticides were detected throughout soil/fill material primarily at the surface/near surface levels (0-1' bgs) that were above Restricted Residential and/or Unrestricted Use SCOs. No VOCs were detected in the RI samples above Restricted Residential SCOs and only a few VOCs were detected in RI samples that exceeded Unrestricted Use SCOs. One (1) Soil sample collected during the Phase 2 ESA (BH-8 at 1'-2') detected three (3) VOCs that exceeded Restricted Residential SCOs

RI Table 2 and **Phase 2 ESA Table 1 January 2018** and **Table 1 May 2018** present all of the analytical results that exceed Restricted Residential/Unrestricted Use SCOs for both the RI and the Phase 2 ESAs.

All soil samples were analyzed for 1,4-Dioxane by Method 8270D and the list of PFAS compounds. **Table 3** provides a comparison of the analytical results (PFAS and 1,4-Dioxane) with NYSDEC guidelines where available. The NYSDEC guideline for 1,4-Dioxane is 1 ppm and all 1,4-Dioxane concentrations in soil samples were Non-Detect (ND).

Groundwater

No SVOCs or pesticide/PCB compounds were detected in any groundwater samples.

Metal compounds were detected in each of the GW samples with only the metal Total Mercury exceeding its TOGs guideline (MW-3 – 2.65 ppb versus 0.7 ppb TOGs guidance value). It should be noted that the laboratory placed a qualifier “L” on all Mercury results which states that the laboratory control sample recovery was outside accepted QC limits. The qualifier places the Total Mercury results in question. MW-3 will be re-sampled to ascertain if the mercury value was truly an anomaly.

The VOC Acetone was detected in the MW-3 sample above its TOGs guideline value, however, as stated earlier acetone is commonly used in laboratory cleaning solutions. Acetone was non-detect in all of the other groundwater samples.

1,4-Dioxane and PFAS compound concentrations were not detected above NYSDEC guidelines.

Sub-Slab Vapor

The sub-slab vapor analytical results reveal that TCE was detected in all six (6) Sub-slab samples at elevated concentrations that when applied to the Indoor Air Decision Matrices requires mitigation to reduce TCE concentrations. It should be noted that TCE was detected in the outdoor background sample but at a low concentration (1.6 ug/m3).

Testing for the other NYSDOH assigned volatile chemicals for Indoor Air Decision Matrices indicated that “No Further Action” is required for these compounds.

Table 1 provides all of the TO-15 VOC results and **Figure 4** provides the sample locations and analytical results with recommended actions.

Building Environmental Condition Assessment

Environmental condition assessments were conducted in the site buildings that included an asbestos containing materials (ACM) survey, lead-based paint (LBP) survey and a PCB inventory/assessment. **Figure 2** shows the location of the building and a summary description of the building is provided in Section 1.1.

A New York State licensed asbestos firm, AMD Environmental Consultants, Inc. of Buffalo, New York, conducted the asbestos survey including the lead-based paint assessment and PCB inventory which they are also licensed to perform.

The results of the ACM survey indicated the presence of ACM, LBP and PCB containing materials throughout the building. The inspection also identified numerous other miscellaneous hazardous waste/environmental issues (e.g. paints, lubricants, and other chemical containers) that were inventoried and if not be reused should be properly disposed of.

3.0 SUMMARY OF REMEDIAL OBJECTIVES AND REMEDY

3.1 REMEDIAL ACTION OBJECTIVES

The final remedial measures for the site must satisfy Remedial Action Objectives (RAOs). Remedial Action Objectives are site-specific statements that convey the goals for minimizing or eliminating substantial risks to public health and the environment. The primary RAOs identified for the site are:

Groundwater

RAOs for Public Health Protection - None

RAOs for Environmental Protection

- Prevent the discharge of contaminants to surface water.
- Remove the source of ground or surface water contamination

Soil

RAOs for Public Health Protection

- Prevent ingestion/direct contact with contaminated soil.
- Prevent inhalation of or exposure from contaminants volatilizing from contaminants in soil.

RAOs for Environmental Protection

- Prevent migration of contaminants that would result in groundwater or surface water contamination.
- Prevent impacts to biota from ingestion/direct contact with soil causing toxicity or impacts from bioaccumulation through the terrestrial food chain.

Soil Vapor

RAOs for Public Health Protection

- Mitigate impacts to public health resulting from existing, or the potential for, soil vapor intrusion into buildings at a site.

3.2 IDENTIFICATION OF STANDARDS, CRITERIA AND GUIDANCE

SCGs are promulgated requirements (i.e., standards and criteria) and non-promulgated guidance that govern activities that may affect the environment and are used by the NYSDEC at various stages in the investigation and remediation of a site. The following are the primary SCGs for this project:

- NYSDEC 6 NYCRR Part 375 – Environmental Remediation Programs December 2006;

- NYSDEC DER-10 – Technical Guidance for Site Investigations and Remediation May 2010;
- NYSDEC - Technical and Operational Guidance Series (1.1.1) Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations June 1998 (TOGS);
- NYSDEC Policy – CP-51- Soil Cleanup Guidance; Date Issued: October 21, 2010; and,
- New York State Department of Health (NYSDOH) October 2006 Guidance for Evaluating Soil Vapor Intrusion in the State of New York and its May 2017 amendment.

3.3 REMEDY

The remediation action (RA) includes:

1 – A Track 1 Unrestricted Use remedy necessitates remediation of all soil/fill across the Site where concentrations exceed the Unrestricted SCOs. Based on RI data It is estimated that this would require soil removal to a depth of approximately two (2) feet (approximate fill and natural soil interface) across the entire property external to the building and Backfill with clean soil or hardscape to meet new development grades. The remedy is depicted in **Figure 10** Track 1 Unrestricted Use remedy.

To address the source of VOCs below building floor slabs, the selected remedy will involve removal of ground level basement concrete floor slabs. Impacted soil and fill will be subsequently removed to Unrestricted Use SCOs along with any soil that is serving as a source of VOC vapors. Additional sampling beneath all remaining building slabs will be undertaken to determine the feasibility of achieving unrestricted SCOs based on cost and structural integrity of the buildings. A supplemental workplan to complete further investigation under the building will be submitted to the NYSDEC for review and approval prior to completing the additional below building slab investigation. If unrestricted SCOs are achievable it is believed removal of the building slabs and all impacted fill/soil beneath the building will mitigate the potential for SVI across the site, therefore, the basement concrete floor slab would need to be removed and the impacted soil beneath the lab removed to meet unrestricted use SCOs (estimated 1 to 2 feet). Confirmation soil samples will be collected in accordance with DER-10 requirements at this level within the building prior to replacement of the clean fill and a new concrete floor system. Confirmation soil sampling would also be conducted at the fill - natural soil interface exterior to the building to assess if material remaining meets Unrestricted SCOs. Following the completion of this task and floor restoration, a sub-slab vapor evaluation will be completed to determine if SVI from VOCs in soil below the building floor slabs has been remediated and that a sub-slab depressurization system (SSDS) is not required. If it is determined that SVI will still occur after soil remediation, then a SSDS will be required and the remedy will default to a conditional Track 1 Unrestricted Use remedy (see **Figure 11** Conditional Track 1 Unrestricted Use). The system and any vapor intrusion monitoring must no longer be needed within 5 years of the date of the Certificate of Completion or the remedy would result in a Default - Track 2 Restricted Residential cleanup. Though the system may remain as a radon mitigation system as a requirement for housing, it should no longer be necessary to mitigate VOC SVI.

As part of the supplemental workplan discussed above a soil gas investigation will be proposed in the area of the proposed new clinic building at the northeast end of the site to assess soil gas concerns to this new structure.

Also, If excavation to Unrestricted Use SCOs beneath the building is determined too costly or may compromise the integrity of the building and/or SVI concerns are not mitigated as noted above, then a Track 4 Restricted Residential remedy (see **Figure 12**) will be the contingent/default option beneath the building and possibly exterior to the building at which time details on exterior hardscape would be presented for approval.

2 - No SSDS would be required in the building under this alternative. However, to meet radon requirements a radon SSDS will be installed when the new building slab is installed.

3 - Mitigate hazardous materials in building sections to be demolished and/ or renovated as part of the new development.

4 – The Track 1 Unrestricted Use remedy does not require an EE or SMP for the Site.

The remedial approach to implement the remedy is discussed in Section 4.0.

4.0 REMEDIAL APPROACH

This approach assumes a supplemental investigation beneath the existing building slabs results in unrestricted SCOs being achievable below the building slabs without endangering building structures.

4.1 SOILS REMOVAL AND REPLACEMENT

4.1.1 Soil Sampling for Disposal Purposes

Prior to excavation of any soils the contractor will, at the request and direction of his approved landfill for soil disposal, collect soil samples from excavation areas for analysis as requested by the landfill to determine acceptability for disposal at their facility to meet their permit requirements. At a minimum, we anticipate that the landfill will request Part 375 analysis be performed and possibly TCLP analysis for certain constituents to determine if any of the compound concentrations fall into the hazardous waste category. The number of soil samples is indeterminate at this time. Results of the soil sampling must be provided to the site representative prior to excavation and removal

4.1.2 Soil/Building Foundation Excavation

Prior to excavation activities at the site, an underground utility location service will be contacted by the remediation contractor to obtain utility clearances.

The contractor's erosion and sediment controls shall be in place (silt fences/filter soxx, berms, etc.) before any excavation begins to prevent contaminated water and/or sediment from leaving the Site and rain water from entering excavations (refer to Appendix G).

Buildings as noted on **Figure 10** will be demolished and floor slabs/foundations removed and, after examination/testing, will be sent to either a landfill or recycler. The basement floor slab of the large building along Rustic Place will also be removed as noted on **Figure 10** and disposed of off-site as previously noted. All proper support of the remaining building structure will be undertaken prior to floor removal as determined from the previous structural assessment.

All open areas across the site will be cleared and grubbed including existing asphalt/concrete surface areas, as necessary. All surface material will be disposed off-site at an approved landfill. The RI and previous investigations indicate that open areas of the site are covered by fill soils (one (1) to two (2) feet in depth) most likely brought in from off-site over time. The RI and previous investigations also indicate that the soils across the site are impacted with concentrations of primarily PAH/metal compounds and a few pesticides that exceed unrestricted SCOs (refer to **Figure 5**). Petroleum impacted soils in the vicinity of borehole RI-BH-10 (refer to **Figure 5**) will also be excavated until Unrestricted Use SCOs have been achieved for off-site disposal. Confirmation samples will be collected

from sidewalls and bottom per DER-10 requirements to confirm all impacted material that exceeds Unrestricted Use SCOs for petroleum VOCs and other contaminants have been removed. The area will then be backfilled per the requirements of section 4.1.3.

Remediation will include either adding clean fill/hardscape or removal of fill followed by addition of clean fill/hardscape. When removal is planned, the contractor will excavate Impacted soil across the area until Unrestricted Use SCOs have been achieved. Surface restoration would only require soil/hardscape needed to restore/construct to design plan grade. Backfill for proposed hardscape areas will include approved clean stone/gravel base and asphalt/concrete. Backfill for proposed greenspace areas will be with approved clean soil/stone and topsoil all to meet Part 375-6.8(a) Unrestricted SCOs. In general, clean fill or hardscape will be placed over the site in areas where the site will be raised to meet final site grades or to backfill excavated areas where Unrestricted Use SCOs have been achieved.

Buried utilities for the new development may be installed during remediation and excavated material from utility trenches will be assessed during excavation, and any material determined by visual assessment to be clean will be stockpiled for sampling/testing to determine reuse. All utility trenches will be backfilled with clean stone, including a minimum of one foot of stone below and around utility lines.

Impacted soil will be directly loaded to trucks for off-site disposal at a NYSDEC approved landfill. If impacted soil needs to be stockpiled for any reason before off-site transport the soils will be placed on minimum 6-mil plastic sheeting and covered with 6-mil plastic upon completion of stockpiling. All trucks for transport will be 9-A approved permitted trucks to haul non-hazardous waste.

A physical inspection (visual/olfactory) along with PID screening will be conducted of the excavation bottom and sidewalls during excavation operations to assess if there are hot spots below the proposed grade excavation limits that will need to be removed. Where the sidewalls of excavation are at the property boundary and the inspection notes possible impacts, confirmatory soil samples will be collected for analysis for VOCs, PAHs and Metals to assess if soils exceeding Unrestricted SCOs extend off-site (refer to Section 4.2.4 Soil Confirmation Sampling).

The excavations will be surveyed by the contractor for excavation and fill quantities which will also be needed the Final Engineering report.

Clean fill identified through visual, olfactory and PID screening process will be stockpiled on site on 6-mil plastic sheeting for potential re-use on the property as clean fill to meet any future re-development design/construction requirements. This material will be covered to prevent wind and rain erosion. The material will be sampled and analyzed for the Part 375 constituents noted above to assess if meet Unrestricted SCOs before re-use.

Dust, VOC and odor control measures with air monitoring will be implemented during all intrusive activities to minimize inhalation exposures and create a public record. The requirements of the New York State Department of Health (NYSDOH) Community Air Monitoring Plan (CAMP) and the NYSDEC Fugitive Dust Suppression and Particulate Monitoring Program (refer to the HASP in **Appendix A** and the Community and Environmental Response Plan in **Appendix G**) will be implemented for VOCs, odors and particulates during all work activities that involve the excavation and handling of the site soils.

If rain water is encountered in any of the excavation areas the contractor will collect and pump the water into drums or a "Frac" tank depending on quantity. The contractor will have any collected water sampled for disposal characterization for either disposal at an approved off-site facility or possible onsite treatment (carbon filtered, etc.) for disposal to the local municipal sewer system. For disposal to a municipal sewer

system the contractor will perform all required testing by the municipality and secure appropriate permits for discharge.

4.1.3 Fill Material

All imported fill materials to backfill excavations or to establish site grades shall be obtained from “virgin” sources and be tested to ensure they meet imported soil requirements of DER-10 Appendix 5 “Allowable Constituent Levels for Imported Fill for Unrestricted requirements and Soil Subdivision 5.4(e)”. DER-10 imported fill requirements are provided in **Appendix E**. The owner’s environmental consultant will approve all backfill material and sources before brought to the site. Stone/gravel from a permitted/approved NYSDOH/NYSDEC quarry maybe used for backfill without analytical testing provided the material contains less than 10 percent by weight of material which would pass through a size 80 sieve.

Fill material will be placed in maximum one-foot lifts and compacted with suitable approved vibratory compaction equipment or as directed by owner’s engineer.

4.1.4 Confirmation Soil Sampling

Confirmatory soil samples will be collected from all excavation side-walls and floor areas as outlined in DER 10 to verify that impacted soil/fill has been removed and remaining soil meets cleanup goals. Sidewall samples will also be required for areas requiring deeper excavation (such as the former tank pits). Sidewall verification samples will be collected to confirm that the sidewalls of the deeper excavation meet cleanup criteria. Floor samples from deeper excavations will also be collected per DER 10 requirements. The collection of soil samples for laboratory analysis will be performed pursuant to the **Appendix C** Field Sampling Plan and NYSDEC guidance. The sample locations will be located by a field GPS meter so that the sample locations are documented for final reporting.

Samples will be analyzed for Part 375 Brownfield constituents VOCs, PAHs and metals and compared to Unrestricted SCOs. All sample analysis will comply with the QA/QC plan provided in **Appendix B**.

The number of samples collected along the excavation wall will be dependent on visual inspection, PID screening and DER-10 requirements, as well as the requirements of the DEC project manager.

4.2 BUILDING SUB-SLAB SOIL VAPOR MITIGATION

With the removal and replacement of the building basement floor and the stone/soil beneath the floor a sub-slab depressurization system (SSDS) in the building to mitigate sub surface elevated solvent related vapors will not be required. Following the completion of this task and floor restoration. A sub-slab vapor evaluation will be completed to determine if SVI from VOCs in soil below the building floor slabs has been remediated and that a sub-slab depressurization system (SSDS) is not required. If it is determined that SVI will still occur after soil remediation, then a SSDS will be required and the remedy will move to a conditional Track 1 Unrestricted Use remedy. The system and any vapor intrusion monitoring must no longer be needed within 5 years of the date of the Certificate of Completion or the remedy would default to a Track 2 - Restricted Residential cleanup. Though the system may remain as a radon mitigation system as a requirement for housing, it should no longer be necessary to mitigate VOC SVI.

5.0 REMEDIAL CONSTRUCTION REQUIREMENTS/SUBMITTALS

Before initiating remedial activities, the selected contractor will complete the following tasks:

- Submit a site-specific Health and Safety Plan (HASP) to cover his workers and the public (will be attached to the HASP provided in **Appendix A**);
- Submit a site-specific plan of operations/work plan;
- Submit an Erosion and sediment control plan to conform to the site SWPPP (**Appendix H**);
- Contact the Underground Facilities Protection Organization and have all subsurface facilities marked;
- Establish contractor work limits within the staked property boundary;
- Install safety fencing around all work areas to restrict and control public access to the site; and,
- Procure all work permits and off-site road permits required by law for the off-site removal/disposal soils and materials; and,
- Designate for BE3/NYSDEC approval, site entrance/exit locations for contractor's equipment along with locations at site exits for truck washes or other vehicle cleaning measures to prevent any contaminated materials from being tracked off-site.

BE3 will be responsible for reviewing all submittals for conformance with the RAWP.

The contractor's work plan shall be submitted to BE3 and the NYSDEC and include, but not limited to, the following:

- Detailed construction schedule that meets the overall project schedule provided in the bid documents;
- A health and safety plan pertaining to the specific remedial work tasks for the protection of his workers and the general public;
- Sequence and methods to be used to accomplish the work;
- Off-site transport and end disposal destinations for contaminated soils;
- All disposal facilities must be NYSDEC approved with permits supplied to owner/engineer;
- Procedure to handle site drainage during construction to prevent contaminated water and/or sediment leaving the Site (silt fences, etc.) and rain water from entering excavations;
- Locations of off-site fill sources and clean verification per DER-10 requirements; and,
- End use verification to meet NYSDEC tracking requirements (Bills of Lading, etc.).

Upon acceptance of the contractor's work plan by BE3, the Owner and NYSDEC, the contractor will commence implementation of the plan and complete all work within the approved project schedule.

5.1 CONTRACTOR HEALTH AND SAFETY REQUIREMENTS

The remedial contractor will prepare and submit to BE3/NYSDEC a site-specific health and safety plan (HASP) pertaining to the remedial work for the protection of his site workers, the general public and the environment.

The contractor's HASP, at a minimum, must comply with: all Federal and State regulations; requirements of the Community and Environmental Response Plan (CERP) provided in **Appendix G**; and, the requirements of the HASP provided in **Appendix A** including, but not limited to, the following:

- Occupational Safety Health Administration (OSHA) Regulations 29 CFR 1910 120;
- OSHA Regulations 29 CFR 1926;
- All applicable laws and regulations regarding the handling and treatment of petroleum containing USTs and excavation/handling of impacted soils; and,
- The contractor's HASP must also comply with the Community Air Monitoring Plan (CAMP)

provided with Appendix A-HASP.

The HASP shall, at a minimum address, the following subject areas, as deemed necessary by the Contractor's health and safety personnel in accordance with OSHA Part 29 CFR 1910.120 and applicable New York State regulations:

- On-site health and safety organization;
- Hazard analysis of each site task and operation to be performed;
- Provisions for employee training to ensure compliance with 29 CFR 1910.120(e). Personal protective equipment (PPE) to be used by employees for each of the site tasks and operations being conducted to eliminate potential exposures, as required by the PPE programs in 1910.120(g)(5);
- Personnel and equipment decontamination procedures in accordance with 1910.120(k), as applicable;
- Standard Operating Safety Procedures, engineering controls and work practices;
- First aid requirements;
- Confined space entry requirements, if applicable, meeting requirements of 29 CFR 1910.146;
- Dust control measures that comply with action levels of the **Appendix A** CAMP;
- A spill containment program meeting the requirements of 1910.120(j);
- Heat/cold stress monitoring; and,
- Record keeping procedures.

The contractor will comply with the odor control requirements specified in the CERP in **Appendix G**.

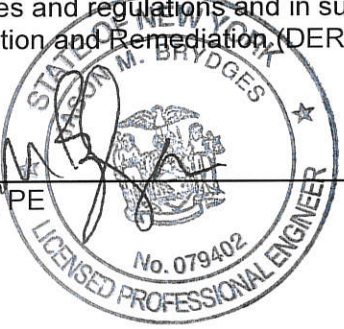
6.0 OVERSIGHT AND REPORTING

As required by BCP regulations the owner's engineer/consultant will provide construction oversight services during all construction activities detailed in the work plan and prepare a Final Engineering Report (FER) at the completion of construction in the NYSDEC template format. The FER will describe all the details of the construction and include copies of contractor submittals, disposal records, daily inspection reports and a certification that all work was completed in conformance with the approved work plan and be signed and stamped by a professional engineer licensed in the State of New York. All reports will be provided electronically in a format acceptable to NY.

7.0 WORK PLAN CERTIFICATION

I, Jason Brydges, certify that I am currently a NYS registered professional engineer as defined in 6 NYCRR Part 375 and that this Remedial Action 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 Brydges, PE

A circular professional engineer seal for the State of New York. The outer ring contains the text "STATE OF NEW YORK" at the top and "LICENSED PROFESSIONAL ENGINEER" at the bottom, separated by a star. The inner circle contains the name "JASON M. BRYDGES" at the top and "No. 079402" at the bottom. In the center is a small emblem of the State of New York. A signature is written across the seal.

REMEDIAL INVESTIGATION TABLES

Table 1
19 Doat Street Site
Sub Slab Vapor Ambient Air Analytical Results
EPA Air Method Toxic Organics -15 (TO-15)

Sample Date	Sample Identification													NYSDOH Minimum Action Levels ^a	
	7/17/19	7/17/19	7/17/19	7/17/19	7/17/19	7/17/19	7/17/19	7/17/19	7/17/19	7/18/19	7/18/19	7/18/19	7/18/19	Sub Slab Vapor Concentration	Indoor Air Concentration
TO-15 Contaminants	IA-01 Indoor	SS-01 Sub Slab	IA-02 Indoor	SS-02 Sub Slab	SS-03 Sub Slab	IA-03 Indoor	SS-04 Sub Slab	IA-04 Indoor	OA-01 Outdoor	SS-05 Sub Slab	IA-05 Indoor	SS-06 Sub Slab	IA-06 Indoor		
VOLATILE ORGANIC COMPOUNDS^b															
1,1,1-Trichloroethane	ND	1.1	ND	1.6	3.8	ND	30	ND	ND	6	ND	5.9	ND	100	3
1,1-Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6	0.2
1,2,4-Trimethylbenzene	2	8.9	2.3	8.5	8.6	1.5	8	1	1.1	11	1.6	13	1.6		
1,3,5-Trimethylbenzene	ND	4.3	3.3	4.1	4.4	1.8	3.5	1.5	1.7	7.1	2.7	8.1	1.4		
1,4-Dichlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
1,4-Dioxane	ND	1.7	ND	1.6	1.6	ND	1.3	ND	ND	2.4	ND	1.5	ND		
2,2,4-Trimethylpentane	ND	ND	ND	ND	0.51	ND	ND	0.56	ND	ND	0.93	ND	0.79		
4-Ethyltoluene	ND	2.1	ND	1.9	2	ND	1.9	ND	ND	2.9	ND	3.6	ND		
Acetone	14	160	14	120	120	14	120	10	23	320	21	110	13		
Benzene	0.54	13	0.61	20	5.8	0.45	5	0.45	0.35	30	0.67	75	0.48		
Carbon disulfide	ND	8.7	ND	12	19	0.34	5.8	ND	ND	29	ND	24	ND		
Carbon tetrachloride	0.5	ND	0.57	ND	ND	0.63	0.82	0.63	0.57	ND	ND	ND	ND	6	0.2
Chloroethane	ND	0.34	ND	0.55	ND	0.68	ND	ND	ND	ND	ND	2.3	ND		
Chloroform	ND	1.3	ND	1.5	32	ND	92	ND	ND	2.3	ND	0.88	ND		
Chloromethane	0.91	2.9	1.4	6.5	1.1	2.7	0.89	1.1	1.2	ND	1	ND	0.85		
cis-1,2-Dichloroethene	ND	ND	ND	ND	7.1	ND	ND	ND	ND	0.52	ND	ND	ND	6	0.2
Cyclohexane	ND	450	ND	1100	48	ND	48	ND	ND	560	ND	65	ND		
Ethyl acetate	0.65	3.5	0.79	3.2	3.1	0.68	2.5	0.5	0.86	2.4	0.83	2.7	0.76		
Ethylbenzene	2.7	14	3.2	13	14	0.91	13	0.43	0.52	15	0.56	12	0.61		
Freon 11	1.4	2	1.2	2.1	1.8	1.5	1.6	1.2	1.3	1.9	1.5	1	1.3		
Freon 113	ND	ND	ND	ND	ND	ND	0.92	ND	ND	ND	ND	ND	ND		
Freon 12	2.7	2.6	2.4	2.8	2.6	2.6	2.4	2.7	2.6	2.5	2.4	2	2.4		
Heptane	1.8	290	2.2	920	32	1.1	30	0.82	1.5	430	0.9	66	0.94		
Hexane	ND	290	ND	770	40	0.63	37	0.7	ND	390	1.3	53	0.88		
Isopropyl alcohol	ND	51 J	ND	ND	ND	11	ND	ND	6.6	ND	2.6	ND	ND		
m&p-Xylene	10	19	12	18	20	3.4	17	1.6	1.8	21	2	21	2.2		
Methyl Ethyl Ketone	1.1	60	1.1	52	48	1.5	43	1.3	2.4	53	2.9	35	7.8		
Methylene chloride	0.9	2.2	0.97	ND	2	1.2	1.5	0.69	1.1	1.5	0.63	1.5	0.59	100	3
o-Xylene	4.2	7.3	4.6	8	7.3	1.5	6.5	0.74	0.78	9.8	0.91	11	0.82		
Tetrachloroethylene	ND	810	ND	670	770	ND	730	ND	ND	790	ND	590	ND	100	3
Toluene	8.3	380	9	320	340	5.7	310	5.1	2.1	350	4	230	2.7		
Trichloroethene	0.97	160	1	130	150	1.1	130	0.91	1.6	120	0.75	100	1.9	6	0.2
Vinyl chloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6	0.2

Results and Action levels are presented in micrograms per meters cubed (ug/m³).

All data has been validated

N/A - Not Applicable ND - Non-detect (1) - Sample from Sub Floor Crawlspace

J - Analyte positively identified; the associated numerical value is approximate concentration of the analyte in the sample.

^aNew York State Department of Health (NYSDOH), Guidance for Evaluating Soil Vapor Intrusion in the State of New York, October 2006 and subsequent updates (select matrix compounds).

^bCompounds with detected concentrations

NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York, May 2017 Decision Matrices Notes:

NO FURTHER ACTION:

Given that the compound was not detected in the indoor air sample and that the concentration detected in the sub -slab vapor sample is not expected to significantly affect indoor air quality, no additional actions are needed to address human exposures

IDENTIFY SOURCE(S) AND RESAMPLE OR MITIGATE:

The concentration detected in the indoor air sample is likely due to indoor and/or outdoor sources rather than soil vapor intrusion given the concentration detected in the sub-slab vapor sample.

Therefore, steps should be taken to identify potential source(s) and to reduce exposures accordingly (e.g., by keeping containers capped or by storing VOC-containing products in places where people do not spend much time, such as a garage or shed).

Resampling may be recommended to demonstrate the effectiveness of actions taken to reduce exposures.

MONITOR:

Monitoring, including sub-slab vapor, basement air, lowest occupied living space air, and outdoor air sampling, is needed to determine whether concentrations in the indoor air or sub-slab vapor have changed.

Monitoring may also be needed to determine whether existing building conditions (e.g., positive pressure heating, ventilation and air-conditioning systems) are maintaining the desired mitigation endpoint and to determine whether changes are needed.

The type and frequency of monitoring is determined on a site-specific and building-specific basis, taking into account applicable environmental data and building operating conditions.

Monitoring is an interim measure required to evaluate exposures related to soil vapor intrusion until contaminated environmental media are remediated.

MITIGATE:

Mitigation is needed to minimize current or potential exposures associated with soil vapor intrusion. The most common mitigation methods are sealing preferential pathways in conjunction with installing a sub-slab depressurization system, and changing the pressurization of the building in conjunction with monitoring. The type, or combination of types, of mitigation is determined on a building-specific basis, taking into account building construction and operating conditions.

TABLE 2
19 DOAT STREET - RI SOIL BORING SAMPLE ANALYTICAL RESULTS SUMMARY

Pg 1 of 4

Contaminants	Sample Identification								Date Sampled: 7/22/19		PART 375 Soil Cleanup Objectives		
	BH-1 (0.5-1')	BH-1 (1 - 2')	BH-2 (0.5- 1')	BH-2 (1 - 2')	BH-3 (0.5 - 1')	BH-3 (1 - 2')	BH-4 (0.5-1')	BH-4 (1 - 2')	BH-5 (0.5 - 1')	BH-5 (1 - 2')	Unrestricted Use	Residential	Restricted Residential
METALS													
Arsenic	3.2	2.2	3.6	1.4	2.2	1.6	2.8	2.5	13	2.2	13	16	16
Barium	40.6	90.4	33.4	76.1	26.7	60.5	21.7	95.1	48.9	92.1	350	350	400
Beryllium	0.31	0.6	0.25	0.5	0.15	0.4	0.2	0.6	0.72	0.6	7.2	14	72
Cadmium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.5	2.5	4.3
Chromium	7.3	14.8	8.1	13.6	4.7	11	5.9	16.4	9.5	15.4	30	36	180
Copper	17.4	17.3	12	11.5	29.1	13.5	15.3	16	29.5	12.7	50	270	270
Lead	35.2	8.7	32.1	6.6	19.5	6.1	22.3	10.6	45.6	9.1	63	400	400
Manganese	220	423	173	309	139	299	155	449	141	527	1600	2,000	2,000
Total Mercury	0.02	0.01	0.01	0.01	0.14	0.01	0.05	0.03	0.09	0.01	0.18	0.81	0.81
Nickel	8.2	15.2	8.9	12.3	5	10.4	6.7	16.6	10.6	16.1	30	140	310
Selenium	1.2	1	1.7	1.5	1.5	0.7	1.5	1.2	1.4	1	3.9	36	180
Zinc	61.7	52.1	47.6	49.8	33.2	46.4	49.2	63.3	71.7	53.4	109	2200	10,000
Cyanide	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	27	27	27
PCBs													
PCB-1254	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.1	1	1
PCB-1260	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.1	1	1
PESTICIDES													
4,4-DDT	0.008	ND	0.006	ND	ND	ND	0.002	ND	0.005	ND	0.0033	1.7	7.9
4,4-DDE	0.002	ND	0.002	ND	0.003	ND	ND	ND	ND	ND	0.0033	1.8	8.9
Endosulfan Sulfate	0.011	ND	0.007	ND	ND	ND	0.003	ND	ND	ND	2.4	4.8	24
Endrin	0.003	ND	0.004	ND	ND	ND	ND	ND	0.003	ND	0.014	2.2	11
SEMIVOLATILE ORGANIC COMPOUNDS													
Acenaphthene	0.72	ND	2.11	ND	ND	ND	0.2	ND	ND	ND	20	100	100
Acenaphthylene	0.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	100	100	100
Anthracene	2.2	ND	3.7	ND	0.17	ND	0.5	ND	0.3	ND	100	100	100
Benz(a)anthracene	7.8	ND	10.1	ND	0.64	ND	2.7	ND	0.55	ND	1	1	1
Benzo(a)pyrene	5.8	ND	7.9	ND	0.53	ND	2.4	ND	0.3	ND	1	1	1
Benzo(b)fluoranthene	6.5	ND	7.5	ND	0.59	ND	2.6	ND	ND	ND	1	1	1
Benzo(g,h,i)perylene	3.8	ND	4.7	ND	0.36	ND	1.8	ND	0.23	ND	100	100	100
Benzo(k)fluoranthene	4.34	ND	7.1	ND	0.42	ND	2	ND	ND	ND	0.8	1	3.9
Chrysene	6.7	ND	9.3	ND	0.63	ND	2.73	ND	0.71	ND	1	1	3.9
Dibenz(a,h)anthracene	1.3	ND	1.6	ND	ND	ND	0.6	ND	ND	ND	0.33	0.33	0.33
Fluoranthene	16.5	ND	23.8	ND	1.26	ND	5.6	ND	0.4	ND	100	100	100
Fluorene	0.74	ND	1.8	ND	ND	ND	1.7	ND	ND	ND	30	100	100
Indeno(1,2,3-cd)pyrene	3.9	ND	5.3	ND	0.4	ND	1.9	ND	ND	ND	0.5	0.5	0.5
Naphthalene	0.3	ND	ND	ND	ND	ND	1.8	ND	1.83	ND	12	100	100
Phenanthrene	10.8	ND	20.5	ND	0.85	ND	3	ND	2.6	ND	100	100	100
Pyrene	12	ND	17.7	ND	0.97	ND	4.3	ND	1.3	ND	100	100	100
TICs	38.3	ND	44.5	ND	3.01	ND	12.5	ND	27.8	ND	NA	NA	NA
VOLATILE ORGANIC COMPOUNDS													
Acetone	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.05	100	100
Toluene	ND	ND	0.007	ND	ND	ND	ND	ND	ND	ND	0.7	100	100
Ethylbenzene	ND	ND	0.003	ND	ND	ND	ND	ND	ND	ND	1	30	41
m,p-Xylene	ND	ND	0.022	ND	ND	ND	ND	ND	ND	ND	0.26	100	100
Methylene chloride	0.008	ND	0.013	ND	0.014	ND	0.03	ND	0.04	ND	0.05	51	100
1,2,4-Trimethylbenzene	ND	ND	0.006	ND	ND	ND	ND	ND	ND	ND	3.6	47	52
1,3,5- Trimethylbenzene	ND	ND	0.002	ND	ND	ND	ND	ND	ND	ND	8.4	47	52
TICs	ND	ND	0.24	ND	0.01	ND	ND	ND	0.013	ND	NA	NA	NA

ND - Non-Detect NA - Not Applicable

J - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

>/= to Residential/Restricted-Residential SCO and Unrestricted Use SCO

All values in ppm

>Unrestricted Use SCO but <Residential/Restricted-Residential SCO.

>Unrestricted Use & Residential SCO but <Restricted-Residential SCO

TABLE 2
19 DOAT STREET - RI SOIL BORING SAMPLE ANALYTICAL RESULTS SUMMARY

Pg 2 of 4

Contaminants	Sample Identification										Date Sampled: 7/22/19			PART 375 Soil Cleanup Objectives		
	BH-6 (0.5-1')	BH-6 (1 -2')	BH-7 (0.5- 1')	BH-7 (1 -2')	BH-8 (0.5 -1')	BH-8 (1 - 2')	BH-9 (0.5-1')	BH-9 (1 - 2')	BH-10 (3 - 6')	BH-10 (8 - 10')	Unrestricted Use	Residential	Restricted Residential	Unrestricted Use	Residential	Restricted Residential
METALS																
Arsenic	2.49	2.05	5.19	ND	2.47	2.3	21.9	3.04	2.48	1.15	13	16	16			
Barium	18.3	58.3	95.3	42.5	87.3	80.6	63.6	76.8	44.9	63	350	350	400			
Beryllium	ND	0.418	0.322	0.299	0.534	0.534	0.347	0.54	0.333	0.45	7.2	14	72			
Cadmium	ND	ND	ND	ND	ND	ND	0.167	ND	ND	ND	2.5	2.5	4.3			
Chromium	4.81	11.5	12.3	9.77	16.3	14	9.96	13.5	9.38	12	30	36	180			
Copper	7.12	10.9	76.8	4.05	15.5	17.4	27.4	16.1	16.1	13.9	50	270	270			
Lead	6.73	7.37	97.4	7.4	23	7.92	51.8	9.91	20.3	7.73	63	400	400			
Manganese	103	306	214	70.7	888	386	154	777	278	351	1600	2,000	2,000			
Total Mercury	0.012	0.008	0.05	0.028	0.006	0.013	0.058	0.0136	0.019	0.011	0.18	0.81	0.81			
Nickel	3.83	11.2	14.3	6.67	10.9	14.9	8.44	17.1	9.86	11.7	30	140	310			
Selenium	1.9	0.996	0.749	ND	1.41	1.26	3.34	0.774	1.25	0.703	3.9	36	180			
Zinc	81.5	54.6	136	34.3	155	52.4	177	52.5	66.4	49.2	109	2200	10,000			
Cyanide	ND	ND	2.15	ND	ND	ND	ND	ND	ND	ND	27	27	27			
PCBs																
PCB-1242	ND	ND	ND	ND	0.04	ND	ND	ND	ND	ND	0.1	1	1			
PCB-1260	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.1	1	1			
PESTICIDES																
4,4-DDT	ND	ND	0.004	ND	ND	ND	ND	ND	ND	ND	0.0033	1.7	7.9			
beta-BHC	ND	ND	ND	ND	ND	ND	ND	ND	0.002	ND	0.036	0.072	0.36			
Endosulfan Sulfate	ND	ND	0.006	ND	ND	ND	0.003	ND	ND	ND	2.4	4.8	24			
Endrin	ND	ND	0.002	ND	ND	ND	ND	ND	ND	ND	0.014	2.2	11			
SEMIVOLATILE ORGANIC COMPOUNDS																
Acenaphthene	ND	ND	ND	ND	ND	ND	0.2	ND	ND	ND	20	100	100			
Acenaphthylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	100	100	100			
Anthracene	ND	ND	2.5	ND	ND	ND	0.6	ND	ND	ND	100	100	100			
Benz(a)anthracene	1.01	ND	7.3	ND	0.9	ND	2.2	ND	0.27	ND	1	1	1			
Benzo(a)pyrene	0.71	ND	5.8	ND	ND	ND	1.8	ND	0.22	ND	1	1	1			
Benzo(b)fluoranthene	ND	ND	6.2	ND	ND	ND	1.9	ND	0.24	ND	1	1	1			
Benzo(g,h,i)perylene	ND	ND	3.7	ND	ND	ND	1.2	ND	ND	ND	100	100	100			
Benzo(k)fluoranthene	ND	ND	4.5	ND	ND	ND	1.5	ND	ND	ND	0.8	1	3.9			
Chrysene	0.88	ND	6.8	ND	ND	ND	2.4	ND	0.24	ND	1	1	3.9			
Dibenz(a,h)anthracene	ND	ND	1.2	ND	ND	ND	0.4	ND	ND	ND	0.33	0.33	0.33			
Fluoranthene	1.7	ND	17.2	ND	2.1	ND	4.3	ND	0.53	ND	100	100	100			
Fluorene	ND	ND	0.8	ND	ND	ND	0.2	ND	0.45	ND	30	100	100			
Indeno(1,2,3-cd)pyrene	ND	ND	4.1	ND	ND	ND	1.3	ND	ND	ND	0.5	0.5	0.5			
Naphthalene	ND	ND	ND	ND	ND	ND	0.5	ND	0.87	ND	12	100	100			
Phenanthrene	1.1	ND	12	ND	1.6	ND	2.7	ND	1.23	ND	100	100	100			
Pyrene	1.8	ND	12.8	ND	1.6	ND	3.3	ND	0.5	ND	100	100	100			
TICs	57.7	ND	19.3	ND	ND	ND	28.9	0.36	45.2	3.6	NA	NA	NA			
VOLATILE ORGANIC COMPOUNDS																
Acetone	ND	ND	ND	ND	ND	0.03	ND	ND	ND	0.3	0.05	100	100			
Toluene	0.003	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.7	100	100			
Ethylbenzene	0.007	ND	ND	ND	ND	ND	ND	ND	ND	0.78	1	30	41			
m,p-Xylene	0.013	ND	ND	ND	0.003	ND	ND	ND	0.94	ND	0.26	100	100			
Methylene chloride	0.01	ND	0.008	ND	0.03	ND	ND	0.015	ND	ND	0.05	51	100			
n-Propylbenzene	0.003	ND	ND	ND	ND	ND	ND	ND	0.6	0.034	3.9	100	100			
sec-Butylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	0.36	ND	11	100	100			
Trichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.47	10	21			
1,2,4-Trimethylbenzene	0.017	ND	ND	ND	ND	ND	ND	ND	5.2	0.03	3.6	47	52			
1,3,5- Trimethylbenzene	0.021	ND	ND	ND	ND	ND	ND	ND	0.97	0.05	8.4	47	52			
TICs	2.4	0.015	0.011	0.015	0.048	0.014	0.023	0.015	67.8	3.5	NA	NA	NA			

ND - Non-Detect NA - Not Applicable

J - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

>/- to Residential/Restricted-Residential SCO and Unrestricted Use SCO

All values in ppm

>Unrestricted Use SCO but <Residential/Restricted-Residential SCO.

>Unrestricted Use & Residential SCO but <Restricted-Residential SCO

TABLE 2
19 DOAT STREET - RI SOIL BORING SAMPLE ANALYTICAL RESULTS SUMMARY

Pg 3 of 4

Contaminants	Sample Identification					Date Sampled: 7/23/19					PART 375 Soil Cleanup Objectives		
	BH-11 (0.5-1')	BH-11 (1-2')	BH-12 (0.5-1')	BH-12 (1-2')	BH-13 (11-13')	BH-14 (0.5-1')	BH-15 (0-2')	BH-16 (0-2')	BH-17 (1) (0.5-1')	BH-17 (1) (1.5-2')	Unrestricted Use	Residential	Restricted Residential
METALS													
Arsenic	3.1	2.55	11.1	4.28	5.57	1.26	1.31	3.46	4.51	1.27	13	16	16
Barium	57.2	58.8	110	113	91.2	53.7	59.9	103	125	115	350	350	400
Beryllium	0.413	0.412	0.471	0.79	0.55	0.577	0.425	0.696	0.261	0.65	7.2	14	72
Cadmium	0.472	0.578	0.694	1.18	1.1	0.509	0.722	0.955	1.13	0.45	2.5	2.5	4.3
Chromium	10.3	11.9	11.2	21.2	42.4	15.6	12	18.2	21	19.3	30	36	180
Copper	13.3	9.45	25.6	19.4	25.4	6.94	9.9	13.4	53.4	13.6	50	270	270
Lead	34.4	5.6	50.5	8.29	42.3	17.3	5.62	23.4	270	25.2	63	400	400
Manganese	171	779	211	380	8130	209	327	466	245	230	1600	2,000	2,000
Total Mercury	0.075	0.0139	0.051	0.015	0.049	0.047	0.012	0.27	0.15	0.044	0.18	0.81	0.81
Nickel	7.31	9.95	9.29	23.1	13.2	10.9	10.6	15.5	24	16.3	30	140	310
Selenium	2.5	1.75	2.78	1.15	2.86	0.9	1.94	ND	3.03	0.92	3.9	36	180
Zinc	47.5	46.6	96.8	62.1	105	58.2	47.5	77.7	234	79.7	109	2200	10,000
Cyanide	ND	ND	ND	ND	ND	ND	ND	ND	1.1	ND	27	27	27
PCBs													
PCBs	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.1	1	1
PESTICIDES													
4,4-DDT	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0033	1.7	7.9
4,4-DDE	ND	ND	0.005	ND	0.003	ND	ND	ND	ND	ND	0.0033	1.8	8.9
4,4-DDD	ND	ND	ND	ND	ND	ND	ND	ND	0.011	ND	0.0033	2.6	13
Endosulfan Sulfate	ND	ND	ND	ND	ND	ND	ND	ND	0.008	ND	2.4	4.8	24
Endrin	ND	ND	ND	ND	ND	ND	ND	ND	0.002	ND	0.014	2.2	11
SEMIVOLATILE ORGANIC COMPOUNDS													
Acenaphthene	ND	ND	ND	ND	ND	ND	ND	ND	0.7	ND	20	100	100
Acenaphthylene	ND	ND	ND	ND	ND	ND	ND	ND	0.3	ND	100	100	100
Anthracene	ND	ND	ND	ND	ND	ND	ND	ND	1.7	ND	100	100	100
Benz(a)anthracene	ND	ND	1.96	ND	0.19	ND	ND	ND	4.5	ND	1	1	1
Benzo(a)pyrene	ND	ND	1.6	ND	ND	ND	ND	ND	3.5	ND	1	1	1
Benzo(b)fluoranthene	ND	ND	1.6	ND	ND	ND	ND	ND	3.2	ND	1	1	1
Benzo(g,h,i)perylene	ND	ND	1	ND	ND	ND	ND	ND	2.2	ND	100	100	100
Benzo(k)fluoranthene	ND	ND	1.3	ND	ND	ND	ND	ND	3.2	ND	0.8	1	3.9
Chrysene	ND	ND	1.8	ND	0.23	ND	ND	ND	4.2	ND	1	1	3.9
Dibenz(a,h)anthracene	ND	ND	ND	ND	ND	ND	ND	ND	0.8	ND	0.33	0.33	0.33
Fluoranthene	ND	ND	4.2	ND	0.31	ND	ND	ND	10.2	ND	100	100	100
Fluorene	ND	ND	ND	ND	ND	ND	ND	ND	0.7	ND	30	100	100
Indeno(1,2,3-cd)pyrene	ND	ND	ND	ND	ND	ND	ND	ND	2.8	ND	0.5	0.5	0.5
Naphthalene	ND	ND	ND	ND	0.32	ND	ND	ND	0.3	ND	12	100	100
Phenanthrene	ND	ND	3	ND	0.38	ND	ND	ND	8.3	ND	100	100	100
Pyrene	0.24	ND	3.2	ND	0.33	ND	ND	ND	7.7	ND	100	100	100
TICs	25.9	ND	3.09	ND	7.27	2.1	ND	0.33	NA	NA	NA	NA	NA
VOLATILE ORGANIC COMPOUNDS													
Acetone	ND	0.11	0.21	0.013	0.095	ND	ND	ND	ND	ND	0.05	100	100
Toluene	0.003	ND	0.002	ND	ND	ND	ND	0.003	0.002	0.002	0.7	100	100
cis-1,2-Dichloroethene	ND	ND	0.3	0.077	ND	ND	ND	ND	ND	ND	0.25	59	100
m,p-Xylene	ND	ND	ND	ND	ND	ND	ND	ND	0.004	0.004	0.26	100	100
Methylene chloride	0.017	ND	ND	ND	ND	ND	ND	ND	0.007	0.007	0.05	51	100
Trichloroethene	ND	ND	ND	0.026	ND	ND	ND	ND	ND	ND	0.47	10	21
trans-1,2-Dichloroethene	ND	ND	0.026	ND	ND	ND	ND	ND	ND	ND	0.19	100	100
TICs	0.407	ND	ND	ND	6.88	ND	ND	ND	NA	NA	NA	NA	NA

ND - Non-Detect NA - Not Applicable

J - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

(1) - Sampled 7/31/19

>= to Residential/Restricted-Residential SCO and Unrestricted Use SCO
>Unrestricted Use SCO but <Residential/Restricted-Residential SCO.
>Unrestricted Use & Residential SCO but <Restricted-Residential SCO

All values in ppm

TABLE 2
19 DOAT STREET - RI SOIL BORING SAMPLE ANALYTICAL RESULTS SUMMARY

Pg 4 of 4

Contaminants	Sample Identification (1)			Date Sampled: 8/8/19			PART 375 Soil Cleanup Objectives		
	BH-18 (0-0.5')	BH-19 (0 -0.5')	BH-19 (0.5- 1')	BH-20 (0 -0.5')	BH-21 (0 -0.5')	BH-22 (0 - 0.5')	Unrestricted Use	Residential	Restricted Residential
METALS									
Arsenic	14.7	5.72	4.14	10.8	4.68	NA	13	16	16
Barium	50.1	78.1	60.1	148	107	NA	350	350	400
Beryllium	0.719	0.6	0.41	0.72	0.44	NA	7.2	14	72
Cadmium	0.77	1.01	0.7	1.47	1.08	NA	2.5	2.5	4.3
Chromium	4.72	12.4	11.3	11.5	11.6	NA	30	36	180
Copper	26.6	27.6	110	31.1	18.5	NA	50	270	270
Lead	51.2	35.2	40.2	64.7	19.4	NA	63	400	400
Manganese	67.3	316	255	304	291	NA	1600	2,000	2,000
Total Mercury	0.203	0.023	0.032	0.1	0.059	NA	0.18	0.81	0.81
Nickel	9.86	15.5	11.9	13	12.7	NA	30	140	310
Selenium	1.38	ND	ND	ND	ND	NA	3.9	36	180
Zinc	47.6	72.6	307	119	81.2	NA	109	2200	10,000
Cyanide	ND	ND	ND	ND	ND	NA	27	27	27
PCBs									
PCBs	ND	ND	ND	ND	ND	ND	0.1	1	1
PESTICIDES									
beta-BHC	ND	ND	0.002	ND	ND	NA	0.036	0.072	0.36
SEMIVOLATILE ORGANIC COMPOUNDS									
Benz(a)anthracene	ND	ND	ND	ND	0.29 J	ND	1	1	1
Benzo(a)pyrene	ND	ND	ND	ND	0.19 J	ND	1	1	1
Chrysene	0.41	0.2	ND	ND	0.32	0.55	1	1	3.9
Fluoranthene	ND	ND	ND	ND	0.6	ND	100	100	100
Naphthalene	ND	ND	ND	ND	0.27	0.66	12	100	100
Phenanthrene	0.33	ND	ND	0.29	0.75	2.43	100	100	100
Pyrene	ND	ND	ND	ND	0.5	ND	100	100	100
VOLATILE ORGANIC COMPOUNDS									
Acetone	ND	0.1	ND	ND	ND	ND	0.05	100	100
Toluene	ND	0.012	0.004	ND	0.004	0.003	0.7	100	100
Benzene	ND	ND	ND	ND	ND	0.004	0.06	2.9	4.8
Methylene chloride	0.015	0.006	0.008	0.014	0.008	0.011	0.05	51	100
Trichloroethene	ND	0.077	0.01	ND	0.003	ND	0.47	10	21

ND - Non-Detect NA - Not Applicable "J" = Result estimated between the quantitation limit and half the quantitation limit.

(1) - Depths recorded are from bottom of basement concrete floor

>= to Residential/Restricted-Residential SCO and Unrestricted Use SCO

>Unrestricted Use SCO but <Residential/Restricted-Residential SCO.

>Unrestricted Use & Residential SCO but <Restricted-Residential SCO

TABLE 3

Pg 1 of 4

19 DOAT STREET - RI SOIL BORING SAMPLE ANALYTICAL RESULTS SUMMARY - PFAS & 1,4 DIOXANE

Sample Number	BH-1 (0.5-1')	BH-1 (1 -2')	BH-2 (0.5- 1')	BH-2 (1 -2')	BH-3 (0.5 -1')	BH-3 (1 - 2')	BH-4 (0.5-1')	BH-4 (1 - 2')	BH-5 (0.5 - 1')	BH-5 (1 - 2')	NYSDEC Guideline
Sample Date	7/22/2019	7/22/2019	7/22/2019	7/22/2019	7/22/2019	7/22/2019	7/22/2019	7/22/2019	7/22/2019	7/22/2019	
1,4 Dioxane by 8270D											
1,4 Dioxane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1 ppm
Perfluorinated Alkyl Acids by Isotope Dilution EPA 537											
Perfluorobutanoic Acid (PFBA)	ND	ND	ND	ND	0.031	ND	0.022	ND	0.042	ND	
Perfluoropentanoic Acid (PFPeA)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Perfluorobutanesulfonic Acid (PFBS)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Perfluorohexanoic Acid (PFHxA)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Perfluoroheptanoic Acid (PFHpA)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Perfluorohexanesulfonic Acid (PFHxS)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Perfluorooctanoic Acid (PFOA)	0.2260	ND	ND	ND	0.1020	ND	ND	0.0560	0.1520	0.0510	
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Perfluoroheptanesulfonic Acid (PFHpS)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Perfluorononanoic Acid (PFNA)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Perfluorooctanesulfonic Acid (PFOS)	2.7500	ND	0.210	ND	0.610	ND	0.254	ND	1.370	ND	
Perfluorodecanoic Acid (PFDA)	0.0790	ND	ND	ND	ND	ND	ND	ND	0.094	ND	
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Perfluoroundecanoic Acid (PFUnA)	0.083	ND	ND	ND	ND	ND	0.058	ND	ND	ND	
Perfluorodecanesulfonic Acid (PFDS)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Perfluorooctanesulfonamide (FOSA)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Perfluorododecanoic Acid (PFDoA)	0.075	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Perfluorotridecanoic Acid (PFTTrDA)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Perfluorotetradecanoic Acid (PFTA)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	

PFAS Values in ppb

N/A - Not Applicable ND - Non-detect

TABLE 3

Pg 2 of 4

19 DOAT STREET - RI SOIL BORING SAMPLE ANALYTICAL RESULTS SUMMARY - PFAS & 1,4 DIOXANE

Sample Number	BH-6 (0.5-1')	BH-6 (1 -2')	BH-7 (0.5- 1')	BH-7 (1 -2')	BH-8 (0.5 -1')	BH-8 (1 - 2')	BH-9 (0.5-1')	BH-9 (1 - 2')	BH-10 (3 - 6')	BH-10 (8 - 10')	NYSDEC Guideline
Sample Date	7/22/2019	7/22/2019	7/22/2019	7/22/2019	7/22/2019	7/22/2019	7/22/2019	7/22/2019	7/22/2019	7/22/2019	
1,4 Dioxane by 8270D											
1,4 Dioxane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1 ppm
Perfluorinated Alkyl Acids by Isotope Dilution EPA 537											
Perfluorobutanoic Acid (PFBA)	0.0420	ND	0.026	ND	0.031	ND	0.054	ND	0.026	ND	
Perfluoropentanoic Acid (PFPeA)	ND	ND	ND	ND	ND	ND	0.169	ND	0.076	ND	
Perfluorobutanesulfonic Acid (PFBS)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Perfluorohexanoic Acid (PFHxA)	ND	ND	ND	ND	ND	ND	0.193	ND	ND	ND	
Perfluoroheptanoic Acid (PFHpA)	ND	ND	ND	ND	ND	ND	0.105	ND	ND	ND	
Perfluorohexanesulfonic Acid (PFHxS)	ND	ND	ND	ND	ND	ND	0.088	ND	ND	ND	
Perfluorooctanoic Acid (PFOA)	0.0560	ND	0.0560	ND	0.0470	ND	0.3010	ND	0.1280	ND	
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Perfluoroheptanesulfonic Acid (PFHpS)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Perfluorononanoic Acid (PFNA)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Perfluorooctanesulfonic Acid (PFOS)	0.6410	ND	0.526	ND	0.460	ND	2.920	ND	1.560	ND	
Perfluorodecanoic Acid (PFDA)	ND	ND	ND	ND	ND	ND	ND	ND	0.126	ND	
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	0.207	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Perfluoroundecanoic Acid (PFUnA)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Perfluorodecanesulfonic Acid (PFDS)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Perfluorooctanesulfonamide (FOSA)	0.210	ND	ND	ND	ND	ND	ND	ND	ND	ND	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	0.118	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Perfluorododecanoic Acid (PFDoA)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Perfluorotridecanoic Acid (PFTTrDA)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Perfluorotetradecanoic Acid (PFTA)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	

PFAS Values in ppb

N/A - Not Applicable ND - Non-detect

TABLE 3
19 DOAT STREET - RI SOIL BORING SAMPLE ANALYTICAL RESULTS SUMMARY - PFAS & 1,4 DIOXANE

Pg 3 of 4

Sample Number	BH-11 (0.5-1')	BH-11 (1 -2')	BH-12 (0.5- 1')	BH-12 (1 -2')	BH-13 (11 -13')	BH-14 (0.5 - 1')	BH-15 (0-2')	BH-16 (0 - 2')	NYSDEC Guideline
Sample Date	7/23/2019	7/23/2019	7/23/2019	7/23/2019	7/23/2019	7/23/2019	7/23/2019	7/23/2019	
1,4 Dioxane by 8270D									
1,4 Dioxane	ND	ND	ND	ND	ND	ND	ND	ND	1 ppm
Perfluorinated Alkyl Acids by Isotope Dilution EPA 537									
Perfluorobutanoic Acid (PFBA)	0.0450	ND	0.090	ND	ND	ND	ND	ND	
Perfluoropentanoic Acid (PFPeA)	0.160	ND	0.425	ND	0.094	ND	ND	ND	
Perfluorobutanesulfonic Acid (PFBS)	ND	ND	ND	ND	ND	ND	ND	ND	
Perfluorohexanoic Acid (PFHxA)	0.124	ND	0.349	ND	ND	ND	ND	ND	
Perfluoroheptanoic Acid (PFHpA)	0.052	ND	0.254	ND	ND	ND	ND	ND	
Perfluorohexanesulfonic Acid (PFHxS)	0.07	ND	ND	ND	ND	ND	ND	ND	
Perfluorooctanoic Acid (PFOA)	0.1690	ND	0.2230	ND	ND	ND	ND	ND	
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND	ND	ND	ND	ND	ND	ND	ND	
Perfluoroheptanesulfonic Acid (PFHpS)	ND	ND	ND	ND	ND	ND	ND	ND	
Perfluorononanoic Acid (PFNA)	ND	ND	0.1050	ND	ND	ND	ND	ND	
Perfluorooctanesulfonic Acid (PFOS)	0.6300	ND	0.336	ND	0.261	ND	ND	ND	
Perfluorodecanoic Acid (PFDA)	ND	ND	0.087	ND	ND	ND	ND	ND	
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND	ND	ND	ND	ND	ND	ND	ND	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND	ND	ND	ND	ND	ND	ND	ND	
Perfluoroundecanoic Acid (PFUnA)	ND	ND	ND	ND	ND	ND	ND	ND	
Perfluorodecanesulfonic Acid (PFDS)	ND	ND	ND	ND	ND	ND	ND	ND	
Perfluorooctanesulfonamide (FOSA)	ND	ND	ND	ND	ND	ND	ND	ND	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND	ND	ND	ND	ND	ND	ND	ND	
Perfluorododecanoic Acid (PFDoA)	ND	ND	ND	ND	ND	ND	ND	ND	
Perfluorotridecanoic Acid (PFTTrDA)	ND	ND	ND	ND	ND	ND	ND	ND	
Perfluorotetradecanoic Acid (PFTA)	ND	ND	ND	ND	ND	ND	ND	ND	

PFAS Values in ppb

N/A - Not Applicable ND - Non-detect

TABLE 3

19 DOAT STREET - RI SOIL BORING SAMPLE ANALYTICAL RESULTS SUMMARY - PFAS & 1,4 DIOXANE

Sample Number	BH-18 (0-0.5')	BH-19 (0 -0.5')	BH-19 (0.5- 1')	BH-20 (0 -0.5')	BH-21 (0 -0.5')	BH-22 (0 - 0.5')	NYSDEC Guideline
Sample Date	8/8/2019	8/8/2019	8/8/2019	8/8/2019	8/8/2019	8/8/2019	
1,4 Dioxane by 8270D							
1,4 Dioxane	ND	ND	ND	ND	ND	ND	1 ppm
Perfluorinated Alkyl Acids by Isotope Dilution EPA 537							
Perfluorobutanoic Acid (PFBA)	ND	ND	ND	ND	ND	0.091	
Perfluoropentanoic Acid (PFPeA)	ND	ND	ND	ND	ND	ND	
Perfluorobutanesulfonic Acid (PFBS)	ND	ND	ND	ND	ND	ND	
Perfluorohexanoic Acid (PFHxA)	0.114	ND	ND	0.069	ND	ND	
Perfluoroheptanoic Acid (PFHpA)	ND	ND	ND	ND	ND	ND	
Perfluorohexanesulfonic Acid (PFHxS)	ND	ND	ND	ND	ND	ND	
Perfluorooctanoic Acid (PFOA)	0.2310	ND	ND	0.097	ND	ND	
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND	ND	ND	ND	ND	ND	
Perfluoroheptanesulfonic Acid (PFHpS)	ND	ND	ND	ND	ND	ND	
Perfluorononanoic Acid (PFNA)	ND	ND	ND	ND	ND	ND	
Perfluorooctanesulfonic Acid (PFOS)	0.8530	ND	ND	1.690	ND	ND	
Perfluorodecanoic Acid (PFDA)	ND	ND	ND	ND	ND	ND	
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND	ND	ND	ND	ND	ND	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND	ND	ND	ND	ND	ND	
Perfluoroundecanoic Acid (PFUnA)	ND	ND	ND	ND	ND	ND	
Perfluorodecanesulfonic Acid (PFDS)	ND	ND	ND	ND	ND	ND	
Perfluorooctanesulfonamide (FOSA)	ND	ND	ND	ND	ND	ND	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND	ND	ND	ND	ND	ND	
Perfluorododecanoic Acid (PFDoA)	ND	ND	ND	ND	ND	ND	
Perfluorotridecanoic Acid (PFTTrDA)	ND	ND	ND	ND	ND	ND	
Perfluorotetradecanoic Acid (PFTA)	ND	ND	ND	ND	ND	ND	

PFAS Values in ppb

N/A - Not Applicable ND - Non-detect

TABLE 4
19 DOAT STREET - RI GROUNDWATER SAMPLE ANALYTICAL RESULTS SUMMARY

Contaminants	MW-1	MW-2	MW-3	MW-4	MW-5	NYSDEC TOGS 1.1.1. GA
Sample Date	8/7/2019	8/7/2019	8/6/2019	8/6/2019	8/6/2019	
DISSOLVED METALS						
Arsenic	18.8	11.3	11.8	ND	ND	25
Barium	109	54.1	93.9	61.7 J	199	1000
Beryllium	ND	ND	ND	ND	ND	3
Chromium	ND	7.6	12.1	ND	ND	50
Copper	ND	ND	ND	ND	ND	200
Cyanide	10	10	10	10	10	200
Lead	ND	ND	ND	ND	ND	25
Manganese	ND	ND	ND	ND	ND	300
Nickel	ND	ND	ND	ND	ND	100
Total Mercury	0.35 L	0.2 L	2.65 L	0.2 L	0.2 L	0.7
Zinc	ND	ND	ND	ND	ND	2000
Selenium	ND	ND	ND	ND	ND	10
PCBs						
PCBs	ND	ND	ND	ND	ND	NA
PESTICIDES						
Dieldrin	ND	ND	ND	ND	ND	0.004
Heptachlor	ND	ND	ND	ND	ND	0.04
Heptachlor Epoxide	ND	ND	ND	ND	ND	0.03
SEMIVOLATILE ORGANIC COMPOUNDS						
SVOCs	ND	ND	ND	ND	ND	NA
Volatile Organic Compounds						
Acetone	ND	ND	291	ND	ND	50
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	5
1,1-Dichloroethane	ND	ND	ND	ND	ND	5
1,1-Dichloroethene	ND	ND	ND	ND	ND	5
cis-1,2-Dichloroethene	ND	ND	ND	ND	ND	5
1,2,4-Trimethylbenzene	ND	ND	ND	ND	ND	5
1,3,5-Trimethylbenzene	ND	ND	ND	ND	ND	5
1,4-Dioxane	ND	ND	ND	ND	ND	1
Trichloroethene	ND	ND	ND	ND	ND	5
trans-1,2-Dichloroethene	ND	ND	ND	ND	ND	5
Vinyl chloride	ND	ND	ND	ND	ND	2
Well Development Field Parameters						
Turbidity (NTU)	>50	>50	>50	>50	>50	NA
pH	8.5	11.6	9.4	9.7	7.8	NA
Dissolved Oxygen	NA	NA	NA	NA	NA	NA
Temp (degrees C)	12.5	12.03	22.5	18.04	16.5	NA
Conductivity	0.8	1.8	0.5	0.50.8	2.75	NA

All values in ppb

"J" = Result estimated between the quantitation limit and half the quantitation limit.

L = Laboratory Control Sample recovery outside accepted QC limits.

N/A - Not Applicable ND - Non-detect

(1) - TOGs 1.1.1 GA - Technical and Operational Guidance Series (1.1.1) Source of Drinking Water (Groundwater)

Exceeds TOGs Guidance Value

TABLE 5
19 DOAT STREET - PFAS AND 1,4 DIOXANE IN GROUNDWATER ANALYTICAL RESULTS SUMMARY

Sample Number	MW-1	MW-2	MW-3	MW-4	MW-5	NYSDEC
Sample Date	8/7/2019	8/7/2019	8/6/2019	8/6/2019	8/6/2019	Guideline
1,4 Dioxane by 8270D						
1,4 Dioxane	ND	ND	ND	ND	ND	1
Perfluorinated Alkyl Acids by Isotope Dilution EPA 537						
Perfluorobutanoic Acid (PFBA)	0.00082	ND	ND	ND	0.00146	
Perfluoropentanoic Acid (PFPeA)	0.00067	ND	ND	0.00051	0.00108	
Perfluorobutanesulfonic Acid (PFBS)	ND	ND	ND	ND	ND	
Perfluorohexanoic Acid (PFHxA)	0.00056	0.00041	0.00052	0.00092	0.00094	
Perfluoroheptanoic Acid (PFHpA)	ND	ND	ND	ND	ND	
Perfluorohexanesulfonic Acid (PFHxS)	ND	ND	ND	ND	ND	
Perfluorooctanoic Acid (PFOA)	ND	ND	ND	0.00046	0.00039	0.01
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND	ND	ND	ND	ND	
Perfluoroheptanesulfonic Acid (PFHpS)	ND	ND	ND	ND	ND	
Perfluorononanoic Acid (PFNA)	ND	ND	ND	ND	0.00036	
Perfluorooctanesulfonic Acid (PFOS)	ND	ND	ND	ND	ND	0.01
Perfluorodecanoic Acid (PFDA)	ND	ND	ND	ND	ND	
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND	ND	ND	ND	ND	
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND	ND	ND	ND	ND	
Perfluoroundecanoic Acid (PFUnA)	ND	ND	ND	ND	ND	
Perfluorodecanesulfonic Acid (PFDS)	ND	ND	ND	ND	ND	
Perfluorooctanesulfonamide (FOSA)	ND	ND	ND	ND	ND	
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND	ND	ND	ND	ND	
Perfluorododecanoic Acid (PFDoA)	ND	ND	ND	ND	ND	
Perfluorotridecanoic Acid (PFTrDA)	ND	ND	ND	ND	ND	
Perfluorotetradecanoic Acid (PFTA)	ND	ND	ND	ND	ND	
PFOA/PFOS Total	ND	ND	ND	0.00046	0.00039	0.50

All Values in ppb

Exceeds NYSDEC Guidance Value

N/A - Not Applicable ND - Non-detect

TABLE 6		
19 Doat Street - Sample Coordinates		
Sample Identification	Coordinates-North American Datum 1983	
	Latitude	Longitude
<u>SSDS</u>		
SSDS-01	42.909636	-78.820128
SSDS-02	42.909308	-78.820153
SSDS-03	42.909031	-78.820147
SSDS-04	42.908767	-78.820144
SSDS-05	42.908906	-78.819789
SSDS-06	42.908708	-78.819675
<u>GeoProbe</u>		
BH-01	42.909572	-78.820034
BH-02	42.909442	-78.820027
BH-03	42.909592	-78.819701
BH-04	42.909611	-78.819605
BH-05	42.909303	-78.819549
BH-06	42.909143	-78.819838
BH-07	42.909021	-78.819923
BH-08	42.909030	-78.819854
BH-09	42.909104	-78.819473
BH-10	42.909017	-78.819512
BH-11	42.908852	-78.819519
BH-12	42.908760	-78.819446
BH-13	42.908688	-78.819597
BH-14	42.908887	-78.819772
BH-15	42.908609	-78.819890
BH-16	42.908663	-78.819952
BH-17	42.90922	-78.820030
<u>Monitoring Wells</u>		
MW- 1	42.908815	-78.82029
MW- 2	42.90957	-78.820373
MW- 3	42.908882	-78.819447
MW- 4	42.909219	-78.819846
MW- 5	42.909636	-78.819596

TABLE 7
19 DOAT STREET SITE - GROUNDWATER ELEVATIONS

Well Number	T of C Elevation (ft)	Water Level	Groundwater
			Elevation
		7/31/2019	
MW - 1	98.74	33.40	65.34
MW - 2	94.35	27.5	66.85
MW - 3	99.59	22.85	76.74
MW - 4	98.3	31.75	66.55
MW - 5	97.24	31.5	65.74

PHASE 2 ESA - TABLES

Table 1
Soil Sample Analytical Results
NYCRR Part 375
Sampling Date: 1-29-18

Contaminants	Sample Identification and Depth													Soil Cleanup Objectives		
	BH-1 (0.5'-1')	BH-2 (0.5'-1')	BH-3 (0.5'-1')	BH-4 (0.5'-1')	BH-5 (0.5'-1')	BH-6 (1'-2')	BH-7 (surface)	BH-8 (1'-2')	BH-9 (5'-6')	BH-10 (10'-12')	SS-1 (surface)	SS-2 (surface)	SS-3 (surface)	Unrestricted Use	Residential	Restricted Residential
METALS																
Arsenic	1.38	3.15	ND	2.21	ND	18.7	ND	7	2.18	3.52	12.6	ND	3.56	13	16	16
Barium	53.8	99.4	21.7	57	24.3	115	91	136	102	93.8	1730	25.2	104	350	350	400
Beryllium	0.273	0.638	0.145	0.471	0.133	0.71	0.202	0.55	0.543	0.567	0.352	ND	0.513	7.2	14	72
Cadmium	0.435	0.85	0.184	ND	0.132	0.283	0.492	ND	ND	ND	5.03	0.146	0.207	2.5	2.5	4.3
Chromium, hexavalent ^a	10.7	14.5	5.54	14.9	4.14	12.6	16.9	15.3	16.9	18.5	197	4.93	18.5	1	22	110
Chromium, trivalent ^a	10.7	14.5	5.54	14.9	4.14	12.6	16.9	15.3	16.9	18.5	197	4.93	18.5	30	36	180
Copper	63.2	11.1	ND	21.7	5.15	ND	12.8	29.8	13.4	16.7	167	ND	10.2	50	270	270
Total Cyanide ^a	0.344	0.439	0.461	ND	ND	113	0.45	ND	ND	ND	15.1	0.518	0.449	27	27	27
Lead	184	118	51.3	14.1	26.9	130	82.6	69	10.3	14.6	2140	13.5	42.6	63	400	400
Manganese	207	287	160	235	127	240	211	331	428	339	496	87.9	189	1600	2,000	2,000
Total Mercury ^c	0.0308	0.0542	0.0221	0.0343	0.0257	0.107	0.0824	0.0613	0.0266	0.0196	0.612	0.00766	0.0509	0.18	0.81	0.81
Nickel	9.21	9.38	6.07	11.1	6.21	14.6	11.2	13.1	18.6	21	25.5	3.49	13.2	30	140	310
Silver	ND	0.39	0.389	0.337	0.264	0.858	0.581	ND	0.475	ND	2.49	0.47	ND	2	36	180
Zinc	139	494	41.4	44.6	30.7	132	157	81.3	47.6	69.7	2500	274	81.1	109	2200	10,000
PCBs/PESTICIDES																
4,4'-DDE	0.00509	0.00177	ND	ND	ND	ND	ND	0.00496	ND	ND	ND	ND	ND	0.0033	1.8	8.9
4,4'-DDT	0.00376	0.00494	0.00482	ND	0.00242	0.00164	ND	ND	ND	ND	0.246	0.00333	0.00462	0.0033	1.7	7.9
4,4'-DDD	0.0188	0.00474	ND	ND	0.003	0.00241	ND	0.0159	ND	ND	ND	0.00344	0.0125	0.0033	2.6	13
Aldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00595	0.02	0.005	0.019	0.097
alpha-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0067	0.00468	0.02	0.097	0.48
Chlordane (alpha)	0.00195	0.0233	0.00187	ND	0.00593	ND	0.773	0.00315	ND	ND	ND	0.00535	0.0154	0.094	0.91	4.2
Dibenzofuran	0.251	0.458	ND	ND	ND	ND	3.04	ND	ND	0.466	12.8	ND	ND	7	14	59
Dieldrin	0.00678	ND	ND	ND	0.0035	ND	ND	0.00212	ND	ND	0.584	0.0236	0.00515	0.005	0.039	0.2
Endosulfan I ^b	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00629	0.00511	2.4	4.8	24
Endosulfan II ^b	0.00573	ND	ND	ND	0.00159	ND	ND	0.00444	ND	0.00173	ND	0.00737	0.0224	2.4	4.8	24
Endosulfan sulfate ^b	0.0148	0.0192	0.0221	ND	0.00212	0.00207	0.471	0.00792	ND	0.00389	0.711	0.0146	0.0118	2.4	4.8	24
Endrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00167	ND	0.0188	0.0297	0.014	2.2	11
Lindane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0045	ND	0.1	0.28	1.3
Polychlorinated biphenyls	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.12	ND	ND	0.1	1	1
SEMIVOLATILE ORGANIC COMPOUNDS																
Acenaphthene	0.313	0.635	ND	ND	ND	ND	3.12	ND	ND	0.944	14	ND	10.2	20	100	100
Acenaphthylene	ND	ND	ND	ND	ND	ND	2.09	ND	ND	ND	ND	ND	ND	100	100	100
Anthracene	0.769	1.52	0.216	ND	ND	0.211	11.2	ND	ND	0.672	30	ND	4.22	100	100	100
Benzo(a)anthracene	2.21	4.18	1.01	ND	ND	0.868	26.2	0.222	ND	1.41	64	4.05	ND	1	1	1
Benzo(a)pyrene	1.84	3.63	0.959	ND	ND	0.726	18.6	0.236	ND	0.803	54.2	ND	ND	1	1	1
Benzo(b)fluoranthene	2	3.96	1.15	ND	ND	0.727	23.2	0.312	ND	ND	52.5	4.9	ND	1	1	1
Benzo(g,h,i)perylene	1.23	2.52	0.717	ND	ND	0.468	10.9	0.221	ND	0.436	33.9	3.75	ND	100	100	100
Benzo(k)fluoranthene	1.29	2.59	0.561	ND	ND	0.577	9.96	0.173	ND	ND	40.2	ND	ND	0.8	1	3.9
Chrysene	2.09	4.16	1	ND	ND	0.857	23.4	0.289	ND	2.62	60.2	ND	5.5	1	1	3.9
Dibenz(a,h)anthracene	0.43	0.873	0.251	ND	ND	0.173	4.74	ND	ND	ND	12	ND	ND	0.33	0.33	0.33
Fluoranthene	5.01	9.92	2.02	ND	1.38	1.73	57.1	0.378	ND	0.401	166	6.82	ND	100	100	100
Fluorene	0.335	0.727	ND	ND	ND	ND	4.32	ND	ND	1.46	16.1	ND	15.4	30	100	100
Indeno(1,2,3-cd)pyrene	1.38	2.81	0.786	ND	ND	0.542	13.3	0.263	ND	ND	41	4.9	ND	0.5	0.5	0.5
Naphthalene	0.237	ND	ND	ND	ND	ND	ND	2.68	ND	5.82	13.6	ND	7.51	12	100	100
Phenanthrene	3.83	7.86	1.04	ND	0.894	0.675	55.2	0.424	ND	9.1	149	5.44	47.9	100	100	100
Pyrene	3.6	7.3	1.57	ND	1.03	1.38	39.8	0.452	ND	2	126	6.75	6.73	100	100	100
TICs	74	20.6	7.4	2.05	24.4	6.4	123	104	5.3	271	268	353	5550	NA	NA	NA

Table 1
Soil Sample Analytical Results
NYCRR Part 375
Sampling Date: 1-29-18

Contaminants	Sample Identification and Depth													Soil Cleanup Objectives		
	BH-1 (0.5-1')	BH-2 (0.5-1')	BH-3 (0.5-1')	BH-4 (0.5-1')	BH-5 (0.5-1')	BH-6 (1'-2')	BH-7 (surface)	BH- 8 (1'-2')	BH-9 (5'-6')	BH-10 (10'-12')	SS-1 (surface)	SS-2 (surface)	SS-3 (surface)	Unrestricted Use	Residential	Restricted Residential
VOLATILE ORGANIC COMPOUNDS																
cis-1,2-Dichloroethene	ND	0.00499	0.00414	ND	0.00287	0.00329	NA	ND	ND	ND	NA	ND	NA	0.25	59	100
Acetone	ND	ND	0.0384	ND	ND	0.314	NA	ND	ND	ND	NA	0.203	NA	0.05	100	100
Benzene	ND	0.00316	0.00412	ND	0.00234	0.00652	NA	ND	ND	1.76	NA	ND	NA	0.06	2.9	4.8
Butylbenzene (n)	ND	ND	ND	ND	ND	ND	NA	ND	ND	2.21	NA	ND	NA	12	100	100
Ethylbenzene	ND	0.00277	0.00383	ND	ND	0.0364	NA	5.73	ND	4.56	NA	ND	NA	1	30	41
Methyl ethyl ketone (2-	ND	ND	0.0202	ND	ND	0.0118	NA	ND	ND	ND	NA	0.0519	NA	0.12	100	100
Methylene chloride	ND	0.00688	ND	ND	ND	0.00754	NA	ND	ND	ND	NA	ND	NA	0.05	51	100
n-Propylbenzene	ND	ND	0.00504	ND	ND	0.0166	NA	6.1	ND	1.29	NA	ND	NA	3.9	100	100
sec-Butylbenzene	ND	ND	0.00271	ND	ND	0.00294	NA	ND	ND	0.819	NA	ND	NA	11	100	100
Toluene	0.00297	0.00325	0.00513	ND	0.0023	0.0656	NA	ND	ND	ND	NA	ND	NA	0.7	100	100
Trichloroethene	0.0532	0.214	0.173	0.0367	0.0585	0.0655	NA	ND	8.82	ND	NA	ND	NA	0.47	10	21
1,2,4-Trimethylbenzene	0.00318	0.00388	0.172	0.00298	0.0162	0.203	NA	371	ND	4.54	NA	0.0437	NA	3.6	47	52
1,3,5- Trimethylbenzene	ND	0.00249	0.0358	ND	0.00689	0.0651	NA	154	ND	ND	NA	0.0104	NA	8.4	47	52
Xylene (mixed)	0.01186	0.03463	0.044	0.00949	0.018	0.294	NA	232.2	ND	0.765	NA	0.0302	NA	0.26	100	100
TICs	ND	0.185	4.42	ND	0.186	1.75	NA	2080	5.64	251	NA	1.18	NA	NA	NA	NA

Results and SCOs are in parts per million (ppm).

ND - Non-Detect

NA - Not Applicable

NS - Not Specified, and may be required to calculate the ERSKO

^a The SCO for this compound (or family of compounds) is considered met if the analysis for the total species of this compound is below the specific SCO.

^b SCO is the sum of endosulfan I, endosulfan II, and endosulfan sulfate (but not for Eco or GW SCO).

^c This SCO includes the values for elemental Hg or inorganic salts Hg.

1	= laboratory value exceeds restricted residential SCOs
2	= laboratory value exceeds residential SCOs but does not exceed restricted residential SCOs
3	= laboratory value exceeds unrestricted SCOs but does not exceed residential SCOs

Table 1
Soil Sample Analytical Results
NYCRR Part 375
Sampling Date: 5-25-18

Contaminants	Sample Identification and Depth				Soil Cleanup Objectives		
	S-01 (0.5-1')	S-03 (0.5-1')	S-06 (0.5-1')	S-09 (0.5-1')	Unrestricted Use	Residential	Restricted Residential
METALS							
Arsenic	7.78	11	28	4.67	13	16	16
Barium	213	364	99.7	72.8	350	350	400
Beryllium	1.58	1.28	0.788	0.403	7.2	14	72
Cadmium	1.57	1.11	1.73	0.976	2.5	2.5	4.3
Chromium, hexavalent ^a	12.3	10.1	12.3	11.3	1	22	110
Copper	29.1	91.7	87.7	27.5	50	270	270
Lead	98.9	104	205	87.7	63	400	400
Manganese	1060	381	261	306	1600	2,000	2,000
Total Mercury ^c	0.0506	0.0949	0.107	0.0302	0.18	0.81	0.81
Nickel	12.7	11.6	18	10.5	30	140	310
Silver	2.79	2.8	3.38	3.11	2	36	180
Zinc	202	285	277	184	109	2200	10,000
SEMIVOLATILE ORGANIC COMPOUNDS							
Acenaphthene	ND	ND	ND	4.21	20	100	100
Anthracene	3.1	4.2	ND	8.87	100	100	100
Benz(a)anthracene	8.31	19	ND	12	1	1	1
Benzo(a)pyrene	6.85	16.2	ND	15.5	1	1	1
Benzo(b)fluoranthene	9.44	21.8	ND	21.4	1	1	1
Benzo(g,h,i)perylene	4.07	10.4	ND	9.62	100	100	100
Benzo(k)fluoranthene	3.23	8.68	ND	9.73	0.8	1	3.9
Chrysene	8.15	17.7	ND	15.9	1	1	3.9
Fluoranthene	19.7	44.3	ND	33.7	100	100	100
Fluorene	ND	ND	ND	4.48	30	100	100
Indeno(1,2,3-cd)pyrene	4.84	12.4	ND	10.5	0.5	0.5	0.5
Phenanthrene	15	22.8	ND	32.5	100	100	100
Pyrene	15.1	34.9	ND	37	100	100	100
VOLATILE ORGANIC COMPOUNDS							
Tetrachloroethene	ND	ND	0.589	ND	1.3	5.5	19

^a Results and SCOs are in parts per million (ppm).

ND - Non-Detect

NA - Not Applicable

NS - Not Specified, and may be required to calculate the ERSCO

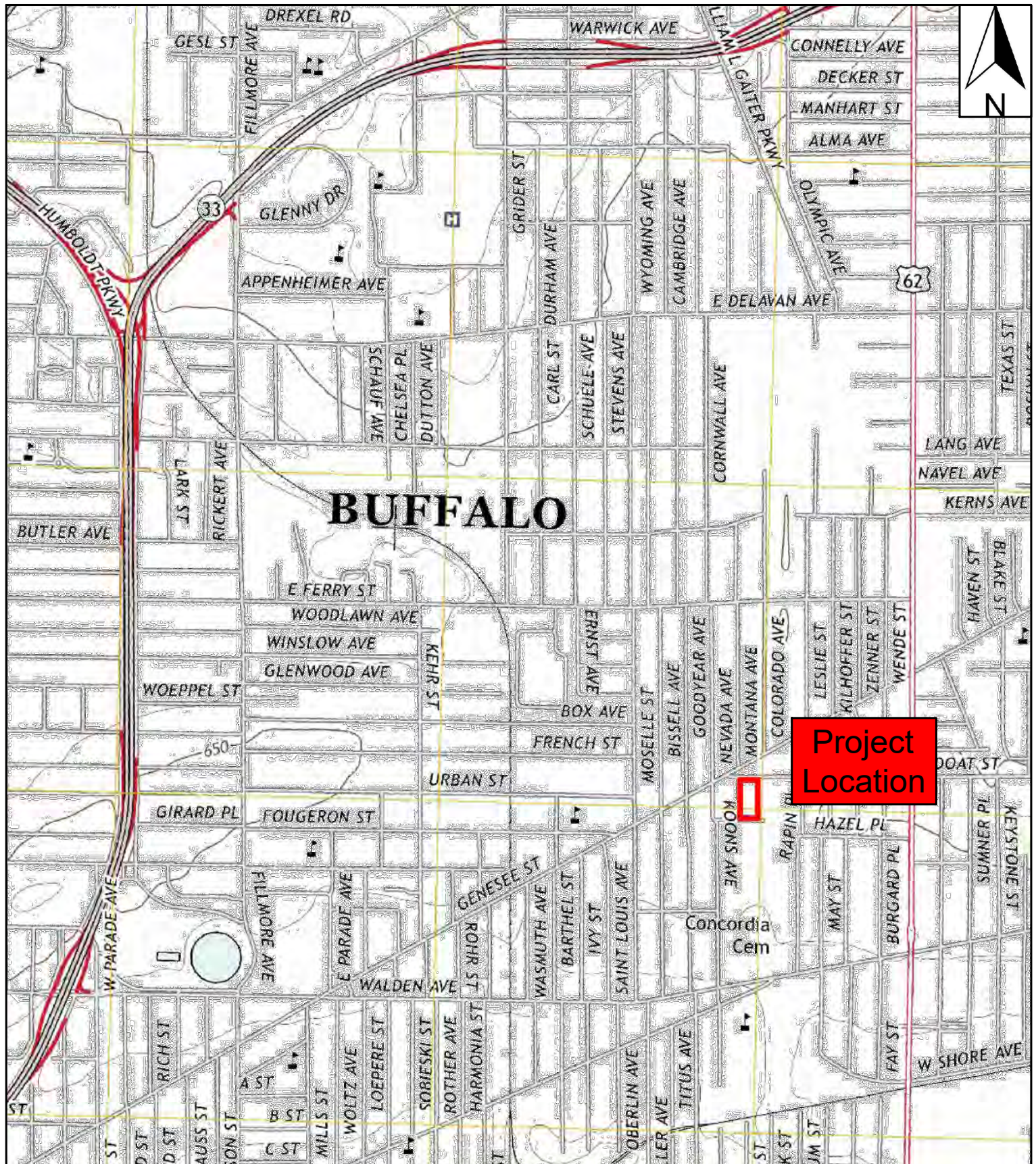
^a The SCO for this compound (or family of compounds) is considered met if the analysis for the total species of this compound is below the specific SCO.

^b SCO is the sum of endosulfan I, endosulfan II, and endosulfan sulfate (but not for Eco or GW SCO).

^c This SCO includes the values for elemental Hg or inorganic salts Hg.

1	= laboratory value exceeds restricted residential SCOs
2	= laboratory value exceeds residential SCOs but does not exceed restricted residential SCOs
3	= laboratory value exceeds unrestricted SCOs but does not exceed residential SCOs

FIGURES



**Project
Location**

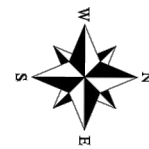
Figure 1: Project Location Map

19 Doat Street

2/26/2018

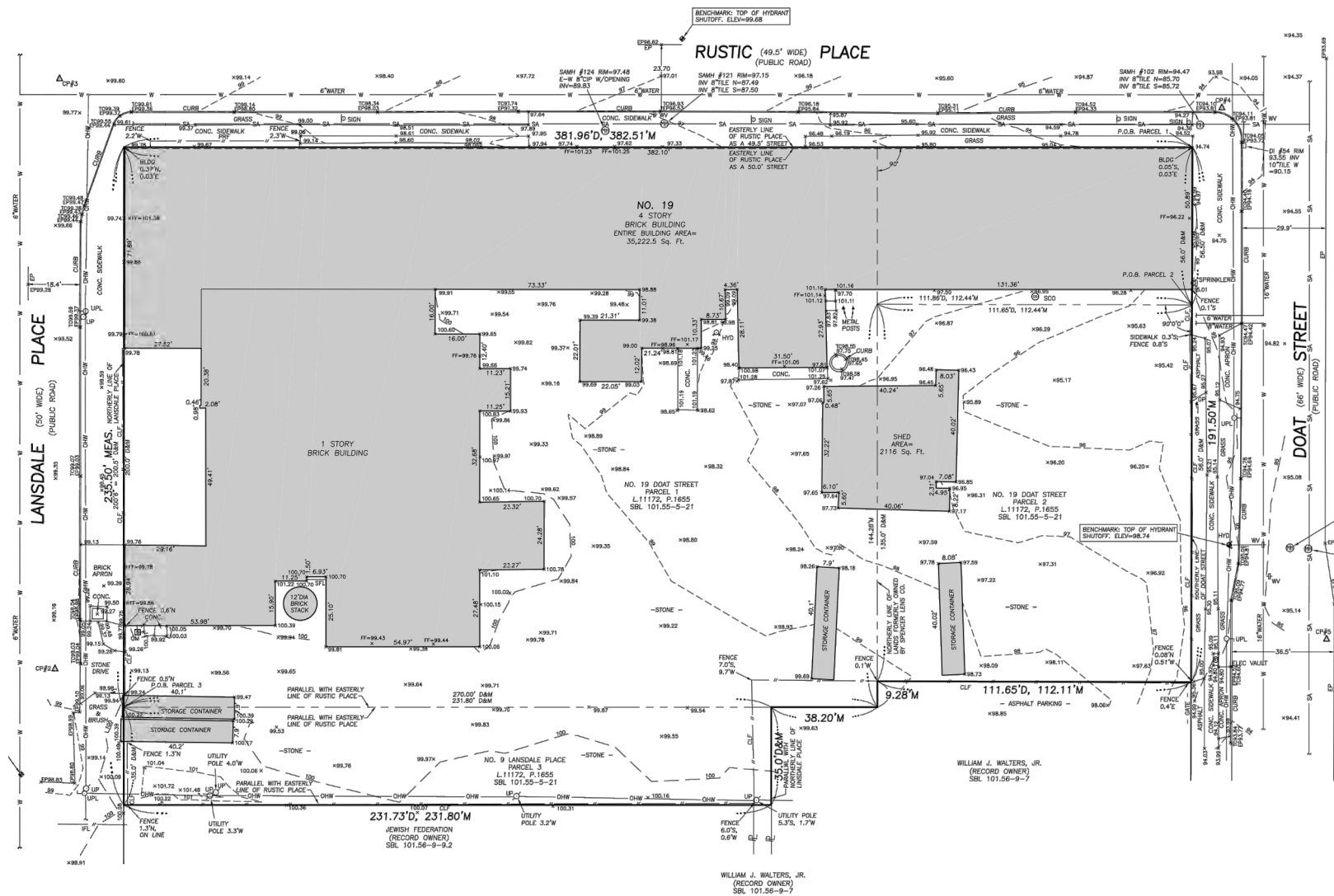
Buffalo, NY

Regan Development



LEGEND

CLF	CHAIN LINK FENCE
PRF	POST AND RAIL FENCE
Q	SIGN
GP	POSTS
G	GAS LINE
DAS	GAS METER
DV	GAS VALVE
DI	DRAINAGE INLET
ST	STORM SEWER LINE
SMH	SANITARY MANHOLE
SCD	SEWER CLEANSOUT
SA	SANITARY SEWER LINE
INV	INVERT ELEVATION
UP	ELECTRIC VAULT
UPL	UTILITY POLE W/ LIGHT
OHW	OVERHEAD WIRES
UE	UNDERGROUND ELECTRIC
W	WATER LINE
WV	WATER VALVE
HYD	HYDRANT
CONC	CONCRETE
TC	TOP OF CURB
SW	SIDEWALK
EP	EDGE OF PAVEMENT
FF	FINISHED FLOOR
D&M	DEED AND MEASURED
CP	PRIMARY CONTROL POINT
BM	BENCHMARK



ALL UNDERGROUND UTILITY LOCATIONS ARE APPROXIMATE. BEFORE YOU DIG, DRILL, OR BLAST, CALL 800 SAFELY NEW YORK AT 1-800-962-7862



FIGURE 2: SITE SURVEY

19 DOAT STREET
Regan Development
1055 Saw Mill River Road #204
Ardsey, NY 10502

2-28-2018

SCALE: N/A

SHEET 1 OF 1

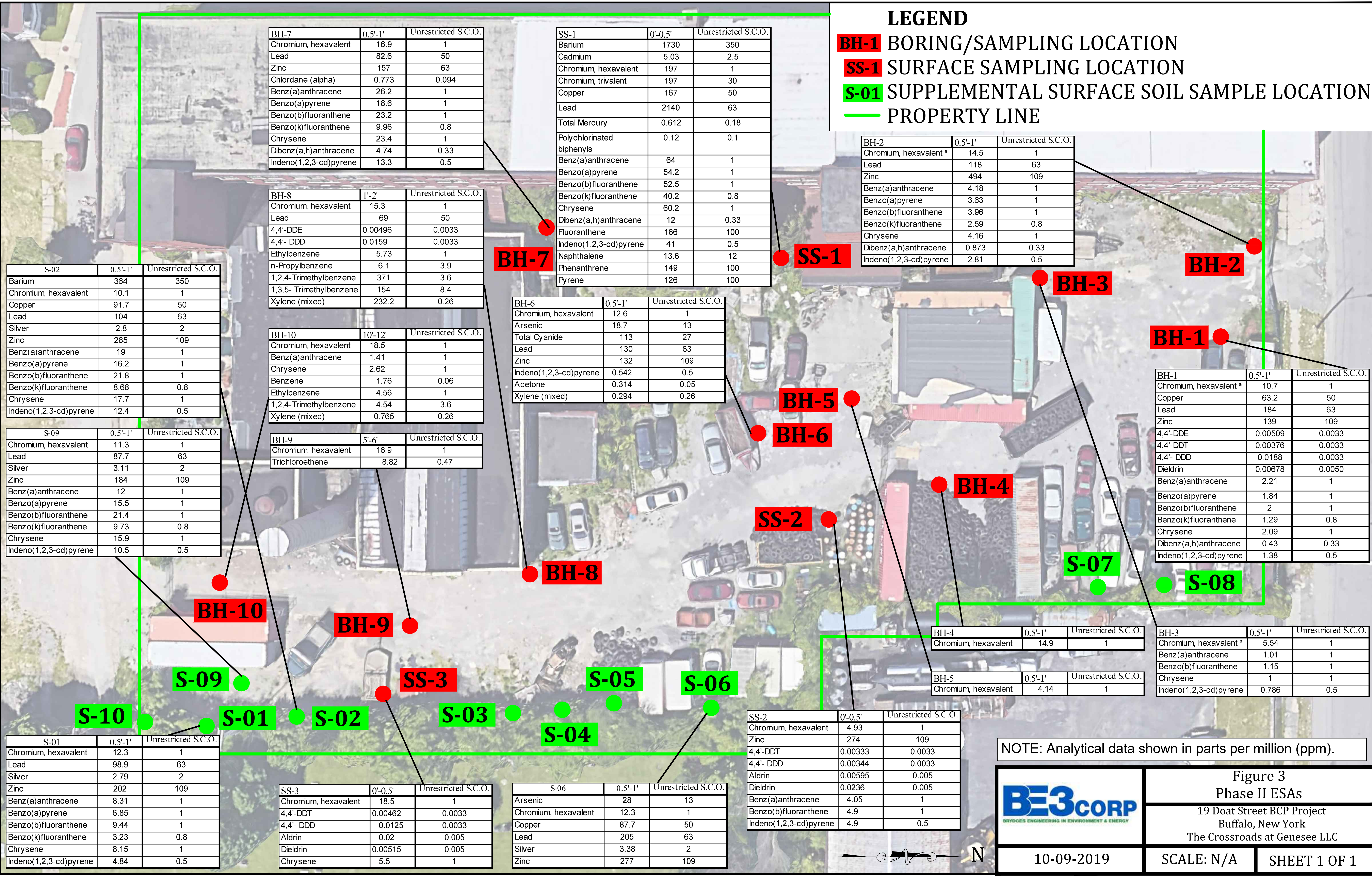
LEGEND

- BH-1

BORING/SAMPLING LOCATION
- SS-1

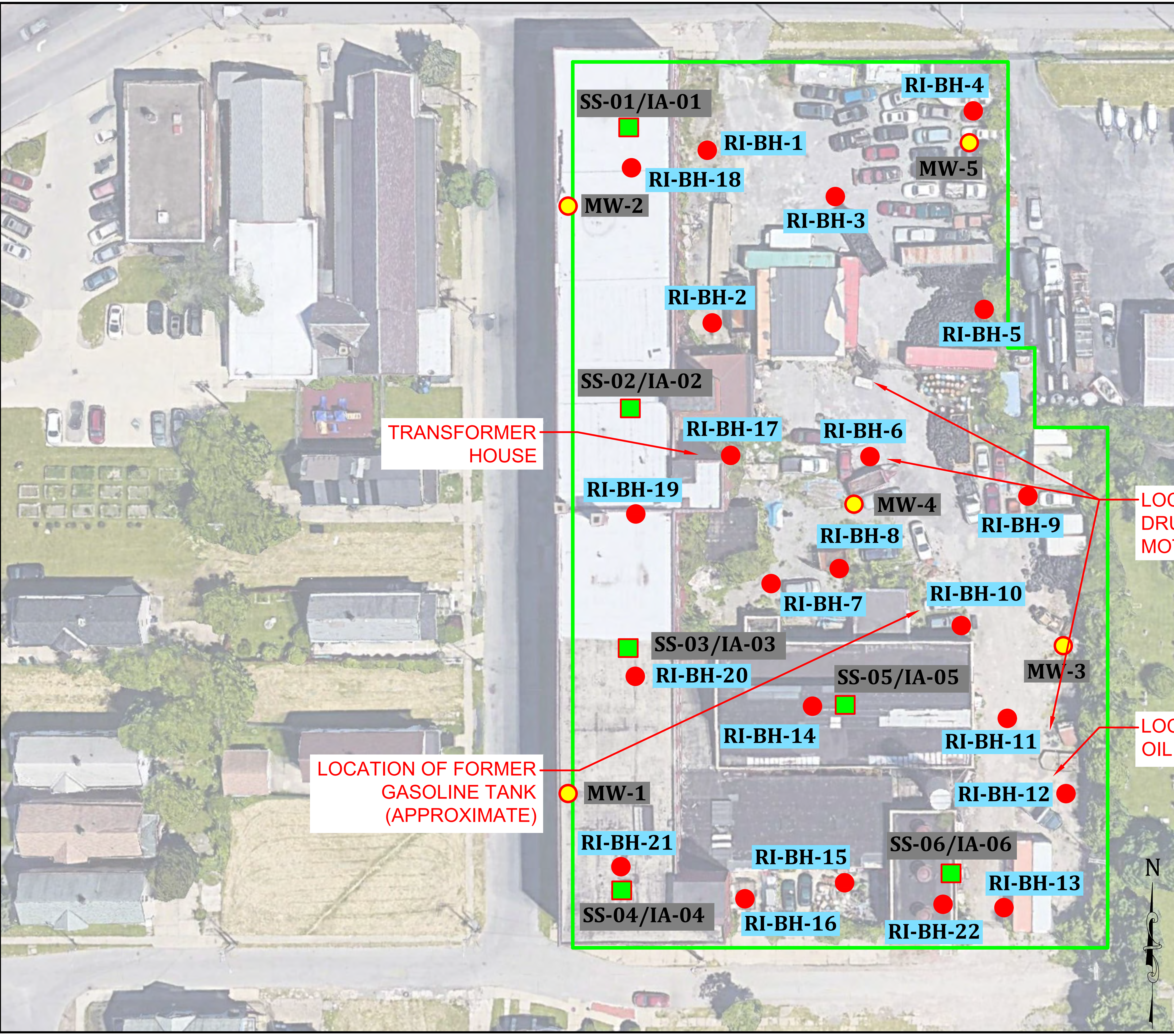
SURFACE SAMPLING LOCATION
- S-01


SUPPLEMENTAL SURFACE SOIL SAMPLE LOCATION
- PROPERTY LINE



LEGEND

- SITE BOUNDARY
- RI-BH-# BORING LOCATION
- SS-# SUB-SLAB VAPOR SAMPLE LOCATION
- MW-# GROUNDWATER WELLS



	Figure 4 RI Investigation Plan	
	19 Doat Street BCP Project Buffalo, New York The Crossroads at Genesee LLC	
10-09-2019	SCALE: N/A	SHEET 1 OF 1

RI-BH-1	0.5'-1'	Unrestricted S.C.O.
Benz(a)anthracene	7.8	1
Benzo(a)pyrene	5.8	1
Benzo(b)fluoranthene	6.5	1
Benzo(k)fluoranthene	4.34	0.8
Chrysene	6.7	1
Dibenz(a,h)anthracene	1.3	0.33
Indeno(1,2,3-cd)pyrene	3.9	0.5
4,4-DDT	0.0080	0.0033

RI-BH-18	0'-0.5'	Unrestricted S.C.O.
Arsenic	14.7	13

RI-BH-2	0.5'-1'	Unrestricted S.C.O.
Benz(a)anthracene	10.1	1
Benzo(a)pyrene	7.9	1
Benzo(b)fluoranthene	7.5	1
Benzo(k)fluoranthene	7.1	0.8
Chrysene	9.3	1
Dibenz(a,h)anthracene	1.6	0.33
Indeno(1,2,3-cd)pyrene	5.3	0.5
4,4-DDT	0.0060	0.0033

RI-BH-17	0.5'-1'	Unrestricted S.C.O.
Copper	53.4	50
Lead	270	63
Benz(a)anthracene	4.5	1
Benzo(a)pyrene	3.5	1
Benzo(b)fluoranthene	3.2	1
Benzo(k)fluoranthene	3.2	0.8
Chrysene	4.2	1
Dibenz(a,h)anthracene	0.8	0.33
Indeno(1,2,3-cd)pyrene	2.8	0.5

RI-BH-8	0.5'-1'	Unrestricted S.C.O.
Zinc	155	109

RI-BH-7	0.5'-1'	Unrestricted S.C.O.
Lead	97.4	63
Zinc	136	109
4,4-DDT	0.0040	0.0033
Benz(a)anthracene	7.3	1
Benzo(a)pyrene	5.8	1
Benzo(b)fluoranthene	6.2	1
Benzo(k)fluoranthene	4.5	0.8
Chrysene	6.8	1
Dibenz(a,h)anthracene	1.2	0.33
Indeno(1,2,3-cd)pyrene	4.1	0.5

RI-BH-20	0'-0.5'	Unrestricted S.C.O.
Lead	64.7	63

RI-BH-16	0'-2'	Unrestricted S.C.O.
Total Mercury	0.27	0.18

RI-BH-13	11'-13'	Unrestricted S.C.O.
Chromium	42.4	1
Manganese	8130	1600
Acetone	0.095	0.05

SS-01/IA-01

RI-BH-1

RI-BH-18

MW-2

RI-BH-2

SS-02/IA-02

RI-BH-17

RI-BH-19

RI-BH-6

MW-4

RI-BH-8

RI-BH-7

RI-BH-10

SS-03/IA-03

RI-BH-20

SS-05/IA-05

MW-3

RI-BH-14

RI-BH-11

RI-BH-12

RI-BH-21

RI-BH-15

SS-06/IA-06

RI-BH-13

SS-04/IA-04

RI-BH-16

RI-BH-22

LEGEND

- SITE BOUNDARY
- RI-BH-# BORING LOCATION
- SS-# SUB-SLAB VAPOR SAMPLE LOCATION
- MW-# GROUNDWATER WELLS

RI-BH-4	0.5'-1'	Unrestricted S.C.O.
Benz(a)anthracene	2.7	1
Benzo(a)pyrene	2.4	1
Benzo(b)fluoranthene	2.6	1
Benzo(k)fluoranthene	2	0.8
Chrysene	2.73	1
Dibenz(a,h)anthracene	0.6	0.33
Indeno(1,2,3-cd)pyrene	1.9	0.5

RI-BH-5	0.5'-1'	Unrestricted S.C.O.
4,4-DDT	0.005	0.0033

RI-BH-6	0.5'-1'	Unrestricted S.C.O.
Benz(a)anthracene	1.01	1


RI-BH-9	0.5'-1'	Unrestricted S.C.O.
Zinc	177	109
Benz(a)anthracene	2.2	1
Benzo(a)pyrene	1.8	1
Benzo(b)fluoranthene	1.9	1
Benzo(k)fluoranthene	1.5	0.8
Chrysene	2.4	1
Dibenz(a,h)anthracene	0.4	0.33
Indeno(1,2,3-cd)pyrene	1.3	0.5

RI-BH-10	3'-6'	8'-10'	Unrestricted S.C.O.
m,p-Xylene	0.94	ND	0.26
1,2,4-Trimethylbenzene	5.2	ND	3.6
Acetone	ND	0.3	0.05

RI-BH-11	1'-2'	Unrestricted S.C.O.
Acetone	0.11	0.05

RI-BH-12	0.5'-1'	Unrestricted S.C.O.
Benz(a)anthracene	1.96	1
Benzo(a)pyrene	1.6	1
Benzo(b)fluoranthene	1.6	1
Benzo(k)fluoranthene	1.3	0.8
Chrysene	1.8	1
Acetone	0.21	0.05
cis-1,2-Dichloroethene	0.3	0.25

NOTE: Analytical data shown in parts per million (ppm).



10-09-2019

Figure 5
Soil Sample Analytical Results
19 Doat Street BCP Project
Buffalo, New York
The Crossroads at Genesee LLC

SCALE: N/A

SHEET 1 OF 1

SAMPLE ID: SS-01
TCE: 160
SAMPLE ID: IA-01
TCE: 0.97

NYSDOH
RECOMMENDATION:
MITIGATE

SAMPLE ID: SS-02
TCE: 130
SAMPLE ID: IA-02
TCE: 1

NYSDOH
RECOMMENDATION:
MITIGATE

SAMPLE ID: SS-03
TCE: 150
SAMPLE ID: IA-03
TCE: 1.1

NYSDOH
RECOMMENDATION:
MITIGATE

SAMPLE ID: SS-04
TCE: 130
SAMPLE ID: IA-04
TCE: 0.91

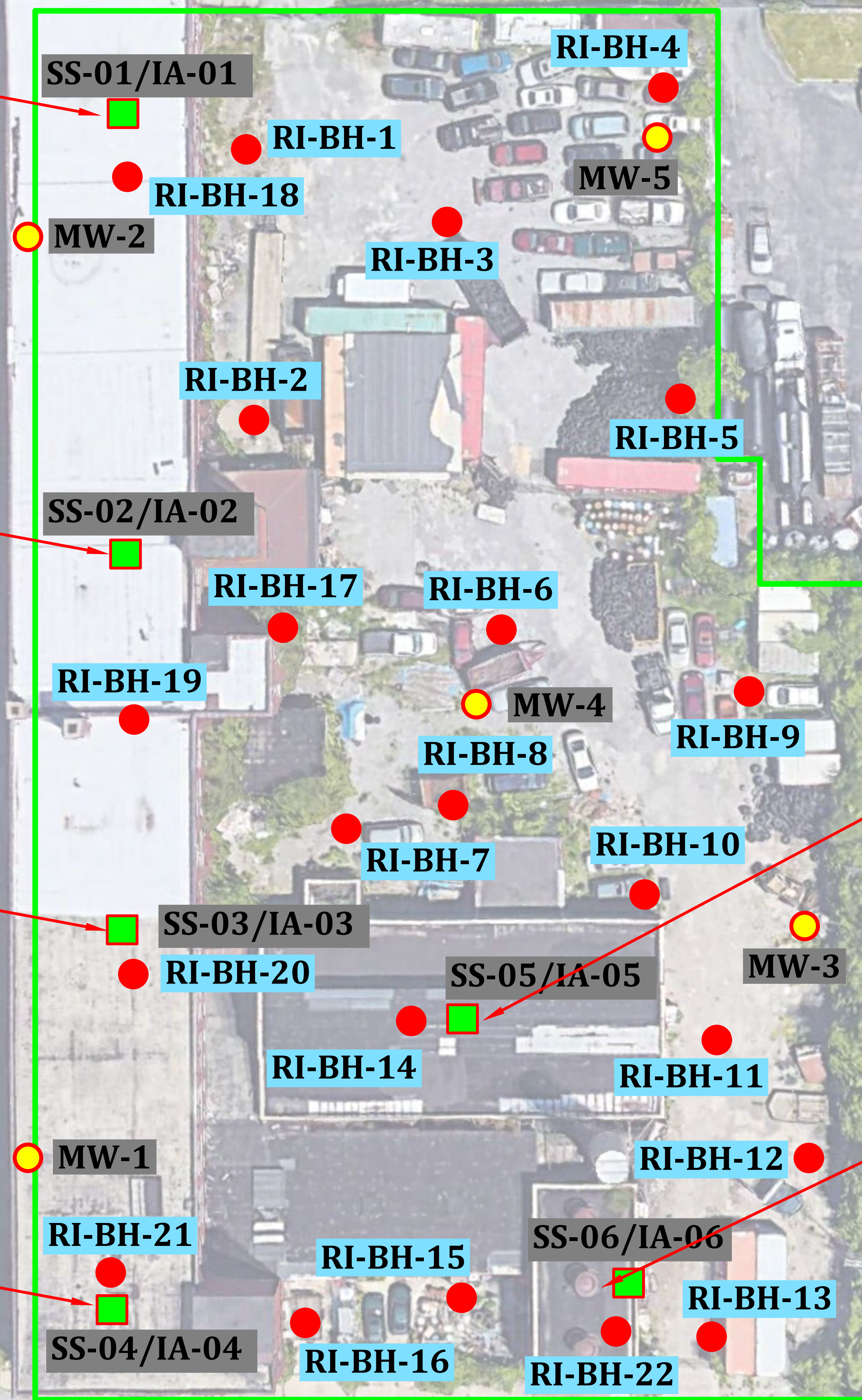
NYSDOH
RECOMMENDATION:
MITIGATE

LEGEND

- SITE BOUNDARY
- RI-BH-# BORING LOCATION
- SS-# SUB-SLAB VAPOR SAMPLE LOCATION
- MW-# GROUNDWATER WELLS

NOTES:

- COMPOUND LEVELS ARE ALL PRESENTED IN ug/m³
- ALL COMPOUND LEVELS SHOWN REQUIRE ACTION BASED ON NYSDOH GUIDANCE FOR EVALUATING SOIL VAPOR INTRUSION DECISION MATRICES MAY 2017



SAMPLE ID: SS-05
TCE: 120
SAMPLE ID: IA-05
TCE: 0.75

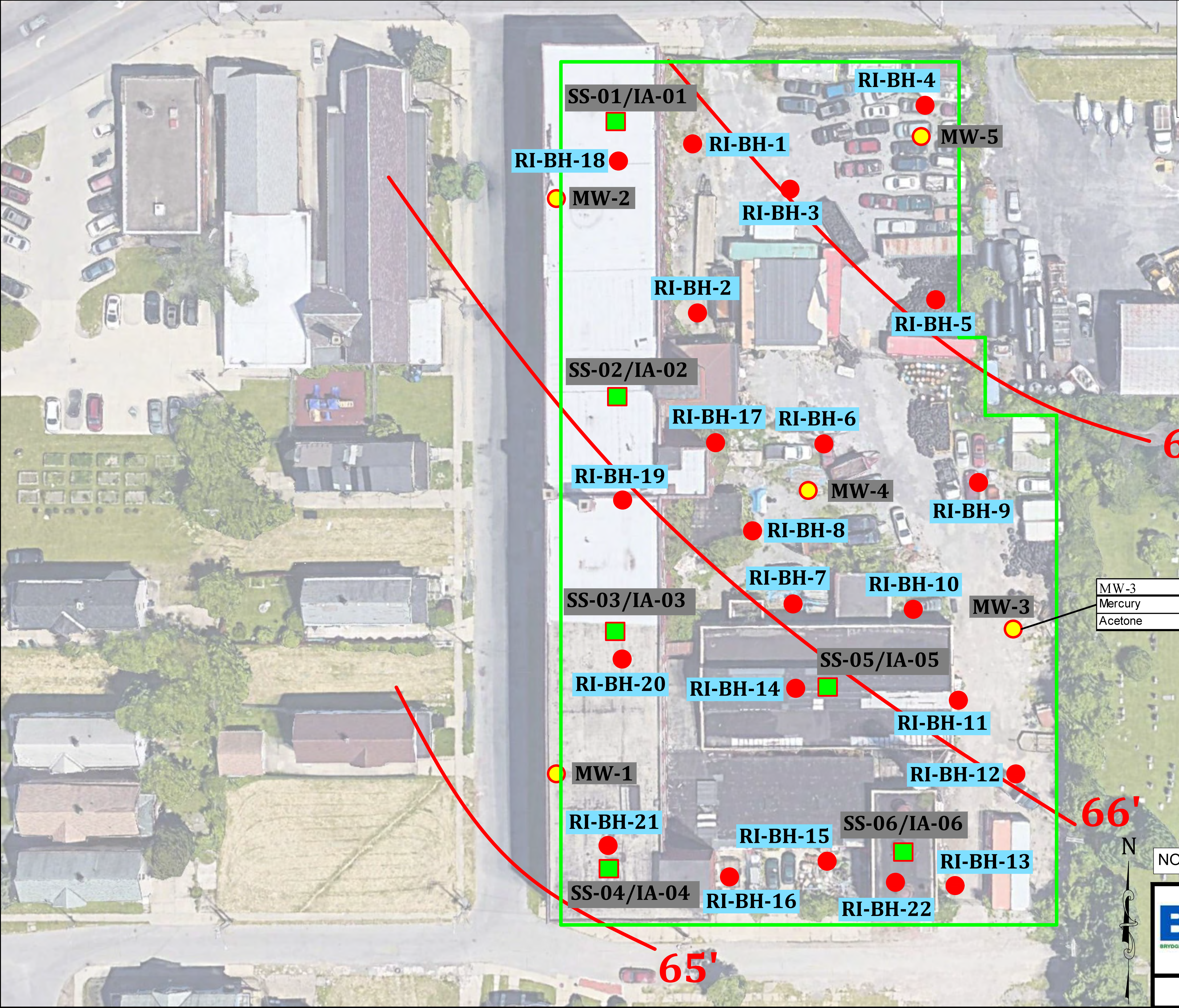
NYSDOH
RECOMMENDATION:
MITIGATE

SAMPLE ID: SS-06
TCE: 100
SAMPLE ID: IA-06
TCE: 1.9

NYSDOH
RECOMMENDATION:
MITIGATE


LEGEND

- SITE BOUNDARY
- RI-BH-# BORING LOCATION
- SS-# SUB-SLAB VAPOR SAMPLE LOCATION
- MW-# GROUNDWATER WELLS



MW-3		T.O.G.s
Mercury	2.65 L	0.7
Acetone	291.0	50.0

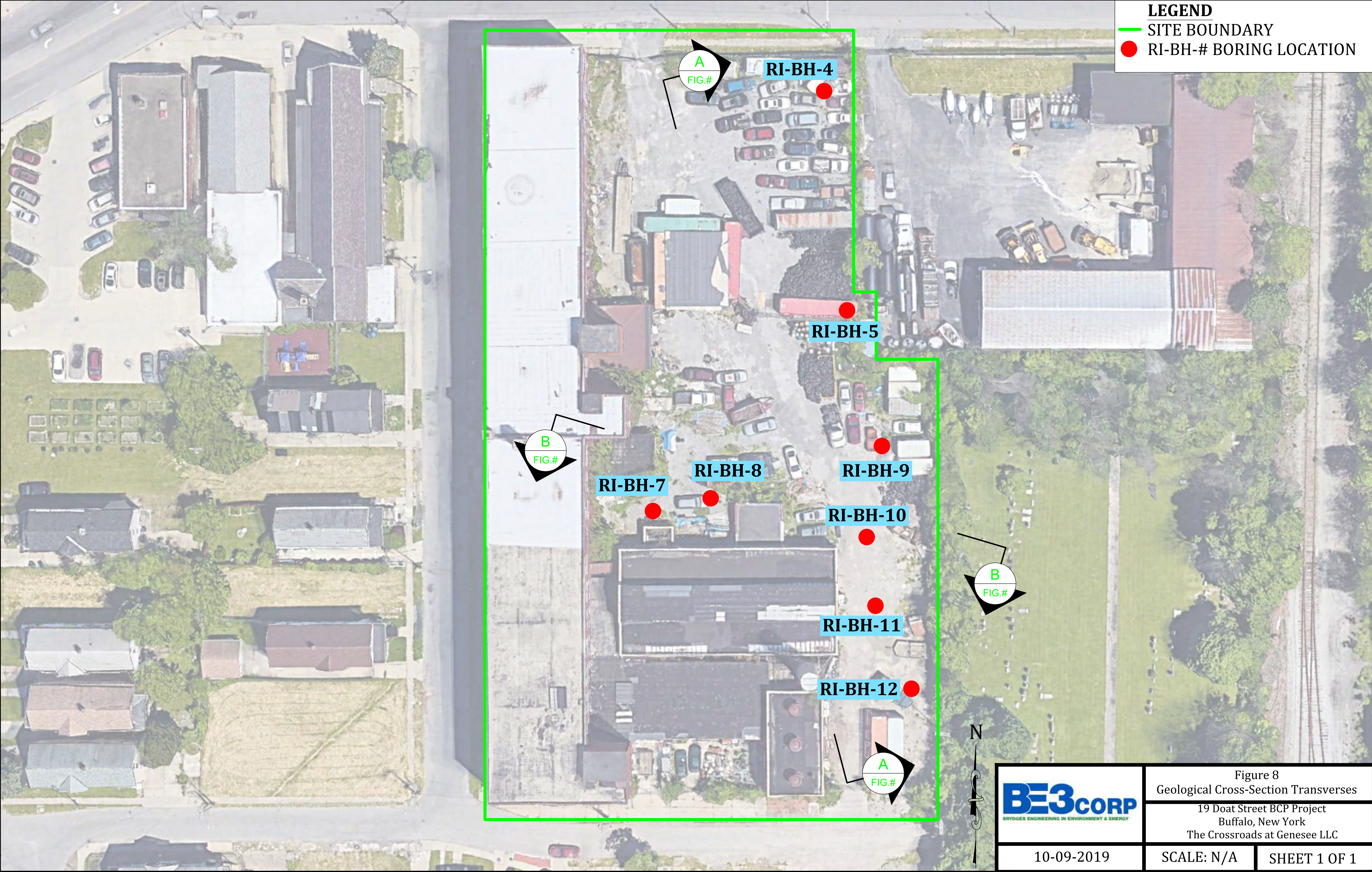
NOTE: Analytical data shown in parts per billion (ppb).

	Figure 7	
	Ground Water Contours and Data	
	19 Doat Street BCP Project Buffalo, New York The Crossroads at Genesee LLC	
10-09-2019	SCALE: N/A	SHEET 1 OF 1

LEGEND

SITE BOUNDARY

RI-BH-# BORING LOCATION

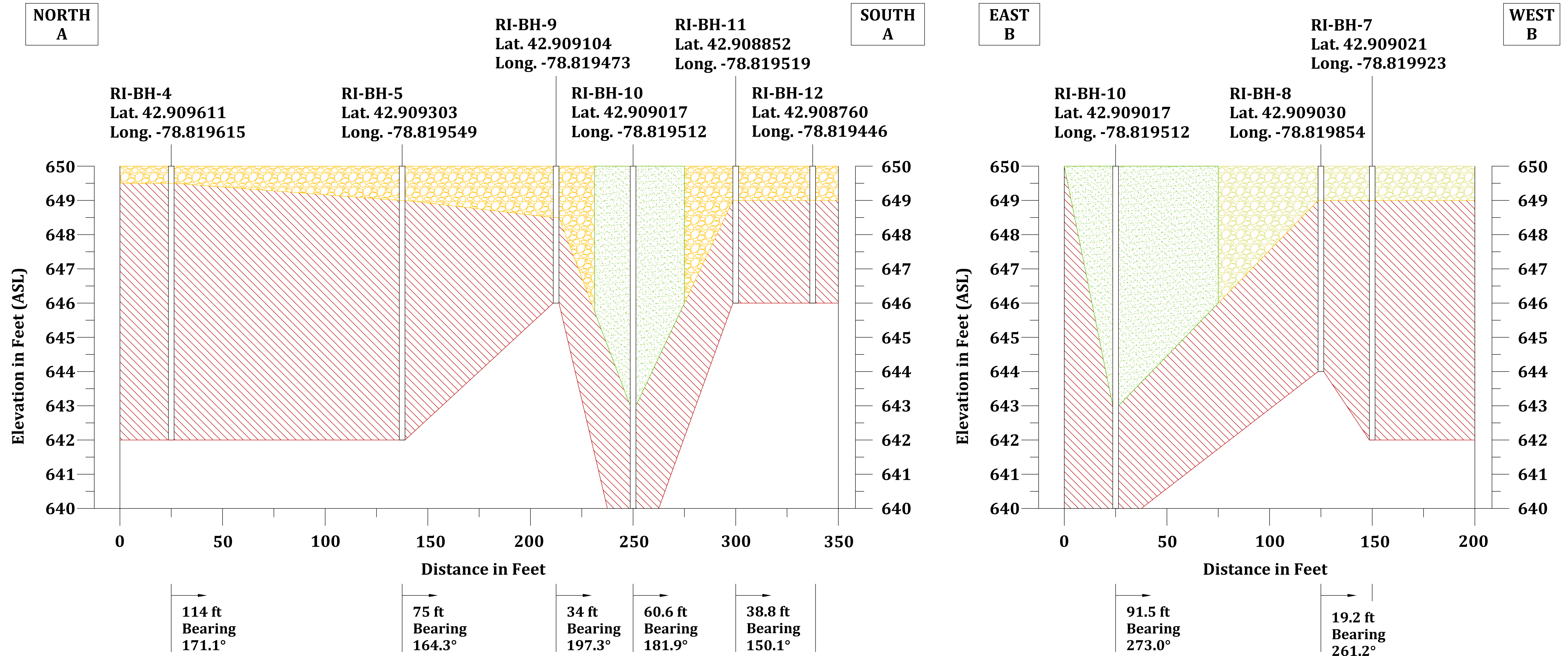


LEGEND

BH-# — BORING HOLE DESIGNATION
— GROUND SURFACE
— BORING HOLE
— STRATIGRAPHIC BOUNDARY
— BOTTOM OF BORING HOLE

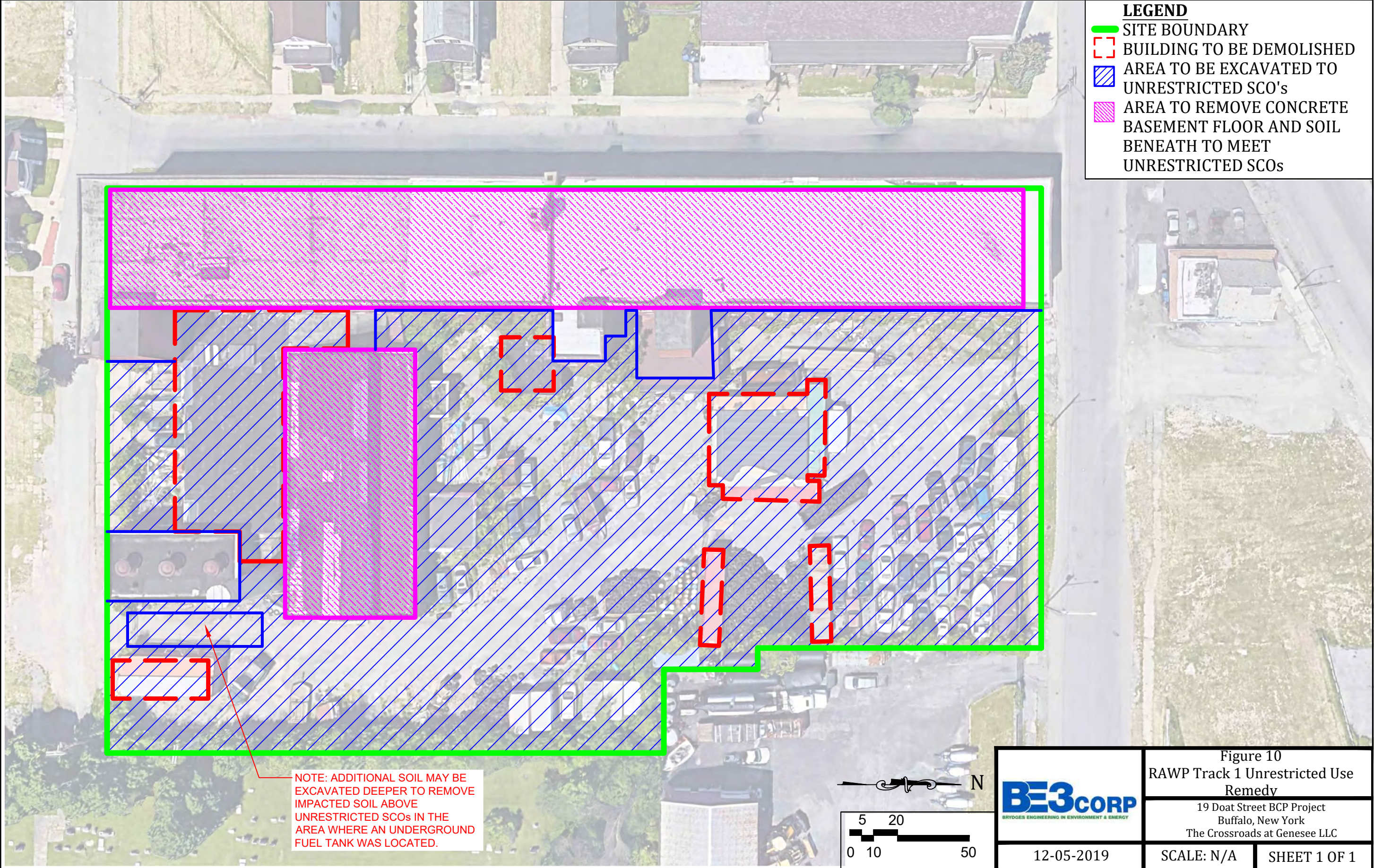
-TYPICAL GRAVEL FILL w/
OCCASIONAL CINDERY
MATERIAL OR SILTY SAND
INCLUSION
-ASPHALT AND STONE FILL

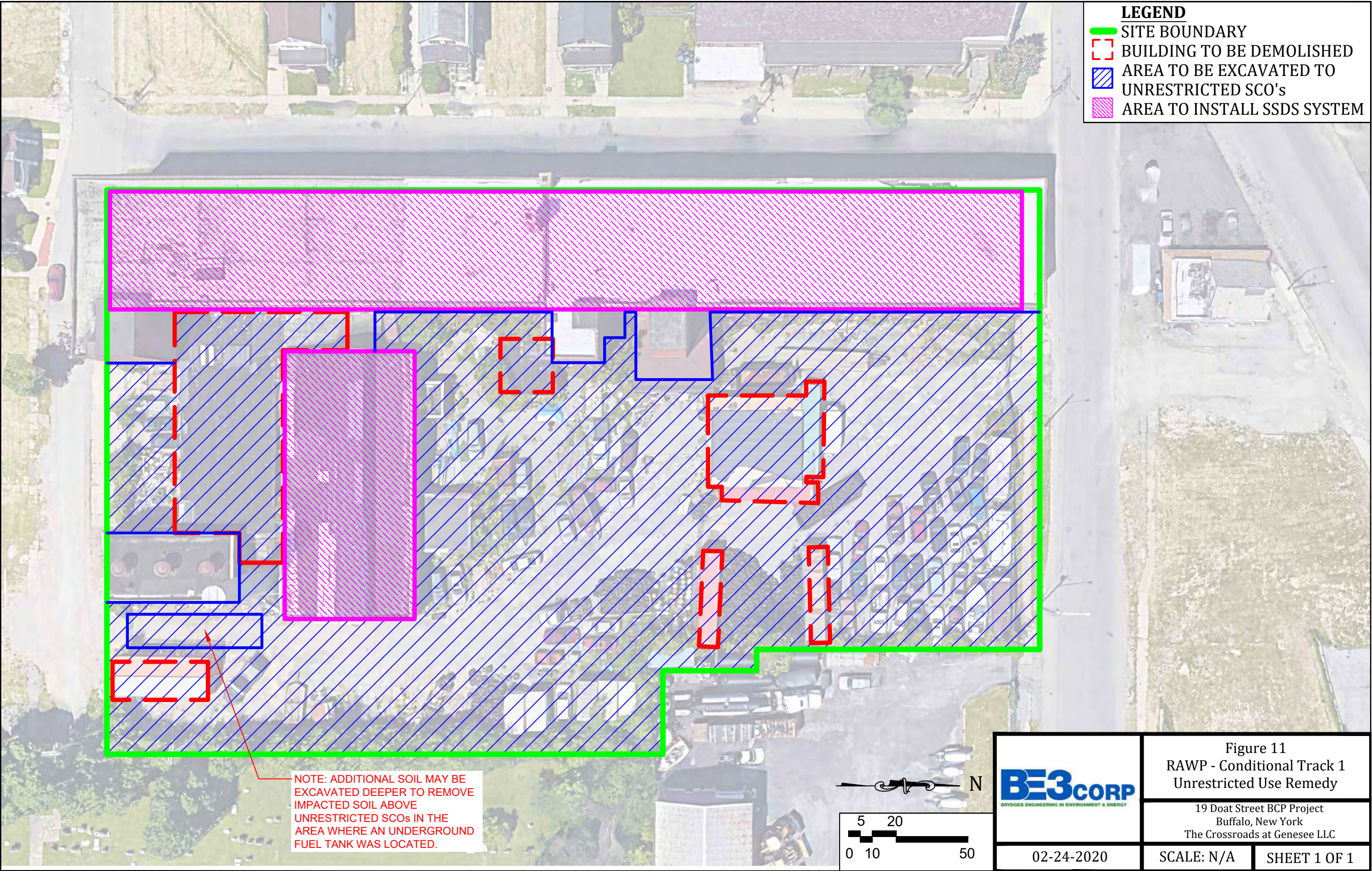
-STIFF RED BROWN CLAY
-SILTY SAND CLAY FILL w/
SMALL GRAVEL INCLUSION
(NOTED PETROLEUM ODOR)

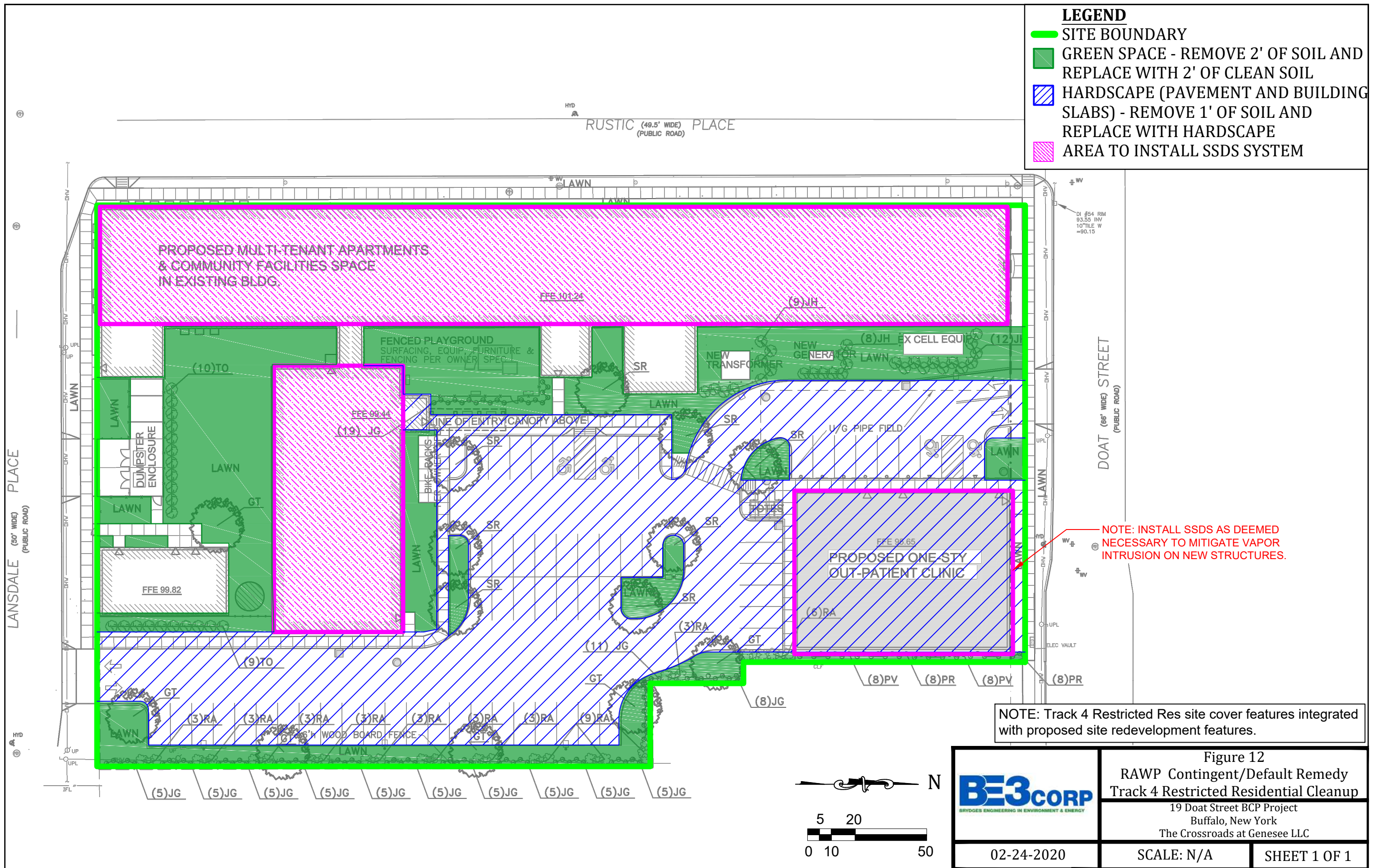


Cross Section A-A

Cross Section B-B







APPENDIX A

HEALTH & SAFETY PLAN

HEALTH AND SAFETY PLAN for SITE INVESTIGATIONS AND REMEDIAL OVERSIGHT

**THE CROSSROADS AT GENESEE
19 DOAT STREET AND 9 LANSDALE PLACE
BUFFALO, NEW YORK 14211
NYSDEC SITE # C915338**

Prepared for:

The Crossroads at Genesee LLC
1055 Saw Mill River Road, Suite 204
Ardsley, New York 10502

Prepared by:



1270 Niagara Street
Buffalo, New York 14213

Dec. 2018

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ATTACHMENTS

- 1 – Table of Potential Hazards and OSHA Standards
- 2 – Heat Stress Management Program and Procedures
- 3 – Trenching and Excavation Health and Safety Requirements
- 4 – Map to Hospital
- 5 – NYSDOH Generic CAMP and Fugitive Dust and Particulate Monitoring

1.0 INTRODUCTION

The following health and safety procedures apply to BCP project personnel, including subcontractors, performing activities described in the RI Work Plan for the Crossroads at Genesee LLC BCP Project. Please note, however, contractors performing remedial work are required to either develop their own plans 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 Health and Safety Plan (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 NYSDEC Brownfields 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 the 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 and groundwater and oversight activities related to remediation. Field work will be conducted that can include test trenches/soil borings, monitoring well installation, groundwater and soil sampling, building demolition, soil excavation, etc.

1.4 PERSONNEL REQUIREMENTS

Key personnel are as follows:

Health and Safety Officer - Peter J. Gorton, MPH, CHCM
Engineer and Project Manager - Jason Brydges, P.E.
Geologist – John Boyd, PG

Technicians – Cory Lauber and Alex Brennen, EIT
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 has the authority to stop work if conditions are deemed to be unsafe. Visitors will be required to report to the overall Site PM 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

Industrial and manufacturing uses have occurred on the properties since the early 1900's. Uses onsite include textile manufacturing and dyeing in the early 1900's when the property was owned by the Monarch Knitting Company (1912) and then the Butterworth Dyeing and Bleach Works (1925). In 1929 the property was purchased by the Spencer Lens Company and the production of optical lenses took place on the properties. According to historical maps, Bond Clothing Store occupied the property from 1946 to approximately 1950, where uses were associated with clothing manufacturing and retail. From the 1950's to the early 2000's, the property was occupied by the Royal Bedding Company and other small retail tenants. In 2009, uses switched to automotive repair and tire sales. Operations on site have recently stopped, but equipment and material associated with the automotive uses remains onsite.

The main site features include an L-shaped, four-story, 91,000 square-foot brick industrial building with the remainder of the site covered with a gravel/asphalt lot. The building takes up most of the south and western portion of the property. With the gravel and asphalt lot covering the north and eastern sections. Currently multiple storage containers, tire piles, and vehicle storage areas exist on the eastern side of the property, however these will be removed by the current owner after the requestor has closed on the property.

2.2 HAZARD EVALUATION

Specific health and safety concerns to the project tasks include working around low levels of heavy metals, PCBs, SVOCs and VOCs in the soil and groundwater. Physical hazards include those associated with working near open excavations and adjacent to manual/mechanical field equipment. 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 at elevated concentrations that exceed Part 375 soil cleanup objectives. 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 PID readings greater than 5 ppm above established background. When 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 is 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 ear muffs 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° C (85° 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 air temperature is less than 40° F (4° C) and a worker perspires, the worker should change to dry clothes. The following summary of the signs and symptoms of cold stress are 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 CFR, subpart P, 1926.650 thru 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 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 be exited/entered 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 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 lightening 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 sun screen 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 petroleum products and other chemical compounds, heavy metals and PAH compounds	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
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

3.0 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)(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 soils are 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.

3.3 TOTAL VOLATILE ORGANICS MONITORING

Monitoring of VOCs will be conducted using a photo-ionization detector (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 soils 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:
 1. Accessibility to personnel, equipment, and vehicles.
 2. Areas of known or suspected contamination.
 3. Site access.
 4. 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 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 personal protective equipment (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 zones and include an exclusion area and support zone. 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, PM 716-830-8636
- Peter J. Gorton, H&S 716-308-8220
- Eugene Melnyk, NYSDEC PM 716 851-7220
- To Be Determined, NYSDOH 518-402-7860
- Sister's of Charity Hospital 716-891-2400 See **Attachment 4** for route to facility.

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 can not 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 log book. 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 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 5** 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 **Attachment 5**. 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 Assessment & 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 N 29 CFR 1926.600-602 29 CFR 1926.604
Building Demolition	covered by 1926	29 CFR 1926 Subpart T
Site Contaminant Abatement	29 CFR 1910.1000-1029 29 CFR 1910.1043-1052	29 CFR 1926.55 29 CFR 1926.622 29 CFR 1926.1101-1152
Elevated Work Surfaces	29 CFR 1910 Subpart D 29 CFR 1910 Subpart F	29 CFR 1926 Subpart L 29 CFR 1926 Subpart M 29 CFR 1926.552
Chemical Storage	29 CFR 1910 Subpart H 29 CFR 1910.1200	29 CFR 1926.59 29 CFR 1926 Subpart F
Personal Protective Equipment	29 CFR 1910 Subpart I	29 CFR 1926 Subpart E
Heavy Equipment Operation	29 CFR 1910.95 29 CFR 1910 Subpart N	29 CFR 1926.52 29 CFR 1926 Subpart O
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° C (70° F) while wearing protective equipment (e.g., hazardous waste site investigations) or when the ambient temperature exceeds 29° (85° 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 or 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 - Notwithstanding 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 cardiovascular 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.

Work Schedules and Activity

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 encouraged 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.

Acclimatization of Workers

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 the loss of acclimatization is substantial, several days at work will be needed before heat tolerance is fully restored.

Drinking Sufficient Quantities of Fluids

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 sweat they produce or 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 10° to 15° (50 to 59° 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, impeding 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 29° C, (85° F) and 2) employees wearing chemical protective clothing (including paper coveralls) working in ambient temperatures exceeding 21° C (70° F). The temperature differential is related to the reduced ability of a person to maintain a core temperature of $\pm 37^{\circ}$ C (98.6° 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 39°C (102.2° 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 exceeds 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 for heat stress monitoring. Failure to use either one could place workers at risk of heat-related disorders.

Phase 1 - Determination of the Initial Work - Rest Regimen

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:

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

-OR-

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

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°F (32.2° C) or above	After each 45 minutes of work	After each 15 minutes of work
87.5°-90° F (30.8°-32.2° C)	After each 60 minutes of work	After each 30 minutes of work
82.5°-87.5° F (28.1°-30.8° C)	After each 90 minutes of work	After each 60 minutes of work
77.5°-82.5° F (25.3°-28.1° C)	After each 120 minutes of work	After each 90 minutes of work
72.5°-77.5° F (22.5°-25.3° 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° C/86° F	26.7° C/80.1° F	25° C/77° F
75% Work-25% Rest Each Hour	30.6° C/87.1° F	28° C/82.4° F	25.9° C/78.6° F
50% Work-50% Rest Each Hour	31.4° C/88.5° F	29.4° C/85.0° F	27.9° C/82.2° F
25% Work-75 % Rest Each Hour	32.2° C/90.0° F	31.1° C/88.0° F	30.0° C/86.0° F

The table reads as follows:

Light, continuous work is possible at any WBGT reading up to 30° C (86° F) but above that limit work breaks

are needed to recover from the heat; light work at temperatures of between 30.0 and 30.6°C (86 to 87°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°C (42.8 to 51.8°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

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 method 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 and 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: plasticity; dry strength; tumb penetration; drying test; and strength tests using a pocket penetrometer or hand-operated shear vane.

Sloping and Benching

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 one-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.

Support Systems, Shield Systems, and Other Protective Devices

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.

Installation and Removal of Support

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.

Shield Systems

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 _____

		<u>Yes</u>	<u>No</u>	<u>N/A</u>
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 7 1/2 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? | _____ | _____ | _____ |

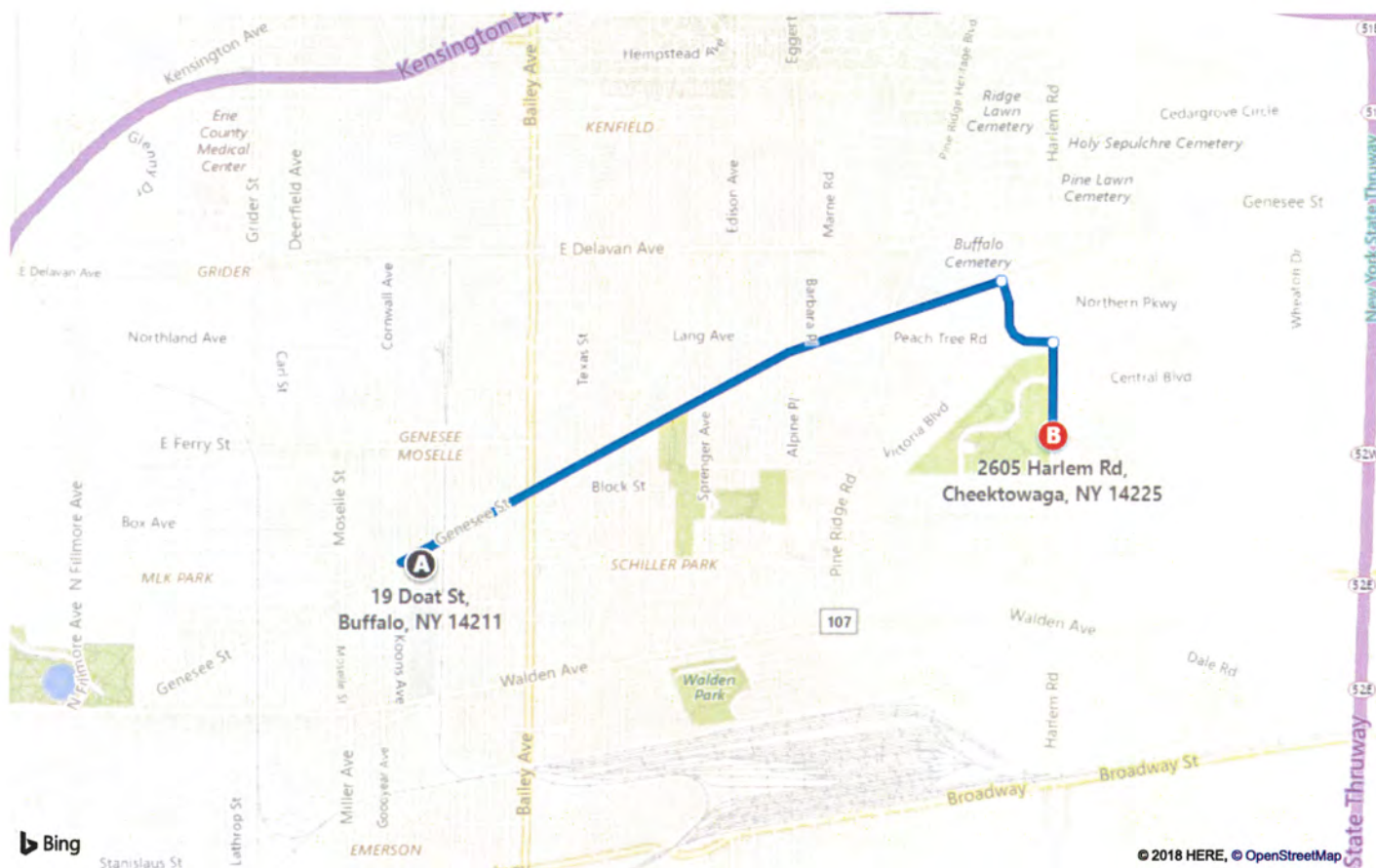
Notes: _____

CPs Name (Print)

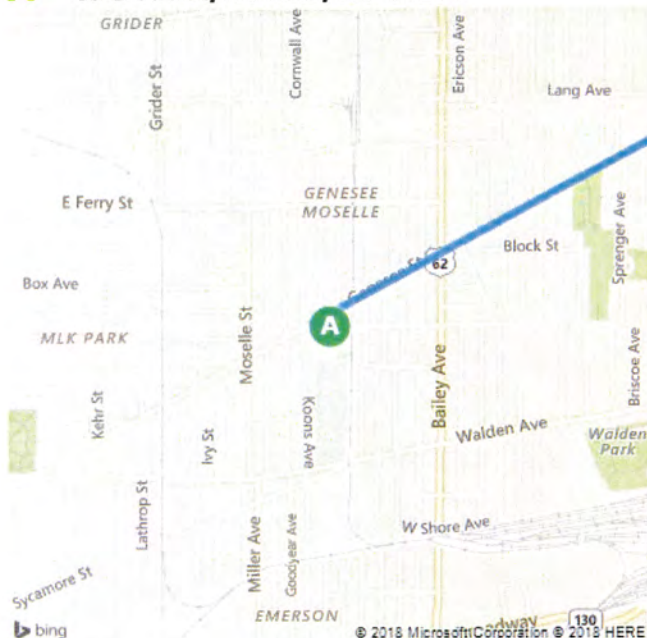
Signature

ATTACHMENT 4

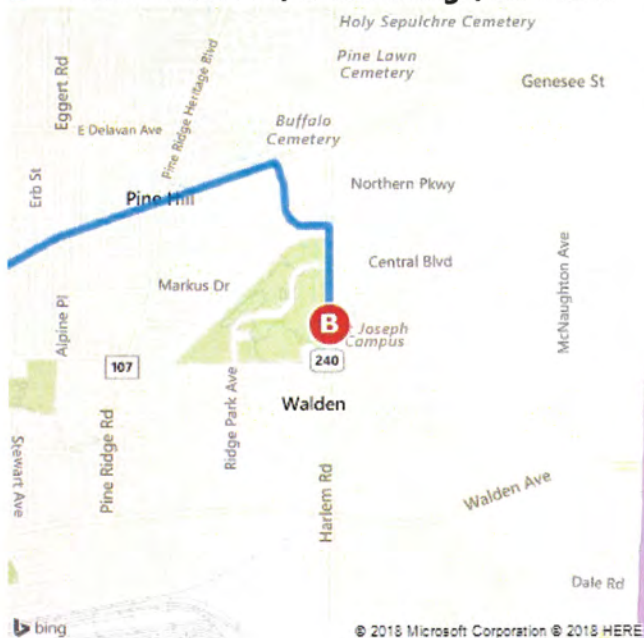
Map to Hospital



A 19 Doat St, Buffalo, NY 14211



B 2605 Harlem Rd, Cheektowaga, NY 14225



These directions are subject to the Microsoft® Service Agreement and are for informational purposes only. No guarantee is made regarding their completeness or accuracy. Construction projects, traffic, or other events may cause actual conditions to differ from these results. Map and traffic data © 2018 HERE™.



- A

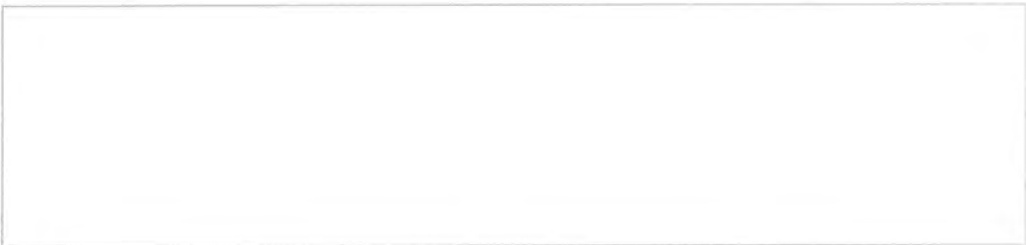
19 Doat St, Buffalo, NY 14211
- B

2605 Harlem Rd, Cheektowaga, NY 14225

10 min , 2.5 mi

Moderate traffic

Via Genesee St, George Urban Blvd · Local roads



A

19 Doat St, Buffalo, NY 14211

↑	1.	Depart Doat St toward Rustic Pl	285 ft
↗	2.	Turn right onto Genesee St Pass McDonald's in 0.4 mi	1.9 mi
↗	3.	Turn right onto George Urban Blvd / CR-316	0.3 mi
↗	4.	Turn right onto RT-240 / Harlem Rd 7-Eleven on the corner	0.3 mi
	5.	Arrive at RT-240 / Harlem Rd The last intersection is Southern Pkwy	

B

2605 Harlem Rd, Cheektowaga, NY 14225

ATTACHMENT 5

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 $150 \text{ mcg}/\text{m}^3$ above the upwind level and provided that no visible dust is migrating from the work area.

2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than $150 \text{ mcg}/\text{m}^3$ above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within $150 \text{ mcg}/\text{m}^3$ of the upwind level and in preventing visible dust migration.

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

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 µg/m³);
- (c) Precision (2-sigma) at constant temperature: +/- 10 µg/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 µm, 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 µg/m³ (15 minutes average). While conservative,

this short-term 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.

APPENDIX B

QA/QC PLAN

QUALITY ASSURANCE/QUALITY CONTROL PLAN

THE CROSSROADS AT GENESEE
19 DOAT STREET AND 9 LANSDALE PLACE
BUFFALO, NEW YORK 14211
NYSDEC SITE # C915338

Prepared for:

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June 2019

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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

REMEDIAL IMPORTED FILL SAMPLING

<u>PARAMETER</u>	<u>ANALYTICAL METHOD</u>
Part 375 VOCs	8260
Part 375 SVOCs	8270
Part 375 Metals	6010/7470/7471
Part 375 PCBs	8082
Part 375 Pesticides	8081

Holding Times: 8260-14 days and 8270, 8081, and 8082-7 days

See Table 2 for Analyte List

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 contaminants 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 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. These data help 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 represent 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 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 enough 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 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 in control. 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. 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 PEI 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. 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.

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

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

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

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-Methylnaphthalene
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

QA/QC Plan

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

**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 EPA 537

Volatiles-Air - TO-15

Acetone
Benzene
Carbon disulfide
Chloromethane
Dichlorodifluoromethane
Ethanol
Ethylbenzene
Ethyl Acetate
4-Ethyltoluene
Heptane
Hexane
Isopropyl Alcohol
Methylene chloride
Methyl ethyl ketone
Propylene
1,1,1-Trichloroethane
1,2,4-Trimethylbenzene
1,3,5-Trimethylbenzene
2,2,4-Trimethylpentane
Tertiary Butyl Alcohol
Tetrachloroethylene
Toluene
Trichloroethylene
Trichlorofluoromethane
m,p-Xylene
o-Xylene
Xylenes (total)
Acetone
Benzene
Carbon disulfide
Chloromethane
Dichlorodifluoromethane
Ethanol
Ethylbenzene
Ethyl Acetate
4-Ethyltoluene
Heptane
Hexane
Isopropyl Alcohol
Methylene
Methyl ethyl ketone
Propylene
1,1,1-Trichloroethane

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
	Perfluorooctanesulfonic 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/PFTTrDA	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	Perfluorooctanesulfonamide	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

APPENDIX C

FIELD SAMPLING PLAN

FIELD SAMPLING PLAN

THE CROSSROADS AT GENESEE
19 DOAT STREET AND 9 LANSDALE PLACE
BUFFALO, NEW YORK 14211
NYSDEC SITE # C915338

Prepared for:

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December 2018

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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.

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. When using dedicated sampling equipment, decontamination can be minimized.
6. Label each sample container with the appropriate sample identification and place sample 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 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 after rig is in a downwind position and continuous air monitoring and VOC screening activities have commenced:

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.
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.
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.

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

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 following is a step-by-step method for the open-hole method of 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 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 rates. 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. Utilize dedicated, new polyethylene discharge and intake tubing (preferably ½ inch diameter HDPE and can't use LDPE for emerging contaminants) for each well.
7. Purge using bailers until the required volume is removed. If the well purges to dryness and recharges within 15 minutes, water can be removed as it recharges. If the well purges to dryness and is greater than 15 minutes, purging is terminated.
8. Purge until at least 1 volume of water is removed, but 3-5 volumes of water is preferred if recharge is sufficiently fast.
9. 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 enough 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 bailers into 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. Collect separate sample into a 120 milliliter (mL) plastic container to measure pH, conductivity, turbidity, and temperature in the field.
7. 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

Construct a sampling probe using a 1/4-inch Swagelok union connected to a short length of 1/4-inch diameter stainless steel tubing, as necessary. Select a length of stainless-steel tubing (as needed) so that the bottom of the probe extends approximately 2 inches below the bottom of the slab; however, tubing should be extended into the subsurface ensuring no clogging. When not using stainless-steel sampling probe, simply extend approximately 2 feet of Teflon or polyethylene tubing through the sample collection point into the subsurface; again, ensuring no clogging. Plug up the other end of the tubing with a small piece of modeling clay to seal the system and prevent air flow in or out of the sub slab while the probe and tubing sits idle.

8.1.3 Installation of the Sampling Probe

Drill through and about 1 inch below the concrete slab using a portable coring drill and 2-inch diameter core drill bit. Record the thickness of the concrete slab. When installing the probe, first put a few inches of drillers sand at the bottom of the cored hole so that the grout will sit on top of the sand and not go all the way to the bottom of the hole and plug the probe inlet.

Install the probe into the hole, with the tubing already attached. Use the tubing to hold the union at the correct height in the hole (just below the top). Mix hydraulic cement and water in a ziplock bag. Cut a hole in one corner of the bag and use it like a pastry chef's bag to grout the probe in place. Use a small rod to push/tap in the grout. Leave the top 1-inch or so of the hole unfilled, being sure that the threaded top of the union (where the tubing attaches) is above the cement. Allow the probe to sit in place for at least one hour to allow the cement to set. If possible, install the probe one day and allow it to sit overnight.

8.1.4 Helium Tracer Gas Testing

Place a 2-quart (or similar size) bucket over the sample probe after threading the Teflon 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 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.

8.1.5 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 24-hour flow controller, and particulate filter to the Summa canister. Attach the sample tube to the Summa canister using a 1/4-inch Swagelok nut with appropriate ferrules, to the end of the flow controller/particulate filter assembly.

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 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. Ship the samples, with COCs, overnight, to the selected laboratory for standard TO-15 analysis.

8.1.6 Removing the Sample Probe

If the probe is to be reused, remove the 1/4-inch tubing and place a Swagelok cap on the exposed part of the union. The cap should be flush or below the level of the floor. If the probe is not to be reused, remove the probe by drilling around the probe with a hammer drill and a 1/4 or 3/8-inch drill bit until loose. Keep the tubing attached to the implant to aid in its removal. Fill the core hole with hydraulic cement.

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-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 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, 2009 would be assigned the sample number in the format YYYYMMDD-FD-1 = 20090222-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 Log Book - 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 D

CITIZEN PARTICIPATION PLAN

CITIZEN PARTICIPATION PLAN

THE CROSSROADS AT GENESEE
19 DOAT STREET AND 9 LANSDALE PLACE
BUFFALO, NEW YORK 14211
NYSDEC SITE # C915338

Prepared for:

The Crossroads at Genesee LLC
1055 Saw Mill River Road, Suite 204
Ardsley, New York 10502

Prepared by:



1270 Niagara Street
Buffalo, New York 14213

December 2018

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ATTACHMENTS

- A. Project Contacts and Locations of Reports and Information
- B. Site Contact List
- C. BCP Process Flowchart

* * * * *

Note: The information presented in this Citizen Participation Plan was current as of the date of its approval by the New York State Department of Environmental Conservation. Portions of this Citizen Participation Plan may be revised during the site's investigation and cleanup process.

1.0 What is New York's Brownfield Cleanup Program?

New York's Brownfield Cleanup Program (BCP) works with private developers to encourage the voluntary cleanup of contaminated properties known as "brownfields" so that they can be reused and developed. These uses include recreation, housing, and business.

A *brownfield* is any real property that is difficult to reuse or redevelop because of the presence or potential presence of contamination. A brownfield typically is a former industrial or commercial property where operations may have resulted in environmental contamination. A brownfield can pose environmental, legal, and financial burdens on a community. If a brownfield is not addressed, it can reduce property values in the area and affect economic development of nearby properties.

The BCP is administered by the New York State Department of Environmental Conservation (NYSDEC) which oversees Applicants that conduct brownfield site investigation and cleanup activities. An Applicant is a person who has requested to participate in the BCP and has been accepted by NYSDEC. The BCP contains investigation and cleanup requirements, ensuring that cleanups protect public health and the environment. When NYSDEC certifies that these requirements have been met, the property can be reused or redeveloped for the intended use.

For more information about the BCP, go online at: <http://www.dec.ny.gov/chemical/8450.html>.

2.0 Citizen Participation Activities

Why NYSDEC?

Involves the Public and Why It Is Important

NYSDEC involves the public to improve the process of investigating and cleaning up contaminated sites, and to enable citizens to participate more fully in decisions that affect their health, environment, and social wellbeing. NYSDEC provides opportunities for citizen involvement and encourages early two-way communication with citizens before decision makers form or adopt final positions.

Involving citizens affected and interest in site investigation and cleanup programs is important for many reasons. These include:

- Promoting the development of timely, effective site investigation and cleanup programs that protect public health and the environment
- Improving public access to, and understanding of, issues and information related to a site and that site's investigation and cleanup process
- Providing citizens with early and continuing opportunities to participate in NYSDEC's site investigation and cleanup process
- Ensuring that NYSDEC makes site investigation and cleanup decisions that benefit from input that reflects the interests and perspectives found within the affected community
- Encouraging dialogue to promote the exchange of information among the affected/interested public, State agencies, and other interested parties that strengthens trust among the parties, increases understanding of site and community issues and concerns, and improves decision making.

This Citizen Participation (CP) Plan provides information about how NYSDEC will inform and involve the public during the investigation and cleanup of the site identified above. The public information and involvement program will be carried out with assistance, as appropriate, from the Applicant.

Project Contacts

Attachment A identifies NYSDEC project contact(s) to which the public should address questions or request information about the site's investigation and cleanup program. The public's suggestions about this CP Plan and the CP program for the site are always welcome. Interested people are encouraged to share their ideas and suggestions with the project contacts at any time.

Locations of Reports and Information

The locations of the reports and information related to the site's investigation and cleanup program also are identified in **Attachment A**. These locations provide convenient access to important project documents for public review and comment. Some documents may be placed on the NYSDEC web site. If this occurs, NYSDEC will inform the public in fact sheets distributed about the site and by other means, as appropriate.

Site Contact List

Attachment B contains the site contact list. This list has been developed to keep the community informed about, and involved in, the site's investigation and cleanup process. The site contact list will be used periodically to distribute fact sheets that provide updates about the status of the project. These will include notifications of upcoming activities at the site (such as fieldwork), as well as availability of project documents and announcements about public comment periods. The site contact list includes, at a minimum:

- chief executive officer and planning board chairperson of each county, city, town and village in which the site is located;
- residents, owners, and occupants of the site and properties adjacent to the site;
- the public water supplier which services the area in which the site is located;
- any person who has requested to be placed on the site contact list;
- the administrator of any school or day care facility located on or near the site for purposes of posting and/or dissemination of information at the facility;
- Location (s) of reports and information.

The site contact list will be reviewed periodically and updated as appropriate. Individuals and organizations will be added to the site contact list upon request. Such requests should be submitted to the NYSDEC project contact(s) identified in **Attachment A**. Other additions to the site contact list may be made at the discretion of the NYSDEC project manager, in consultation with other NYSDEC staff as appropriate.

CF Activities

The table at the end of this section identifies the CP activities, at a minimum, that have been and will be conducted during the site's investigation and cleanup program. The flowchart in **Attachment C** shows how these CP activities integrate with the site investigation and cleanup process. The public is informed about these CP activities through fact sheets and notices distributed

at significant points during the program. Elements of the investigation and cleanup process that match up with the CP activities are explained briefly in Section 5.

- **Notices and fact sheets** help the interested and affected public to understand contamination issues related to a site, and the nature and progress of efforts to investigate and clean up a site.
- **Public forums, comment periods and contact with project managers** provide opportunities for the public to contribute information, opinions and perspectives that have potential to influence decisions about a site's investigation and cleanup.

The public is encouraged to contact project staff at any time during the site's investigation and cleanup process with questions, comments, or requests for information. This CP Plan maybe revised due to changes in major issues of public concern identified in Section 3 or in the nature and scope of investigation and cleanup activities.

Technical Assistance Grant

NYSDEC must determine if the site poses a significant threat to public health or the environment. This determination generally is made using information developed during the investigation of the site, as described in Section 5.

If the site is determined to be a significant threat, a qualifying community group may apply for a Technical Assistance Grant (TAG). The purpose of a TAG is to provide funds to the qualifying group to obtain independent technical assistance. This assistance helps the TAG recipient to interpret and understand existing environmental information about the nature and extent of contamination related to the site and the development/implementation of a remedy.

An eligible community group must certify that its membership represents the interests of the community affected by the site, and that its members' health, economic well-being or enjoyment of the environment may be affected by a release or threatened release of contamination at the site. For more information about TAGs, go online at <http://www.dec.ny.gov/regulations/2590.html>

Note: The table identifying the citizen participation activities related to the site's investigation and cleanup program follows on the next page:

CITIZEN PARTICIPATION ACTIVITIES	TIMING OF CP ACTIVITIES
Application Process	
<ul style="list-style-type: none"> • Prepare site contact list • Establish document repositories • Publish notice in Environmental Notice Bulletin (ENB) announcing receipt of application and 30-day public comment period • Publish above ENB content in local newspaper • Mail above ENB content to site contact list • Conduct 30-day public comment period 	<p>At time of preparation of application to participate in the BCP.</p> <p>When NYSDEC determines that BCP application is complete. The 30-day public comment period begins on date of publication of notice in ENB. End date of public comment period is as stated in ENB notice. Therefore, ENB notice, newspaper notice, and notice to the site contact list should be provided to the public at the same time.</p>
After Execution of Brownfield Site Cleanup Agreement	
<ul style="list-style-type: none"> • Prepare Citizen Participation (CP) Plan 	Before start of Remedial Investigation
Before NYSDEC Approves RIWP	
<ul style="list-style-type: none"> • Distribute fact sheet to site contact list about proposed RI activities and announcing 30-day public comment period about draft RI Work Plan • Conduct 30-day public comment period 	Before NYSDEC approves RI Work Plan. If RI Work Plan is submitted with application, public comment periods will be combined, and public notice will include fact sheet. Thirty-day public comment period begins/ends as per dates identified in fact sheet.
After Applicant Completes RI	
<ul style="list-style-type: none"> • Distribute fact sheet to site contact list that describes RI results 	Before NYSDEC approves RI Report
Before NYSDEC Approves RAWP	
<ul style="list-style-type: none"> • Distribute fact sheet to site contact list about proposed RWP and announcing 45-day public comment period • Public meeting by NYSDEC about proposed RWP (if requested by affected community or at discretion of NYSDEC project manager) • Conduct 45-day public comment period 	Before NYSDEC approves RWP. Forty-five-day public comment period begins/ends as per dates identified in fact sheet. Public meeting would be held within the 45-day public comment period.
Before Applicant Starts Cleanup Action	
<ul style="list-style-type: none"> • Distribute fact sheet to site contact list that describes upcoming cleanup action 	Before the start of cleanup action.
After Applicant Completes Cleanup Action	
<ul style="list-style-type: none"> • Distribute fact sheet to site contact list that announces that cleanup action has been completed and that summarizes the Final Engineering Report • Distribute fact sheet to site contact list announcing issuance of Certificate of Completion (COC) 	At the time NYSDEC approves Final Engineering Report. These two fact sheets are combined if possible if there is not a delay in issuing the COC.

3.0 Major Issues of Public Concern

This section of the CP Plan identifies major issues of public concern as they relate to the site. Additional major issues of public concern may be identified during the site's remedial process.

At this juncture the public has not identified major concerns with the project. In the event major concerns are expressed, future communication addressing those concerns will be issued to stakeholders.

4.0 Site Information

Note: please refer to the BCP Application and RIWP (and corresponding appendices) for more detailed information on the Site. Below is a summary of Site description, future use of Site, historical use of Site, and Site environmental history.

Site Description

The property is located on the east side of Buffalo northeast of the downtown area approximately 4 miles east of Lake Erie and a quarter mile west of State Route 62. The property is approximately 250 feet east of the intersection of Genesee and Doat Street. The property is in an En-Zone. The main site features include an L-shaped, four-story, 91,000 square-foot brick industrial building with the remainder of the site covered with a gravel/asphalt lot. The building takes up most of the south and western portion of the property with the gravel and asphalt lot covering the north and eastern sections. Currently multiple storage containers, tire piles, and vehicle storage areas exist on the eastern side of the property associated with the former tire sales/automotive repair shop. The property is zoned D-C, flex-commercial, by the City of Buffalo green code and was formerly zoned M-1.

Future Use of the Site

The proposed "The Crossroads at Genesee Apartments" will be led by Regan Development teamed with Matt Urban Human Services Center of W.N.Y. and Jericho Road Community Health Center. Redevelopment on the property is planned to be a new mixed-use; approximate 70-unit, affordable apartment building and health care facility. A mix of one, two, and three-bedroom apartments and 1,600 SF of residential community support space, 400 SF for Matt Urban Human Services Center offices are planned. Also, an 8,100 SF, one-story structure will be constructed to provide a new full-service health center operated by Jericho Road.

History of Site Use

Industrial and manufacturing uses have occurred on the properties including textile manufacturing and dyeing in the early 1900's when the property was owned by the Monarch Knitting Company (1912) and the Butterworth Dyeing and Bleach Works (1925). In 1929 the property was purchased by the Spencer Lens Company to produce optical lenses. According to historical maps Bond Clothing Store occupied the property from 1946 to approximately 1950 for clothing manufacturing and retail. From the 1950's to the early 2000's, the property was occupied by the Royal Bedding Company and other small retail tenants. In 2009, the site was associated with automotive repair and tire sales and equipment and material associated with the automotive uses remains.

Site Environmental History

The past investigations on the property include:

1. *Phase I Environmental Site Assessment for 19 Doat Street and 9 Lansdale Street Properties Buffalo, NY* completed in 2017
2. *Phase II Environmental Site Assessment for 19 Doat Street and 9 Lansdale Street Properties Buffalo, NY* completed in 2018
3. *Supplemental Phase II ESA – 19 Doat and 9 Lansdale Street Properties* complete in 2018.

The Phase I has identified the following RECs on the property.

- Historic use of portions of the property for textile manufacturing, textile dyeing and bleaching, optical glass and instrument manufacturing, and vehicle and tire repair represent uses that typically create environmental impairment.
- Records indicate at least four different USTs were associated with the property. One permit record suggests a history of leaks from one of the UST. There were no spill reports or documentation of removal of any of these USTs.
- Several drums and containers of unknown content were observed within the basement of the building and outside on the southern and eastern portions of the property. Please note the property transfer agreement includes a stipulation that the current owner will remove contents and leave the facility “broom clean”.
- Two gasoline service stations were historically located on adjacent northern property across Doat Street.

The Phase II ESAs on the properties illustrate the likely cause of environmental impairment to be associated with bulk petroleum storage, chemical use associated with textile dyeing, and dry cleaner solvents. The primary contaminants associated with petroleum contamination and dry cleaner solvents are noted as Volatile Organic Compounds (VOCs), including BTEX, and chlorinated solvents, respectively. Polyaromatic Hydrocarbons (PAHs) and other specific Semi Volatile Organic Compounds (SVOCs) can also be associated with petroleum in addition to the known areas of urban backfill. Results also found that metals, PCBs, VOCs, and/or SVOCs were detected in all but two of the soil samples taken. Pesticide exceedances were detected above unrestricted SCOs across the parcels but below residential SCOs. All but one surface sample show SVOCs mainly PAHs exceeding restricted residential SCOs. Various surface samples detected Restricted residential SCO exceedances of metals, pesticides, and/or SVOCs across both parcels.

5.0 Remedial Cleanup Process

Application

The Applicant is applying for acceptance into New York’s Brownfield Cleanup Program as a Volunteer. This means that the Applicant is not responsible for the disposal or discharge of the contaminants or whose ownership or operation of the site took place after the discharge or disposal of contaminants. The Volunteer must fully characterize the nature and extent of contamination onsite, and must conduct a qualitative exposure assessment, a process that characterizes the actual or potential exposures of people, fish and wildlife to contaminants on the site and to contamination that has migrated from the site.

The Applicant in its Application proposes that the site will be used for restricted purposes. To achieve this goal, the Applicant will conduct investigation and/or cleanup activities at the site with

oversight provided by NYSDEC. The Brownfield Cleanup Agreement to be executed by NYSDEC and the Applicant sets forth the responsibilities of each party in conducting these activities at the site.

Investigation

The Applicant will complete a RI as part of the BCP. NYSDEC will use the information in the investigation report to determine if the site poses a significant threat to public health or the environment. If the site is a significant threat, it must be cleaned up using a remedy selected by NYSDEC from an analysis of alternatives prepared by the Applicant and approved by NYSDEC. If the site does not pose a significant threat, the Applicant may select the remedy from the approved analysis of alternatives.

Remedy Selection

The Applicant will recommend in its application that action needs to be taken to address site contamination. Pending approval of the investigation report by the NYSDEC, the Applicant has proposed a remediation of impacted soil to meet at least restricted residential use.

The RI results will help develop a remedial approach which may include an IRM. When the Applicant submits the proposed Remedial (IRM) Work Plan for approval, NYSDEC will announce the availability of the proposed plan for public review during a 45-day public comment period.

Cleanup Action

NYSDEC will consider public comments and revise the draft Remedial (IRM) Work Plan if necessary, before approving the proposed remedy. The New York State Department of Health (NYSDOH) must concur with the proposed remedy. After approval, the proposed remedy becomes the selected remedy.

The Applicant may then design and perform the cleanup action to address the site contamination. NYSDEC and NYSDOH will oversee the activities. When the Applicant completes cleanup activities, it will prepare a final engineering report that certifies that cleanup requirements have been achieved or will be achieved within a specific time frame. NYSDEC will review the report to be certain that the cleanup is protective of public health and the environment for the intended use of the site.

Certificate of Completion

When NYSDEC is satisfied that cleanup requirements have been achieved or will be achieved for the site, it will approve the final engineering report. NYSDEC then will issue a Certificate of Completion (COC) to the Applicant. The COC states that cleanup goals have been achieved and relieves the Applicant from future liability for site-related contamination, subject to certain conditions. The Applicant would be eligible to redevelop the site after it receives a COC.

Site Management

Site management is the last phase of the site cleanup program. This phase begins when the COC is issued. Site management may be conducted by the Applicant under NYSDEC oversight, if contamination will remain in place. Site management incorporates any institutional and engineering controls required to ensure that the remedy implemented for the site remains protective of public health and the environment. All significant activities are detailed in a Site Management Plan.

An institutional control is a non-physical restriction on use of the site, such as a deed restriction that would prevent or restrict certain uses of the property. An institutional control may be used when the cleanup action leaves some contamination that makes the site suitable for some, but not all uses.

An engineering control is a physical barrier or method to manage contamination. Examples include: caps, covers, barriers, fences, and treatment of water supplies.

Site management also may include the operation and maintenance of a component of the remedy, such as a system that is pumping and treating groundwater. Site management continues until NYSDEC determines that it is no longer needed.

Attachment A

Project Contacts and Locations of Reports and Information

For information about the site's investigation and cleanup program, the public may contact any of the following project staff:

New York State Department of Environmental Conservation (NYSDEC):

Eugene Melnyk, PE
Remediation Engineer
270 Michigan Avenue
Buffalo, New York 14203
716-851-7220
Eugene.melnyk@dec.ny.gov

Kristen Davidson
Citizen Participation Specialist Division of Public Affairs
270 Michigan Avenue
Buffalo, New York 14203
(716)-851-7220
Kristen.Davidson@dec.ny.gov

New York State Department of Health (NYSDOH):

Sarita Wagh
NYSDOH-BEEI
Corning Tower; Room 1787
Albany, New York 12237
518-402-7860
BEEI@health.ny.gov

Public Repository for Reports and Information:

Frank E. Merriweather Jr. Library
1324 Jefferson Av
Buffalo, NY 14208
Phone: 716-883-4418

Attachment B

Site Contact List

1. THE CHIEF EXECUTIVE OFFICER AND PLANNING BOARD CHAIRPERSON OF EACH COUNTY, CITY, TOWN AND VILLAGE IN WHICH THE PROPERTY IS LOCATED.

Erie County

County Executive - Mark C. Poloncarz
Edward A. Rath County Office Building
95 Franklin Street, 16th Floor
Buffalo, New York 14202
Phone: (716) 858-8500

City of Buffalo

Mayor – Byron W. Brown
201 City Hall,
Buffalo, NY 14202
Mayor's Office Telephone: 716-851-4841

Planning Board Chairman - James K. Morrell
901 City of Hall
Buffalo NY 14202
Phone: 716-851-5082

- 2 RESIDENTS, OWNERS, AND OCCUPANTS OF THE PROPERTY AND PROPERTIES ADJACENT TO THE PROPERTY.

Property Owners

Khalil, Mohamud (101.55-5-21, 101.55-9-8)
411 Walden Avenue
Buffalo, NY 14211

Adjacent Property Owners

City of Buffalo (101.55-6-41, 101.55-6-40, 101.55-6-39, 101.55-6-38, 101.55-6-36, 101.55-6-37, 101.55-6-32, 101.55-5-12, 101.55-5-11, 101.48-2-13, 101.48-2-12) – Owner, Vacant
65 Niagara Square
Buffalo, NY 14202

Ahmed, Ishtiaq (101.48-2-2) – Owner, Vacant
29 Adams Avenue
Staten Island, NY 10306

Ayash, Ahmed (101.48-2-1) – Owner/Occupant
58 Montana Ave
Buffalo, NY 14211

The Evangelist Lutheran Church (101.55-5-5, 101.55-5-4) – Owner
3 Doat Street

Buffalo, NY 14211

Occupant: Jericho Road Family Practice (101.55-5-5)

11 Doat Street
Buffalo, NY 14211

Barksdale Holdings LLC (101.55-5-6) – Owner, Vacant

1173-A Second Ave, Suite 229
New York, NY 10065

Dechantell, Lloyd (101.55-5-7, 101.55-5-9) – Owner, Vacant

33 Burke Dr
Cheektowaga, NY 14215

Moore, George Jr. (101.55-8) – Owner/Occupant

PO Box 448
Buffalo, NY 14212

Hossain, Abul (101.55-5-10) – Owner/Occupant

499 Ocean Parkway, Apt 25
Brooklyn, NY 11218

Huff, Griel Jr. (101.55-6-33) – Owner/Occupant

320 Martha Ave
Buffalo, NY 14215

River, Ruth (101.55-6-34) – Owner/Occupant

23 Landsdale Pl.
Buffalo, NY 14211

Bagwell, Jacqueline (101.55-6-35) – Owner, Vacant

25 Lansdale Pl.
Buffalo, NY 14211

The Jewish Federation of Greater Buffalo (101.56-9-9.1, 101.56-9-9.2) – Owner/Occupant (Cemetery)

2640 North Forest Rd
Getzville, NY 14068

Waters, William Jr. (101.56-9-7) – Owner/Occupant

7 Windcrest Dr.
Cheektowaga, NY 14225

3 LOCAL NEWS MEDIA FROM WHICH THE COMMUNITY TYPICALLY OBTAINS INFORMATION.

News Papers

The Buffalo News

One News Plaza

PO Box 100
Buffalo, NY 14240
Phone: 716-849-4051

TV

WGRZ-TV 2NBC 259 Delaware Ave, Buffalo, NY 14202. 716-849-2222.
WIVB-TV 4, WNLO-TV. 2077 Elmwood Avenue, Buffalo, NY 14207. 716-874-4410
WKBW-TV 7 Broadcast Plaza, Buffalo, NY 14202. 716-845-6100. Fax: 716-842-1855.
WNED-TV 17 PBS. 140 Lower Terrace Street, Buffalo, NY 14202. 716-845-7000
YNN Buffalo, 355 Chicago St., Buffalo, NY 14204 716) 558-8999 Option 2

- 4 THE PUBLIC WATER SUPPLIER WHICH SERVICES THE AREA IN WHICH THE PROPERTY IS LOCATED

Public Water Supplier:

Buffalo Water Department
120 Delaware Ave,
Buffalo, New York 14202

County:

Erie County Water Department
295 Main St Rm 350
Buffalo, New York, 14202

- 5 ANY PERSON WHO HAS REQUESTED TO BE PLACED ON THE CONTACT LIST.

None

- 6 THE ADMINISTRATOR OF ANY SCHOOL OR DAY CARE FACILITY LOCATED ON OR NEAR THE PROPERTY.

There are no day care or school facilities on the property. The following are located near the property:

Universal School
1957 Genesee St
Buffalo, NY 14211
Administrator: Myles Carter

PS 92 B.U.I.L.D. Community School
340 Fougerson St
Buffalo, NY 14211
Administrator: Dr. Kriner Cash

Harvey Austin Elementary School
1405 Sycamore St
Buffalo, NY 14211

Administrator: Dr. Kriner Cash

7 THE LOCATION OF A DOCUMENT REPOSITORY FOR THE PROJECT (E.G., LOCAL LIBRARY).

Frank E. Merriweather Jr. Library

1324 Jefferson Av

Buffalo, NY 14208

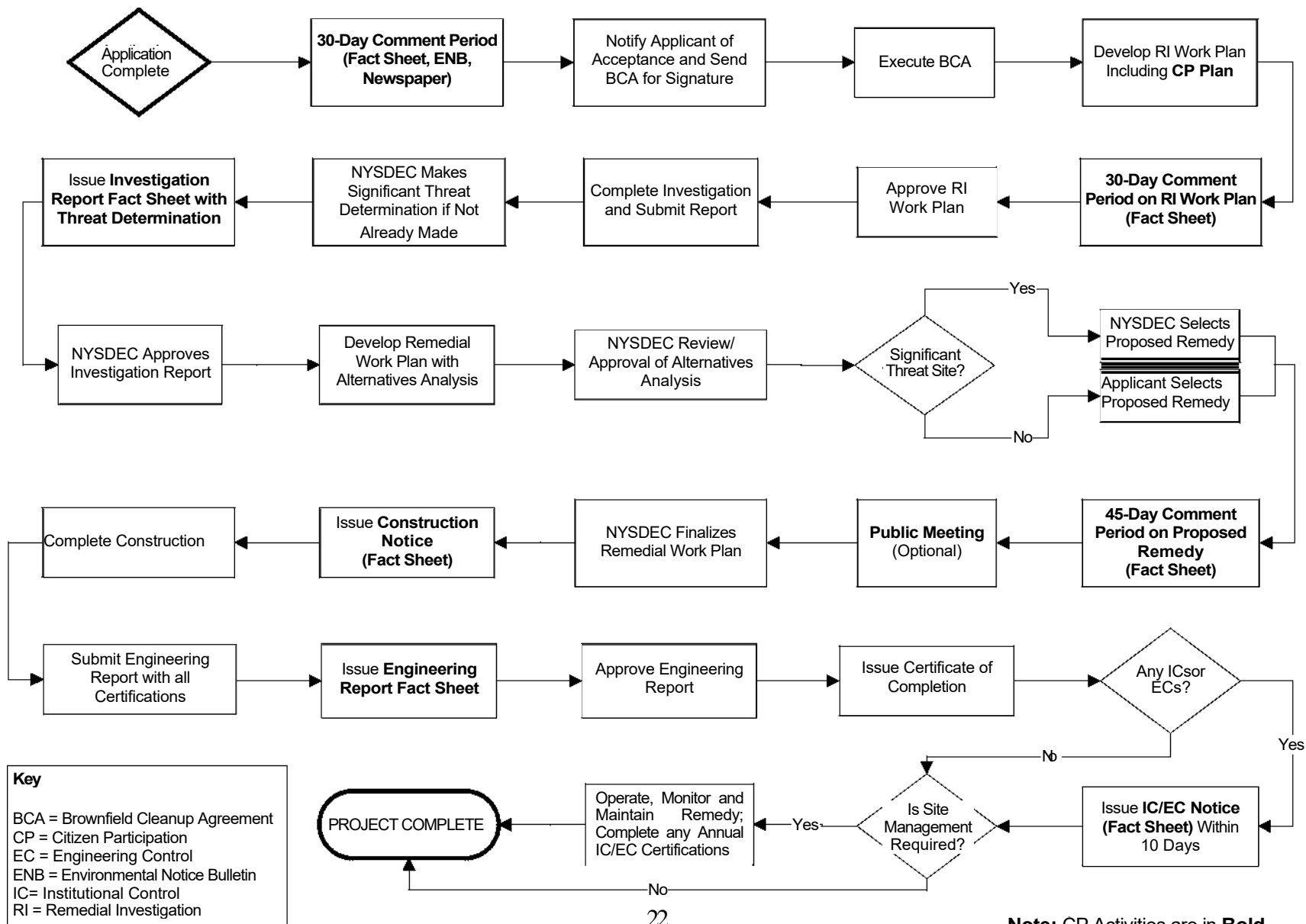
Phone: 716-883-4418

8 COMMUNITY BOARD IN A CITY WITH A POPULATION OF ONE MILLION OR MORE

Not Applicable.

Attachment C

BCP Process Flowchart



APPENDIX E

DER-10 IMPORTED FILL REQUIRMENTS

site-specific exemption for one or more of the requirements set forth in this section, based upon site-specific conditions, such as:

- i. use and redevelopment of the site;
- ii. depth of the placement of the backfill material relative to the surface or subsurface structures;
- iii. depth of the placement of the backfill material relative to groundwater;
- iv. volume of backfill material;
- v. potential for odor from the backfill material;
- vi. presence of historic fill in the vicinity of the site;
- vii. DEC-issued beneficial use determination, pursuant to 6 NYCRR Part 360; or
- viii. background levels of contamination in areas surrounding the site.

9. For remedial programs pursuant to the BCP, DEC can only provide a site-specific exemption for backfill consistent with the provisions of paragraph 8 above as follows:

- i. for Track 2 and Track 3 cleanups, for soils greater than 15 feet below ground surface; or
- ii. for Track 4 cleanups, for soils beneath buildings, pavement and other improvements or for soils beneath the soil cover system or soil cap over exposed surface soils.

10. **Sampling fill imported to or exported from a site.** The remedial party will sample and analyze the fill being imported to the site in accordance with this subdivision and Table 5.4(e)10. Samples of the fill will be collected based on the soil quantity and type of constituents identified in the table and will be a combination of discrete and composite samples, handled as follows:

- i. for VOCs only, grab samples are allowed. These grab samples are one or more discrete samples taken from the fill, with the number as specified in the volatile column of Table 5.4(e)10 for the soil quantity in question, and analyzed for the VOCs identified in Appendix 5; or
- ii. for SVOCs, inorganics and PCBs/pesticides:
 - (1) one or more composite samples are collected from the volume of soil identified in Table 5.4(e)10 for analysis, with each composite from a different location in the fill volume;
 - (2) each composite is prepared by collecting discrete samples from 3 to 5 random locations from the volume of soil to be tested; and
 - (3) the discrete samples are mixed, and after mixing, a sample of the mixture is analyzed for the SVOCs, inorganic and PCBs/pesticide constituents identified in Appendix 5.

Table 5.4(e)10 Recommended Number of Soil Samples for Soil Imported To or Exported From a Site			
Contaminant	VOCs	SVOCs, Inorganics & PCBs/Pesticides	
Soil Quantity (cubic yards)	Discrete Samples	Composite	Discrete Samples/Composite
0-50	1	1	3-5 discrete samples from different locations in the fill being provided will comprise a composite sample for analysis
50-100	2	1	
100-200	3	1	
200-300	4	1	
300-400	4	2	
400-500	5	2	
500-800	6	2	
800-1000	7	2	
➤ 1000	Add an additional 2 VOC and 1 composite for each additional 1000 Cubic yards or consult with DER		

(f) Compliance for soil exported from a site for reuse. For soil that is being exported from a site to locations other than permitted disposal facilities, the handling requirements are set forth in this subdivision and in paragraph 5.4(e)4.

1. Levels of contamination must not exceed the lower of the groundwater and residential use levels as shown in Appendix 5, absent a beneficial use determination issued by DEC. DER will coordinate with the Division of Solid & Hazardous Materials (DSHM), prior to the start of the remedial action, relative to whether the exported soil can be used beneficially in accordance with 6 NYCRR 360-1. The sampling and analysis requirements are set forth in paragraph 5.4(e)10.

2. The number of required samples are specified in Table 5.4(e)10 and paragraph (e)10 above, which may be modified by the DER project manager based on various factors, including the location of the site receiving the soil.

(g) Compliance for the decommissioning of monitoring wells. All monitoring wells not required for site management should be decommissioned in accordance with paragraph (d)6 above prior to DER approval of the FER.

5.5 Underground Storage Tank Closure

(a) The first step for underground storage tank (UST) closure is the identification, removal, treatment, containment and/or stabilization of the contents to prevent contaminant exposure to receptors and to prevent further movement of contaminants through any pathway as set forth herein.

1. A health and safety plan for the site is developed, as described in section 1.9, by a qualified individual in accordance with subparagraph 1.5(a)3.i.

2. Underground tank closures not performed in accordance with this section will require a certification of the closure report by a professional engineer, as described in section 1.5.

Appendix 5

Allowable Constituent Levels for Imported Fill or Soil

Subdivision 5.4(e)

Source: This table is derived from soil cleanup objective (SCO) tables in 6 NYCRR 375. Table 375-6.8(a) is the source for unrestricted use and Table 375-6.8(b) is the source for restricted use.

Note: For constituents not included in this table, refer to the contaminant for supplemental soil cleanup objectives (SSCOs) in the Commissioner Policy on [Soil Cleanup Guidance](#). If an SSCO is not provided for a constituent, contact the DER PM to determine a site-specific level.

Constituent	Unrestricted Use	Residential Use	Restricted Residential Use	Commercial or Industrial Use	If Ecological Resources are Present
Metals					
Arsenic	13	16	16	16	13
Barium	350	350	400	400	433
Beryllium	7.2	14	47	47	10
Cadmium	2.5	2.5	4.3	7.5	4
Chromium, Hexavalent ¹	1 ³	19	19	19	1 ³
Chromium, Trivalent ¹	30	36	180	1500	41
Copper	50	270	270	270	50
Cyanide	27	27	27	27	NS
Lead	63	400	400	450	63
Manganese	1600	2000	2000	2000	1600
Mercury (total)	0.18	0.73	0.73	0.73	0.18
Nickel	30	130	130	130	30
Selenium	3.9	4	4	4	3.9
Silver	2	8.3	8.3	8.3	2
Zinc	109	2200	2480	2480	109
PCBs/Pesticides					
2,4,5-TP Acid (Silvex)	3.8	3.8	3.8	3.8	NS
4,4'-DDE	0.0033 ³	1.8	8.9	17	0.0033 ³
4,4'-DDT	0.0033 ³	1.7	7.9	47	0.0033 ³
4,4'-DDD	0.0033 ³	2.6	13	14	0.0033 ³
Aldrin	0.005	0.019	0.097	0.19	0.14
Alpha-BHC	0.02	0.02	0.02	0.02	0.04 ⁴
Beta-BHC	0.036	0.072	0.09	0.09	0.6
Chlordane (alpha)	0.094	0.91	2.9	2.9	1.3
Delta-BHC	0.04	0.25	0.25	0.25	0.04 ⁴
Dibenzofuran	7	14	59	210	NS
Dieldrin	0.005	0.039	0.1	0.1	0.006
Endosulfan I	2.4 ²	4.8	24	102	NS
Endosulfan II	2.4 ²	4.8	24	102	NS
Endosulfan sulfate	2.4 ²	4.8	24	200	NS
Endrin	0.014	0.06	0.06	0.06	0.014
Heptachlor	0.042	0.38	0.38	0.38	0.14
Lindane	0.1	0.1	0.1	0.1	6
Polychlorinated biphenyls	0.1	1	1	1	1

Constituent	Unrestricted Use	Residential Use	Restricted Residential Use	Commercial or Industrial Use	If Ecological Resources are Present
Semi-volatile Organic Compounds					
Acenaphthene	20	98	98	98	20
Acenaphthylene	100	100	100	107	NS
Anthracene	100	100	100	500	NS
Benzo(a)anthracene	1	1	1	1	NS
Benzo(a)pyrene	1	1	1	1	2.6
Benzo(b)fluoranthene	1	1	1	1.7	NS
Benzo(g,h,i)perylene	100	100	100	500	NS
Benzo(k)fluoranthene	0.8	1	1.7	1.7	NS
Chrysene	1	1	1	1	NS
Dibenz(a,h)anthracene	0.33 ³	0.33 ³	0.33 ³	0.56	NS
Fluoranthene	100	100	100	500	NS
Fluorene	30	100	100	386	30
Indeno(1,2,3-cd)pyrene	0.5	0.5	0.5	5.6	NS
m-Cresol(s)	0.33 ³	0.33 ³	0.33 ³	0.33 ³	NS
Naphthalene	12	12	12	12	NS
o-Cresol(s)	0.33 ³	0.33 ³	0.33 ³	0.33 ³	NS
p-Cresol(s)	0.33	0.33	0.33	0.33	NS
Pentachlorophenol	0.8 ³	0.8 ³	0.8 ³	0.8 ³	0.8 ³
Phenanthrene	100	100	100	500	NS
Phenol	0.33 ³	0.33 ³	0.33 ³	0.33 ³	30
Pyrene	100	100	100	500	NS
Volatile Organic Compounds					
1,1,1-Trichloroethane	0.68	0.68	0.68	0.68	NS
1,1-Dichloroethane	0.27	0.27	0.27	0.27	NS
1,1-Dichloroethene	0.33	0.33	0.33	0.33	NS
1,2-Dichlorobenzene	1.1	1.1	1.1	1.1	NS
1,2-Dichloroethane	0.02	0.02	0.02	0.02	10
1,2-Dichloroethene(cis)	0.25	0.25	0.25	0.25	NS
1,2-Dichloroethene(trans)	0.19	0.19	0.19	0.19	NS
1,3-Dichlorobenzene	2.4	2.4	2.4	2.4	NS
1,4-Dichlorobenzene	1.8	1.8	1.8	1.8	20
1,4-Dioxane	0.1 ³	0.1 ³	0.1 ³	0.1 ³	0.1
Acetone	0.05	0.05	0.05	0.05	2.2
Benzene	0.06	0.06	0.06	0.06	70
Butylbenzene	12	12	12	12	NS
Carbon tetrachloride	0.76	0.76	0.76	0.76	NS
Chlorobenzene	1.1	1.1	1.1	1.1	40
Chloroform	0.37	0.37	0.37	0.37	12
Ethylbenzene	1	1	1	1	NS
Hexachlorobenzene	0.33 ³	0.33 ³	1.2	3.2	NS
Methyl ethyl ketone	0.12	0.12	0.12	0.12	100
Methyl tert-butyl ether	0.93	0.93	0.93	0.93	NS
Methylene chloride	0.05	0.05	0.05	0.05	12

Volatile Organic Compounds (continued)					
Propylbenzene-n	3.9	3.9	3.9	3.9	NS
Sec-Butylbenzene	11	11	11	11	NS
Tert-Butylbenzene	5.9	5.9	5.9	5.9	NS
Tetrachloroethene	1.3	1.3	1.3	1.3	2
Toluene	0.7	0.7	0.7	0.7	36
Trichloroethene	0.47	0.47	0.47	0.47	2
Trimethylbenzene-1,2,4	3.6	3.6	3.6	3.6	NS
Trimethylbenzene-1,3,5	8.4	8.4	8.4	8.4	NS
Vinyl chloride	0.02	0.02	0.02	0.02	NS
Xylene (mixed)	0.26	1.6	1.6	1.6	0.26

All concentrations are in parts per million (ppm)

NS = Not Specified

Footnotes:

¹ The SCO for Hexavalent or Trivalent Chromium is considered to be met if the analysis for the total species of this contaminant is below the specific SCO for Hexavalent Chromium.

² The SCO is the sum of endosulfan I, endosulfan II and endosulfan sulfate.

³ For constituents where the calculated SCO was lower than the contract required quantitation limit (CRQL), the CRQL is used as the Track 1 SCO value.

⁴ This SCO is derived from data on mixed isomers of BHC.

APPENDIX F

PROJECT SCHEDULE

APPENDIX G

COMMUNITY AND ENVIRONMENTAL RESPONSE PLAN

COMMUNITY AND ENVIRONMENTAL RESPONSE PLAN SITE REMEDIATION

THE CROSSROADS AT GENESEE
19 DOAT STREET AND 9 LANSDALE PLACE
BUFFALO, NEW YORK 14211
NYSDEC SITE # C915338

Prepared for:

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Prepared by:



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October 2019

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1.0 INTRODUCTION

This Community and Environmental Response Plan (CERP) has been prepared to summarize the controls, monitoring and/or work practices that will be implemented during the site remediation at the Crossroads at Genesee – 19 Doat Street (Site) to address the potential for short-term impacts to the surrounding community or environmental resources. The remediation will include the following:

- Remove/cover impacted soils to meet Part 375 Unrestricted Use SCOs.
- Remove building basement floor slab and subsurface impacted soils and replace with clean fill and new concrete floor to eliminate sub-slab vapor impacts.

The CERP is a concise summary of the controls, monitoring, and work practices and how they combine to provide the necessary protection of the community and ecological resources. Additional details regarding how this will be implemented are contained in various sections of the Work Plan. The purpose of the CERP is to provide members of the community with information on the steps and programs that have been put in place in order to protect their health and minimize the disturbance caused by construction activity. This effort will be performed under the approval and oversight of the New York State Department of Environmental Conservation (NYSDEC) and the New York State Department of Health (NYSDOH).

This CERP has been prepared in accordance Section 5.1(f) *NYSDEC Final DER-10 Technical Guidance for Site Investigation and Remediation*, dated May 2010.

1.1 CERP ORGANIZATION

This CERP has been organized in general accordance with the Section 5.1(f) *NYSDEC DER-10* as follows:

- Section 1 – Introduction, describes the purpose and objectives of the CERP
- Section 2 – Community Air Monitoring Plan (CAMP)
- Section 3 – Public Protection Measures
- Section 4 – Vapor/Odor Management
- Section 5 – Noise Reduction Plan
- Section 6 – Vibration Monitoring
- Section 7 – Site Security Plan
- Section 8 – Storm Water and Erosion Control Plan
- Section 9 – Waste Management
- Section 10 – Traffic Management Plan

2.0 COMMUNITY AIR MONITORING PLAN (CAMP)

A site-specific CAMP has been prepared for the site and shall be in force during the course of the site remediation. The intent of the CAMP 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 work activities) from volatile organic compounds (VOCs) and particulates (i.e., dust) carried in the air as a direct result of remedial work activities on the Site. The CAMP provides air monitoring procedures, contamination concentration limits, and procedures to reduce VOCs and dust generation if the limits are approached. The CAMP is included in Appendix A - Health and Safety (H & S) Plan of this work plan.

The generic CAMP presented in *NYSDEC DER-10* titled *Appendix 1A-New York State Department of*

Health Generic Community Air Monitoring Plan and included in Attachment 4 to the Appendix A H & S Plan, will be followed and adhered to for the site remediation.

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 4 noted above. The fugitive dust suppression and particulate monitoring program will be employed at the site during site remediation and other intrusive activities which warrant its use.

3.0 PUBLIC PROTECTION MEASURES

A number of plans to protect the public from physical hazards at the Site will be implemented. Each of these measures is designed to make the area surrounding the remediation safe for the general public.

3.1 WARNING SIGNS

The contractor will place signs at the entrances to the property indicating that the Site is being remediated by The Crossroads at Genesee, LLC., under the oversight of the NYSDEC.

3.2 SITE FENCING

Fencing will be placed around the property that comprises the Site where none exist and entrance gates with locks to deter entrance during non-work hours.

4.0 VAPOR/ODOR MANAGEMENT PLAN

If significant nuisance odors are noted, The Owner, the BE3 site inspector, and the contractor will consult to determine what type of emission control action is appropriate. Actions that may be taken to reduce contaminant or odor levels include the following:

- Covering working areas of exposed impacted soils, trucks loaded with impacted soils, or stockpiles of impacted soils with tarpaulin covers, vapor reducing foam, or other vapor control agents.
- Reduce the production rate or change the sequence of work activities.
- Change the work methods or equipment to alternatives that reduce the potential to create dust or release contaminants into the air.
- Using specialized odor suppressing foams to cover the contaminated soils. The foam is a product which reduces the ability of vapors and dust to enter the air.
- Misting water onto soil in order to prevent dust that may carry odors.

Corrective measures may also include halting work and implementing additional dust suppression techniques which may include:

- Applying water on haul roads
- Wetting equipment and excavation faces
- Spraying water on truck buckets during excavation and dumping
- Restricting heavy equipment traffic use or areas of operation
- Restricting vehicle speeds
- Covering excavated areas and materials after excavation activity ceases or completing site

excavation, grading, and filling in small area sequences to reduce leaving large surface areas exposed

In practice, these actions will typically be used proactively to prevent alert levels from being reached at the Site perimeter.

5.0 NOISE REDUCTION PLAN

The remedial activities conducted on Site will conform to the noise codes/ordinances for the City of Buffalo during the work.

To be in compliance, construction activities on the Site will be prohibited between the hours of 6:00 PM and 7:00 AM Monday through Friday, Saturdays, Sundays, and on all legal holidays. In the event of an emergency that requires work to be conducted during the aforementioned times, the contractor will seek a variance from the Building Department Administrator of the City of Buffalo to permit such activities.

It is not anticipated that the activities at the Site will create excess levels of noise to a degree that would cause concern to nearby residents. If noise issues do become a concern the following steps may be taken to reduce the noise level caused by construction:

- Locating pieces of machinery on the Site to maximize the distance from potential receptors.
- Developing a design for a site perimeter sound barrier.
- Specifying the use of low noise emission construction equipment.

The work that will be completed does not currently require the contractor to perform tasks which are commonly associated with high levels of noise. The periodic use of back up alarms on vehicles will in all likelihood be the noise that is commonly heard from the Site, and the contractor will make every effort to minimize the need for vehicles to use them.

6.0 VIBRATION MONITORING

It is not anticipated that the remedial activities at the Site will generate high levels of vibrations for nearby residents. The remedial work that will be completed does not currently require the contractor to perform tasks that are commonly associated with high levels of vibration such as blasting, or pile driving.

The most common source of vibrations from the Site will be from pavement busting and compaction equipment, which will be used to compact clean soil as it is used to replace impacted soil that has been excavated. Compaction equipment will create vibrations over a very small area and not nearly powerful enough to cause damage to nearby structures.

7.0 SITE SECURITY PLAN

The objectives of the Site security plan are to prevent the vandalism/destruction of construction equipment, prevent access, and minimize health and safety concerns for the surrounding property owners.

7.1 PERIMETER SECURITY

The site will be completely fenced and have locked gates.

7.2 EQUIPMENT SECURITY

All vehicles and/or equipment left on the site will be secured at the end of each working day and during non-work days. No vehicles or equipment will be left overnight in an unsecured location. The contractor will ensure that all non-essential equipment is de-energized when left on site and not in use to prevent any malfunctions from occurring while workers are not present.

8.0 STORMWATER AND EROSION CONTROL PLAN

The stormwater and erosion control plan is intended to minimize soil erosion, and control stormwater on the Site. This plan is provided in the SWPPP for the site provided in Appendix H of the RAWP.

8.1 IMPLEMENTATION OF EROSION CONTROL MEASURES

Filtrexx erosion control Soxx or silt fences will be installed around the perimeter of the support zones and all areas to be excavated and/ or backfilled.

The contractor shall install and maintain the erosion control measures for the duration of the excavation/backfill work.

8.2 STORMWATER RUNOFF CONTROL

The contractor will be required to utilize appropriate control measures to direct stormwater to flow around an excavation area and to a discharge point. Appropriate controls may include digging a small ditch to direct the water flow, or building barriers out of clean soil to collect the stormwater so it can be pumped to a suitable discharge point (see Appendix H SWPPP)

9.0 WASTE MANAGEMENT

The waste management plan identifies the procedures for managing, treatment, and disposal of waste materials generated as a result of the Site remediation. All wastes removed from the Site will be transported by properly permitted and/or licensed waste haulers directly to approved disposal facilities. All trucks will be inspected to ensure the proper placards, decals and permits are displayed. Trucks will utilize the most direct hauling route to the disposal facility.

9.1 SOIL MANAGEMENT AND TREATMENT

Impacted soils removed from excavation areas will be loaded into trucks for transport to the approved disposal facility. Trucks will not be allowed to stage on local roadways. The Contractor will schedule trucks in a manner that will minimize the wait time for loading.

Vehicles containing impacted soils will be covered with a solid plastic tarp. If necessary, spray-on odor suppressing materials may be used to reduce potential VOC emissions or odors during transit.

9.2 CONSTRUCTION DEWATERING AND TREATMENT

Stormwater encountered during excavation that has been impacted by contaminated soils will be pumped to a temporary storage/Frac tank. The water will be sampled and tested to determine if it can be discharged to the City of Buffalo sewer system or required to be sent to a disposal facility.

10. TRAFFIC MANAGEMENT PLAN

The objectives of the traffic plan at the Site are to describe the objectives for traffic control and address any potential concerns. The traffic control plan outlines traffic management at the site for:

- Trucking materials on and off site
- Contractor access and parking
- Equipment access and storage
- Traffic control at the site entrance
- Requirements for truck flagmen at site access gates.

Trucking of materials and equipment to and from the site will be through an established entrance gate. Contractor employees will also enter and leave the site through this same gate. The contractor's traffic control personnel will direct traffic as needed upon delivery of equipment, trailers, excavation support materials, etc. To maintain access and lines of sight, the contractor will arrange for and coordinate with the appropriate local authorities to ensure that on-street parking nearest to the entrance/exit gate is limited throughout the duration of the work. Trucks will not be allowed to queue on local streets; however, the contractor may negotiate with a third party to obtain off-site parking where vehicles can wait to be loaded. All the roadways utilized by the contractor during the work will be checked daily for spillage and seepage, and cleaned to the satisfaction of Owner's representative and as directed by NYSDEC. All trucking on local roadways will meet the requirements of all local regulatory agencies.

10.1 TRUCK CONTROLS

Upon arrival to the site, each truck will be visually inspected to ensure appropriate permits are in place. Trucks hauling impacted soil will be initially lined with polypropylene plastic tarp along their beds to prevent water from seeping out of the soil onto local streets. When applicable, odorous truckloads of soil will be foamed to control odors (refer to Sections 4 and 9). The trucks will also utilize a heavy tarp which will be extended over the cargo area and overlap the sides and rear of the cargo area to prevent soil being removed from the truck by wind. Trucks, before exiting the site, will pass through an inspection area and be inspected to ensure tires and undercarriages are clean and that tarps are secured. Excessive mud and loose dirt observed on the truck tires will be removed by installing a truck wash station or equivalent at the exit gate. Additional excess mud and soil on truck carriages will be manually removed with brooms and brushes as necessary. The proper cleaning of trucks exiting the site will aid in minimizing/eliminating dust and soil leaving the site.

APPENDIX H

SWPPP

STORMWATER POLLUTION PREVENTION PLAN

for

ADAPTIVE REUSE
CROSSROADS AT GENESEE
19 DOAT STREET
CITY OF BUFFALO, NY

Revised December 9, 2019

Prepared By:

tredo
ENGINEERS

CIVIL | STRUCTURAL | ENGINEERING

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For:

HHL Architects
Buffalo, NY

I. SUMMARY

This project includes the redevelopment of a 1.92-acre parcel into a mixed-use multi-family residential apartments and a stand-alone out-patient clinic located at 19 Doat Street in the City of Buffalo. The existing facility shall be (partially) removed and renovated into new apartments and community space and a paved parking lot. The new medical facility shall be one-story 6000 sf. A common driveway between the new and existing buildings is planned.

Currently, storm water runoff generated by the existing developed sites flows overland south-to-north and thru roof leaders into the existing combined sanitary/storm sewers located in Doat Street, without detention. After development occurs, runoff from the existing structure roof and new roof and parking areas shall be conveyed thru a new detention basin and restricted conveyance to the same BSA combined sewer located in the middle of Doat Street.

This development will actually result in a decrease in impervious surfaces on this site however, the area of soil disturbance required to reconstruct the building and parking lots exceeds the one-quarter acre (0.25-acre) threshold defined by the BSA in the recently adopted Unified Development Ordinance. The proposed runoff control measures incorporated in the detention system(s) outlet will provide the storm water attenuation required to control the discharge of stormwater thereby relieving the combined public sewers of peak stormwater inflow generated from the re-development area and improving existing conditions.

This project is **not** required to comply with the water quality and water quantity requirements of the NYSDEC SPDES Permit GP-015-002 for storm water discharges from a construction activity as the outfall is to the public combined sanitary/storm sewer system which is ultimately conveyed to the City of Buffalo Bird Island Sewer Treatment Facility. The project development is not pursuing LEED Accreditations.

II. BACKGROUND INFORMATION

I. Existing (Pre-Development) Conditions

The parcel currently contains operating structures, a gravel storage lot, and utilities to be (partially) demolished for the proposed new facilities. The existing parcel currently discharges stormwater runoff to the public combined sewer system without detention. Refer to pre-developed mapping contained in Appendix B.

II. Hydrologic Soil Group

Hydrologic soil groups (HSG) are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A,B,C, and D) and three dual classes (A/D, B/D, and C/D). the groups defined for the project area is as follows:

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have high shrink-swell potential,

soils that have a high water table, soils that have a clay pan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

The predominant soil types within the proposed project disturbance area consists of Type Ud, HSG D, Urban development. Refer to soils map contained in Appendix A for additional information.

III. Proposed (Post-Development) Conditions

The proposed development includes the construction of the new structures and associated paved surface parking. Storm water management is provided for the new facility by constructing underground storage basins and restriction piping prior to discharge of runoff into the combined sewer system located in Doat Street. The overall development design and detail of the proposed stormwater system shall be in compliance with BSA mandated practices for discharge to a combined sanitary/storm sewer system and will be an improvement over existing conditions.

Refer to post-developed mapping in Appendix B for additional information.

III. STORMWATER MANAGEMENT

I. Design Criteria

The design of the storm water facilities will be in accordance with the following:

- i. City of Buffalo Storm Water Drainage Policy and Construction Standards
- ii. The Erie Niagara Regional Storm Drainage Design Manual

II. Stormwater Conveyance

The majority of stormwater runoff generated by the proposed development is from the impervious building roofs. Surface runoff from yards and driveways shall also be conveyed to the proposed detention structure.

The estimated areas for the runoff tributary to the new detention systems and conveyance of the 10-year rainfall total was calculated using the Rational Method. Storm conveyance pipe sizing is included in Appendix B.

III. Stormwater Detention

According to the City of Buffalo Sewer Authority (BSA) policy for storm water drainage, detention is required when the storm water runoff from a site is increased due to the increase in impervious surfaces resulting from a new development and/or a soil disturbance area exceeding 0.25-acres. The proposed construction and re-construction of the overall development area exceeds the 0.25 acre threshold therefore storm water detention will be provided to limit the future peak discharge to the combined sewer

system. The BSA criterion for sizing the stormwater basin(s) is based on temporarily storing the difference between the **25-year post**-developed conditions attenuated to the **2-year pre**-developed conditions runoff.

After the proposed development occurs, runoff from existing and new roofs and paved surface parking lot will be collected and conveyed to an underground piped detention basin. This basin will then discharge at a controlled rate into the existing combined sanitary/storm sewer within Doat Street.

The SCS Unit Hydrograph Method was utilized to estimate the peak discharges associated with the various storm events for both the existing and the proposed conditions. An elevation-storage-discharge relationship was established for the proposed detention basin for runoff conveyed to the existing public drainage system.

The primary stormwater outlet from the underground detention system to Doat Street sewer is proposed to be a **6-inch diameter** PVC lateral. The hydrographs for the developed conditions 25-year storm event was routed through the detention system to establish the peak outflows to the existing sewer system. This was then compared to the pre-developed runoff from the 2-year storm event at the combined sewer. The results of the calculations are tabulated below:

Detention Basin Hydrocad Node [1P]	2-Year	10-Year	25-Year
Existing Peak Runoff, cfs: to Combined Sewer [1R]	5.65	-	-
Proposed Peak Runoff, cfs: to Combined Sewer [1R]	-	4.75	6.00
High Water Elevation, feet: UG detention basin [1P]	-	92.74	93.67
Peak Storage Volume, ac-ft: UG detention basin [1P]	-	0.103	0.144
Total Peak Post-Dev Outflow, cfs: Basin [1P]		1.49	1.75
Total Peak Post-dev Outflow, cfs: [1R]	-	1.49	1.75

Note: The basin invert = el. 91.0 for the proposed 36-inch diameter pipe field. The peak discharge value for the 25-year post-developed storm is less-than the pre-developed 2-year outfall for the new developed conditions.

Implementations of Water Quality/Runoff Reduction Techniques are required to treat runoff from new impervious surfaces as per mandate of the City of Buffalo UDO and BSA Stormwater Management guidelines. Runoff Reduction was achieved by implementing a bio-retention bed as a Tier 2 Green Infrastructure Technique (GIT), capturing and filtering runoff from portions of the paved parking lot:

GIT	Impervious Area (acre)	RRv Min. (ac-ft)	RRv Provided (ac-ft)
Bio-retention	0.27	0.004	0.004

The minimum calculated Runoff Reduction Volume of 0.004 ac-ft is treated by conveying runoff overland and into a (central) curbed island within the parking lot. The bio-retention filtration method selected will be constructed by installing an undercut of filter media over a perforated underdrain system and providing a yard drain in the planter bed, which then conveys to the underground pipe-field detention basin. The use of additional Runoff Reduction Techniques for the remaining Water Quality (WQv) is limited by space constraints and the reduced effectiveness of the natural subsoil.

Based on the restrictions and filtering systems incorporated and resulting outfall, the storm water drainage plan for this project has been developed in accordance with the requirements of the City of Buffalo Sewer Authority Storm Water Drainage Policy.

The hydrographs, reservoir report, outlet structure information, WQv and routing calculations are included in Appendix B.

IV. COMPONENTS OF EROSION CONTROL

Refer to Planned Erosion & Sediment Control Practices at the end of this report.

I. Daily Site Maintenance (Performed by Owner/Contractor)

At the beginning and end of each day of construction, the Contractor shall walk the site to determine the presence of any extraneous material (litter) and to review all stormwater outfall locations. All debris shall be picked up and disposed of in an appropriate manner.

Construction chemicals shall be stored in an area that is away from any temporary or permanent stormwater drainage facilities and in an area that is elevated above ground surface, so that surface water runoff does not deteriorate the associated container/bag. All containers shall be adequately sealed at the end of each workday or

at the end of use. Large fuel tank(s), if required, shall be located within a secondary containment vessel, size equal to or greater than the capacity of the fuel tank used.

Construction debris shall be stockpiled in one particular area within the site that is located away from any permanent or temporary storm drainage facility. All construction debris shall be removed from the site and disposed of in an appropriate manner. Locate trash receptacle on high ground so as not to allow stormwater runoff to collect within the bin(s). The material/equipment storage shall be monitored on a daily basis for any identified chemical (oil, grease, etc.) spills.

II. Construction Sequence

- Obtain all necessary shop drawing approvals and applicable permits.
- Conduct a pre-construction meeting.
- Perform stakeout of property limits and facilities.
- Notify the City of Buffalo (24) hours prior to the start of operations.
- Remove pavements and portions of buildings and gravel surfacing from the site.
- Install fabric silt fence (or 12"dia silt sock) where shown on plans. Maintain all erosion and sediment control devices throughout the construction period.
- Utilize existing paved driveways from Doat Street for temporary stabilized construction entrances. Provide wheel washing for all outgoing vehicles entering the public roadway with runoff directed into on-site temporary conveyances or sediment basins.
- Construct detention basin and install storm sewers, underdrains and catch basins.
- Provide excavated drop inlet protection (where shown).
- Excavate road box.
- Install pavt section
- Finish grade, topsoil, plant, seed & mulch disturbed areas.
- Remove sediment traps, silt fence and other erosion control devices after vegetation has been established

III. Post Construction Operation & Maintenance (Performed by Owner)

-
- On a quarterly basis and following rain events of 0.5-inch or greater, perform the following:
-
- Inspect catch basins and storm piping for debris and sediments;
- Remove and properly dispose of any collected debris from the structures;
- Flush piping with water, if necessary to remove accumulated sediment.
- Inspect grassed/landscaped areas for un-vegetated area or areas with less than 80% healthy stand of grass and reseed and mulch as necessary. Water areas daily if reseeded through July and August.
- Maintain all lawn areas by regular mowing. Any eroded areas shall be re-graded, seeded and mulched immediately.

V. PERMITS

The proposed construction of the stormwater management facilities must receive approval from the Buffalo Sewer Authority and City of Buffalo Permit Office.

PLANNED EROSION AND SEDIMENTATION CONTROL PRACTICES

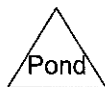
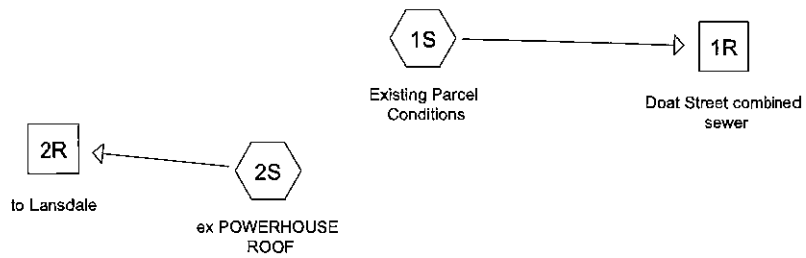
1. **Temporary Gravel Construction Entrance/Exit:** Contractors shall utilize existing paved driveways. **A wheel wash station** shall be installed adjacent to the driveway connected to a fire hydrant with an approved backflow preventer and meter – or – the contractor may elect to use a water storage tank – or – the owner has provided use of an existing service. All vehicles exiting onto public roadways shall be cleaned of sediment and stones. The roadway shall be cleaned immediately of any sediment and stone deposited from a construction vehicle.
2. **Silt Fencing:** Sediment control fencing (or 8" silt sock) shall be installed along the perimeter of the parcel where shown. Temporary soil stockpiles shall also contain silt fence surround and/or plastic tarps.
3. **Surface Stabilization:** All disturbed soils shall be stabilized as soon as grade is established, either in fill or cut areas, with either vegetation and mulch or geotextile fabric and stone subbase in building pad and paved parking lot footprints.
4. **Dust Control:** Dust shall be controlled by sprinkling during extended periods of demolition efforts and/or soil exposure. See item #1 above for optional temporary water sources.
5. **Excavated Storm Drain Inlet Protection:** Installation of new receivers shall leave the rim above the surrounding grades to allow for pooling and settlement of sediment prior to runoff entering the storm sewer piping. A geotextile fabric shall also be installed under the grate of each receiver which shall be regularly cleaned of any built-up sediment.
6. **Land Grading:** All temporary cut slopes shall not exceed 3h:1v to avoid instability due to wet weather. Cut slopes shall be fine graded immediately after rough grading and stabilized per Item #4 above. Fill areas shall be 2h:1v max with fill depths from 1-ft to 2-ft anticipated. Fill layers shall not exceed 8-inches in depth and compacted to 95% modified proctor in pavement areas, and 90% in lawn/landscape beds.
7. **Dewatering:** The foundation, basement and utility excavations for the demolition and new construction activities shall contain a dewatering system providing for a sump setting and filter-bag sediment screen prior to discharge to the combined sewer system.

APPENDIX A

STORM SEWER COMPUTATIONS (10 yr)

[illegible]

APPENDIX B



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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.040	96	Gravel surface, HSG D (1S)
0.888	98	Roofs, HSG D (1S, 2S)
0.047	98	Unconnected pavement, HSG D (2S)
1.975	97	TOTAL AREA

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Type II 24-hr 2 YEAR Rainfall=2.25"

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Summary for Subcatchment 1S: Existing Parcel Conditions

Runoff = 5.65 cfs @ 11.96 hrs, Volume= 0.302 af, Depth= 1.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-32.00 hrs, dt= 0.05 hrs
Type II 24-hr 2 YEAR Rainfall=2.25"

Area (ac)	CN	Description
1.040	96	Gravel surface, HSG D
0.853	98	Roofs, HSG D
1.893	97	Weighted Average
1.040		54.94% Pervious Area
0.853		45.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.2	150	0.0164	1.16		Sheet Flow, Parking lot sheet to street
					Smooth surfaces n= 0.011 P2= 2.25"
0.8	147	0.0207	2.92		Shallow Concentrated Flow, shallow flow across sidewalk
					Paved Kv= 20.3 fps
3.0	297	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 2S: ex POWERHOUSE ROOF

Runoff = 0.25 cfs @ 11.96 hrs, Volume= 0.014 af, Depth= 2.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-32.00 hrs, dt= 0.05 hrs
Type II 24-hr 2 YEAR Rainfall=2.25"

Area (ac)	CN	Description
0.035	98	Roofs, HSG D
0.047	98	Unconnected pavement, HSG D
0.082	98	Weighted Average
0.082		100.00% Impervious Area
0.047		57.32% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	30	0.0200	0.91		Sheet Flow, Roof slope
					Smooth surfaces n= 0.011 P2= 2.25"
0.4	35	0.0025	1.43	0.28	Pipe Channel, RD to street
					6.0" Round Area= 0.2 sf Perim= 1.6' r= 0.13'
					n= 0.013 Cast iron, coated
1.0	65	Total, Increased to minimum Tc = 6.0 min			

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Type II 24-hr 2 YEAR Rainfall=2.25"

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Summary for Reach 1R: Doat Street combined sewer

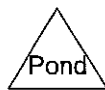
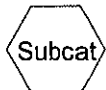
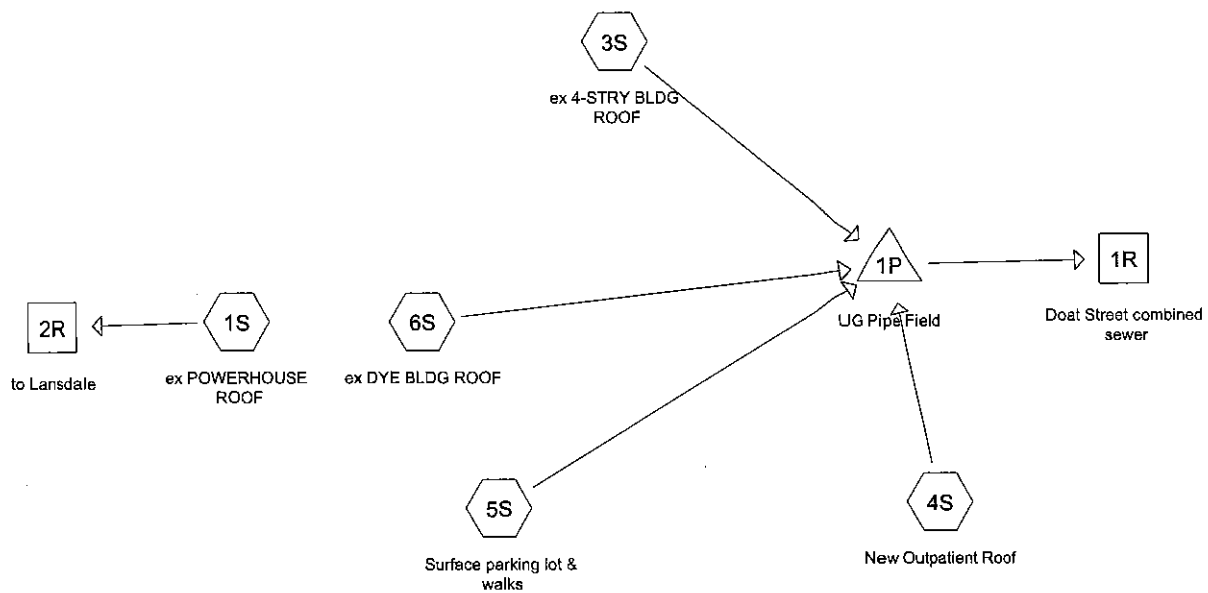
Inflow Area = 1.893 ac, 45.06% Impervious, Inflow Depth = 1.92" for 2 YEAR event
Inflow = 5.65 cfs @ 11.96 hrs, Volume= 0.302 af
Outflow = 5.65 cfs @ 11.96 hrs, Volume= 0.302 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 1.00-32.00 hrs, dt= 0.05 hrs

Summary for Reach 2R: to Lansdale

Inflow Area = 0.082 ac, 100.00% Impervious, Inflow Depth = 2.02" for 2 YEAR event
Inflow = 0.25 cfs @ 11.96 hrs, Volume= 0.014 af
Outflow = 0.25 cfs @ 11.96 hrs, Volume= 0.014 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 1.00-32.00 hrs, dt= 0.05 hrs



Routing Diagram for post developed
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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.487	80	>75% Grass cover, Good, HSG D (1S, 5S)
0.645	98	Paved parking, HSG D (5S)
0.812	98	Roofs, HSG D (1S, 3S, 4S, 6S)
0.031	98	Unconnected pavement, HSG D (1S)
1.975	94	TOTAL AREA

Project: Crossroads at Genesee 19 Doat Project #: 17 61 Sheet #: of
 Description: Water Quality & RRv Calcs Date: Dec 2019 Drawn by: avm

Water Quality Volume (WQv) and Runoff Reduction Volume (RRv) Calculations:

Base Data

Location: City of Buffalo		MS4?	n/a
Captured Drainage Area	0.35 acres	Parcel Area	1.9 acres
Offsite Area	0.00 acres	Redevelopment includes Tier 2 Bio-Retention Practice for portion of paved surface parking lot	
Total Drainage Area =	0.35 acres	Net 14% credited reduction of impervious	
Measure Impervious Area =	0.27 acres		
Site Soil Types (HSG)	A B C D		
Percentage	0% 0% 0% 100%		
Soil Description	- - - Ud		

Computation of Preliminary Stormwater Storage Volumes and Peak Discharges

Water Quality Volume, WQv

Compute Impervious Cover

Use both on-site and off-site drainage:

$$I = 77.1$$

Compute Runoff Coefficient, Rv

$$R_v = 0.74$$

Compute WQv (Includes both on-site and off-site drainage)

Use the 90% capture rule with 1.0 inches of rainfall (Ref NYS SWMDM Figure 4.1)

$$WQ_v = 0.022 \text{ ac-ft} \quad \text{Total prior to RRv}$$

Compute Water Quality Peak Flow

P = 1.00 inches
 Q = 0.74 inches
 CN = 97 per NYSDEC App B
 $Ia/P = 0.17$
 $t_c = 6 \text{ min} \quad 0.1 \text{ hrs}$
 $C_0 = 2.540$
 $C_1 = -0.615$
 $C_2 = -0.164$
 $K = 2.991$

$$\text{therefore } q_u = 980 \text{ cfs/sq mi/inch}$$

$$Q_p = q_u \times A \times WQ_v$$

A = 0.00055 sq miles
 WQv = 0.74 watershed inches

$$\text{therefore } Q_p = 0.40 \text{ cfs} \quad \text{Total prior to RRv}$$

Runoff Reduction Volume (RRv):

$$\text{Minimum RRv (in ac-ft of storage)} = ((P)(R_v^*)(A_i) / 12)$$

where P = 1.00 inches
 $A_i = (S)(A_{ic}) = 0.05 \text{ acres}$
 $R_v = 0.95$ (where I is 100% impervious)
 Average S = 0.20 Specified Minimum Reduction Factor if WQv > RRv
 $A_{ic} = 0.27 \text{ acres}$

$$\text{therefore } RR_v \text{ Min.} = 0.004 \text{ ac-ft} \quad 20\% \text{ reduction}$$

$$A_i = (S)(A_{ic})$$

A_i = Impervious cover targeted for runoff reduction

(A_{ic}) = Total area of new impervious cover

$R_v^* = 0.05 + 0.009(I) = 0.95$, where I is 100% impervious

S = Hydrologic Soil Group (HSG) Specific Reduction Factor =

HSG A =	0.55	0%
HSG B =	0.40	0%
HSG C =	0.30	0%
HSG D =	0.20	100%

Project: Crossroads at Genesee 19 Doat Project #: 17 61 Sheet #: of
 Description: Water Quality & RRv Calcs Date: Dec 2019 Drawn by: avm

Runoff Reduction Techniques

(As determined by NYSDEC SWMDM Tables 3.1, 3.2 & 3.3)

Area Credits none

Volume Credits

Bioretention Bed Sizing:

Areas Tributary to BIOBED: 0.35 acres Node (1S)
 Impervious Area(s) 11761 sf 0.27 ac
 New I = 77.1 %
 New Rv = 0.74
 New WQv = 0.022 ac-ft
 Size Bed to convey 946 cf in 48 hours Soil Matrix per specs.

Calc Surface Area Infiltration Practice: $Af = (WQv)(df)/[(k)(hf+df)(tf)]$

Af = Surface Area of filter bed
 WQv = Water Quality Volume (cf)
 df = Filter bed depth (2.0-ft min)
 k = Coefficient of permeability of filter media (ft/day) (0.5 ft/day)
 hf = Average depth water over filter bed (ft) (use 3-inches) (Note: 2-days max. for bioretention)
 tf = Design filter bed drain time (days)

thus Af = 841 sf

Possible proportions:

1:1	29	ft Width	by	29	ft Length
1.5:1	24	ft Width	by	36	ft Length
2:1	21	ft Width	by	41	ft Length
3:1	17	ft Width	by	50	ft Length
4:1	14	ft Width	by	58	ft Length

Bed Area limited by site constraints:
 Adjusted WQv = 0.011 ft Avg Width by 432 sf
 WQv Credit curbed island per plan

Size underdrain area:

10% Af = 43 sf
 use perf pipe in 3-ft wide gravel bed (max 10-ft oc)
 Length of pipe req'd = 14 ft

Create overflow device (weir) set 6-inches above planting bed

Qwq = 0.40 cfs
 C = 3.33 for concrete
 L = 8.00 ft catch basin rim

$H = (Q/(CL))^{2/3} = 0.06$ ft 0.73 in
 add 6-inches for freeboard and set top of bank = 12.7 inches above the planting bed elevation = 1.06 ft

RRv = 0.004 ac-ft RRv Credit (40% MAX in HSG C and D, 80% MAX in HSG A and B)
 % WQv Reduced by GIT: 20.6% of Original WQv

Total % WQv Reduced: 20.6% 0.004 Minimum RRv Satisfied

Actual WQv = 0.011 ac-ft Remaining After Treatment
 Total % WQv Treated: 51% 0.011 NG, keep trying

The treatment of remaining WQv is impracticable due to site constraints and existing subsurface soil conditions, however the reduction of 11,500SF of existing impervious surfacing onsite results in a lawn/landscape credit of 14% new greenspace.

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Type II 24-hr 10 YEAR Rainfall=3.25"

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Summary for Subcatchment 1S: ex POWERHOUSE ROOF

Runoff = 0.34 cfs @ 11.96 hrs, Volume= 0.018 af, Depth= 2.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-32.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 YEAR Rainfall=3.25"

Area (ac)	CN	Description
0.035	98	Roofs, HSG D
0.031	98	Unconnected pavement, HSG D
0.015	80	>75% Grass cover, Good, HSG D
0.081	95	Weighted Average
0.015		18.52% Pervious Area
0.066		81.48% Impervious Area
0.031		46.97% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	30	0.0200	0.91		Sheet Flow, Roof slope Smooth surfaces n= 0.011 P2= 2.25"
0.4	35	0.0025	1.43	0.28	Pipe Channel, RD to street 6.0" Round Area= 0.2 sf Perim= 1.6' r= 0.13' n= 0.013 Cast iron, coated
1.0	65	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 3S: ex 4-STRY BLDG ROOF

Runoff = 2.21 cfs @ 11.96 hrs, Volume= 0.124 af, Depth= 3.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-32.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 YEAR Rainfall=3.25"

Area (sf)	CN	Description
21,540	98	Roofs, HSG D
21,540		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	35	0.0200	0.93		Sheet Flow, Roof slope to pipe field Smooth surfaces n= 0.011 P2= 2.25"
0.6	35	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 4S: New Outpatient Roof

Runoff = 0.62 cfs @ 11.96 hrs, Volume= 0.035 af, Depth= 3.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-32.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 YEAR Rainfall=3.25"

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Type II 24-hr 10 YEAR Rainfall=3.25"

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Area (sf)	CN	Description
6,000	98	Roofs, HSG D
6,000		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	35	0.0200	0.93		Sheet Flow, Roof pitch Smooth surfaces n= 0.011 P2= 2.25"
0.6	35	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 5S: Surface parking lot & walks

Runoff = 2.45 cfs @ 12.17 hrs, Volume= 0.206 af, Depth= 2.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-32.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 YEAR Rainfall=3.25"

Area (ac)	CN	Description
0.472	80	>75% Grass cover, Good, HSG D
0.645	98	Paved parking, HSG D
1.117	90	Weighted Average
0.472		42.26% Pervious Area
0.645		57.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.5	100	0.0100	0.07		Sheet Flow, first 100-ft of sheet flow Grass: Dense n= 0.240 P2= 2.25"
0.5	52	0.0100	1.61		Shallow Concentrated Flow, grass shallow to pvmnt Unpaved Kv= 16.1 fps
0.2	30	0.0100	2.03		Shallow Concentrated Flow, pvmnt shallow to rcvr Paved Kv= 20.3 fps
0.8	190	0.0100	4.02	2.19	Pipe Channel, Pipe to Detention 10.0" Round Area= 0.5 sf Perim= 2.6' r= 0.21' n= 0.013 Corrugated PE, smooth interior
24.0	372	Total			

Summary for Subcatchment 6S: ex DYE BLDG ROOF

Runoff = 0.65 cfs @ 11.96 hrs, Volume= 0.036 af, Depth= 3.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-32.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 YEAR Rainfall=3.25"

Area (ac)	CN	Description
0.145	98	Roofs, HSG D
0.145		100.00% Impervious Area

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Type II 24-hr 10 YEAR Rainfall=3.25"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	27	0.4170	2.99		Sheet Flow, Roof slope to RD Smooth surfaces n= 0.011 P2= 2.25"
0.8	190	0.0100	4.02	2.19	Pipe Channel, CB1 to Pipe Field 10.0" Round Area= 0.5 sf Perim= 2.6' r= 0.21' n= 0.013 Corrugated PE, smooth interior
1.0	217	Total, Increased to minimum Tc = 6.0 min			

Summary for Reach 1R: Doat Street combined sewer

Inflow Area = 1.894 ac, 75.08% Impervious, Inflow Depth = 2.53" for 10 YEAR event
 Inflow = 1.49 cfs @ 12.43 hrs, Volume= 0.399 af
 Outflow = 1.49 cfs @ 12.43 hrs, Volume= 0.399 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 1.00-32.00 hrs, dt= 0.05 hrs

Summary for Reach 2R: to Lansdale

Inflow Area = 0.081 ac, 81.48% Impervious, Inflow Depth = 2.69" for 10 YEAR event
 Inflow = 0.34 cfs @ 11.96 hrs, Volume= 0.018 af
 Outflow = 0.34 cfs @ 11.96 hrs, Volume= 0.018 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 1.00-32.00 hrs, dt= 0.05 hrs

Summary for Pond 1P: UG Pipe Field

Inflow Area = 1.894 ac, 75.08% Impervious, Inflow Depth = 2.54" for 10 YEAR event
 Inflow = 4.75 cfs @ 11.98 hrs, Volume= 0.402 af
 Outflow = 1.49 cfs @ 12.43 hrs, Volume= 0.399 af, Atten= 69%, Lag= 26.8 min
 Primary = 1.49 cfs @ 12.43 hrs, Volume= 0.399 af

Routing by Stor-Ind method, Time Span= 1.00-32.00 hrs, dt= 0.05 hrs / 2
 Peak Elev= 92.74' @ 12.43 hrs Surf.Area= 0.106 ac Storage= 0.103 af

Plug-Flow detention time= 29.1 min calculated for 0.399 af (99% of inflow)
 Center-of-Mass det. time= 24.1 min (811.1 - 786.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	90.00'	0.000 af	38.00'W x 120.00'L x 4.50'H Field A 0.471 af Overall - 0.171 af Embedded = 0.300 af x 0.0% Voids
#2A	90.50'	0.137 af	ADS N-12 36 x 35 Inside #1 Inside= 36.1"W x 36.1"H => 7.10 sf x 20.00'L = 142.0 cf Outside= 42.0"W x 42.0"H => 8.86 sf x 20.00'L = 177.2 cf Row Length Adjustment= +10.00' x 7.10 sf x 7 rows 35.00' Header x 7.10 sf x 2 = 497.0 cf Inside
#3	88.00'	0.009 af	5.00'D x 6.50'H Vertical Cone/Cylinderx 3
		0.146 af	Total Available Storage

Storage Group A created with Chamber Wizard

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Type II 24-hr 10 YEAR Rainfall=3.25"

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Device	Routing	Invert	Outlet Devices
#1	Primary	90.00'	6.0" Round Culvert L= 45.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 90.00' / 87.70' S= 0.0511 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=1.49 cfs @ 12.43 hrs HW=92.74' (Free Discharge)

↑**1=Culvert** (Inlet Controls 1.49 cfs @ 7.59 fps)

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Type II 24-hr 25 YEAR Rainfall=4.00"

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Summary for Subcatchment 1S: ex POWERHOUSE ROOF

Runoff = 0.43 cfs @ 11.96 hrs, Volume= 0.023 af, Depth= 3.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-32.00 hrs, dt= 0.05 hrs
Type II 24-hr 25 YEAR Rainfall=4.00"

Area (ac)	CN	Description
0.035	98	Roofs, HSG D
0.031	98	Unconnected pavement, HSG D
0.015	80	>75% Grass cover, Good, HSG D
0.081	95	Weighted Average
0.015		18.52% Pervious Area
0.066		81.48% Impervious Area
0.031		46.97% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	30	0.0200	0.91		Sheet Flow, Roof slope Smooth surfaces n= 0.011 P2= 2.25"
0.4	35	0.0025	1.43	0.28	Pipe Channel, RD to street 6.0" Round Area= 0.2 sf Perim= 1.6' r= 0.13' n= 0.013 Cast iron, coated
1.0	65	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 3S: ex 4-STRY BLDG ROOF

Runoff = 2.73 cfs @ 11.96 hrs, Volume= 0.155 af, Depth> 3.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-32.00 hrs, dt= 0.05 hrs
Type II 24-hr 25 YEAR Rainfall=4.00"

Area (sf)	CN	Description
21,540	98	Roofs, HSG D
21,540		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	35	0.0200	0.93		Sheet Flow, Roof slope to pipe field Smooth surfaces n= 0.011 P2= 2.25"
0.6	35	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 4S: New Outpatient Roof

Runoff = 0.76 cfs @ 11.96 hrs, Volume= 0.043 af, Depth> 3.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-32.00 hrs, dt= 0.05 hrs
Type II 24-hr 25 YEAR Rainfall=4.00"

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Type II 24-hr 25 YEAR Rainfall=4.00"

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Area (sf)	CN	Description
6,000	98	Roofs, HSG D
6,000		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	35	0.0200	0.93		Sheet Flow, Roof pitch Smooth surfaces n=0.011 P2= 2.25"
0.6	35	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 5S: Surface parking lot & walks

Runoff = 3.20 cfs @ 12.17 hrs, Volume= 0.272 af, Depth= 2.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-32.00 hrs, dt= 0.05 hrs
Type II 24-hr 25 YEAR Rainfall=4.00"

Area (ac)	CN	Description
0.472	80	>75% Grass cover, Good, HSG D
0.645	98	Paved parking, HSG D
1.117	90	Weighted Average
0.472		42.26% Pervious Area
0.645		57.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.5	100	0.0100	0.07		Sheet Flow, first 100-ft of sheet flow Grass: Dense n= 0.240 P2= 2.25"
0.5	52	0.0100	1.61		Shallow Concentrated Flow, grass shallow to pvmnt Unpaved Kv= 16.1 fps
0.2	30	0.0100	2.03		Shallow Concentrated Flow, pvmnt shallow to rcvr Paved Kv= 20.3 fps
0.8	190	0.0100	4.02	2.19	Pipe Channel, Pipe to Detention 10.0" Round Area= 0.5 sf Perim= 2.6' r= 0.21' n= 0.013 Corrugated PE, smooth interior
24.0	372	Total			

Summary for Subcatchment 6S: ex DYE BLDG ROOF

Runoff = 0.80 cfs @ 11.96 hrs, Volume= 0.045 af, Depth= 3.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-32.00 hrs, dt= 0.05 hrs
Type II 24-hr 25 YEAR Rainfall=4.00"

Area (ac)	CN	Description
0.145	98	Roofs, HSG D
0.145		100.00% Impervious Area

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Type II 24-hr 25 YEAR Rainfall=4.00"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	27	0.4170	2.99		Sheet Flow, Roof slope to RD Smooth surfaces n= 0.011 P2= 2.25"
0.8	190	0.0100	4.02	2.19	Pipe Channel, CB1 to Pipe Field 10.0" Round Area= 0.5 sf Perim= 2.6' r= 0.21' n= 0.013 Corrugated PE, smooth interior
1.0	217	Total, Increased to minimum Tc = 6.0 min			

Summary for Reach 1R: Doat Street combined sewer

Inflow Area = 1.894 ac, 75.08% Impervious, Inflow Depth = 3.25" for 25 YEAR event
 Inflow = 1.75 cfs @ 12.46 hrs, Volume= 0.513 af
 Outflow = 1.75 cfs @ 12.46 hrs, Volume= 0.513 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 1.00-32.00 hrs, dt= 0.05 hrs

Summary for Reach 2R: to Lansdale

Inflow Area = 0.081 ac, 81.48% Impervious, Inflow Depth = 3.43" for 25 YEAR event
 Inflow = 0.43 cfs @ 11.96 hrs, Volume= 0.023 af
 Outflow = 0.43 cfs @ 11.96 hrs, Volume= 0.023 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 1.00-32.00 hrs, dt= 0.05 hrs

Summary for Pond 1P: UG Pipe Field

Inflow Area = 1.894 ac, 75.08% Impervious, Inflow Depth > 3.27" for 25 YEAR event
 Inflow = 6.00 cfs @ 11.98 hrs, Volume= 0.516 af
 Outflow = 1.75 cfs @ 12.46 hrs, Volume= 0.513 af, Atten= 71%, Lag= 28.4 min
 Primary = 1.75 cfs @ 12.46 hrs, Volume= 0.513 af

Routing by Stor-Ind method, Time Span= 1.00-32.00 hrs, dt= 0.05 hrs / 2
 Peak Elev= 93.67' @ 12.46 hrs Surf.Area= 0.106 ac Storage= 0.144 af

Plug-Flow detention time= 32.9 min calculated for 0.513 af (99% of inflow)
 Center-of-Mass det. time= 28.8 min (810.5 - 781.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	90.00'	0.000 af	38.00'W x 120.00'L x 4.50'H Field A 0.471 af Overall - 0.171 af Embedded = 0.300 af x 0.0% Voids
#2A	90.50'	0.137 af	ADS N-12 36 x 35 Inside #1 Inside= 36.1"W x 36.1"H => 7.10 sf x 20.00'L = 142.0 cf Outside= 42.0"W x 42.0"H => 8.86 sf x 20.00'L = 177.2 cf Row Length Adjustment= +10.00' x 7.10 sf x 7 rows 35.00' Header x 7.10 sf x 2 = 497.0 cf Inside
#3	88.00'	0.009 af	5.00'D x 6.50'H Vertical Cone/Cylinder x 3
		0.146 af	Total Available Storage

Storage Group A created with Chamber Wizard

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Type II 24-hr 25 YEAR Rainfall=4.00"

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Device	Routing	Invert	Outlet Devices
#1	Primary	90.00'	6.0" Round Culvert L= 45.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 90.00' / 87.70' S= 0.0511 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=1.75 cfs @ 12.46 hrs HW=93.67' (Free Discharge)

↑**1=Culvert** (Inlet Controls 1.75 cfs @ 8.90 fps)

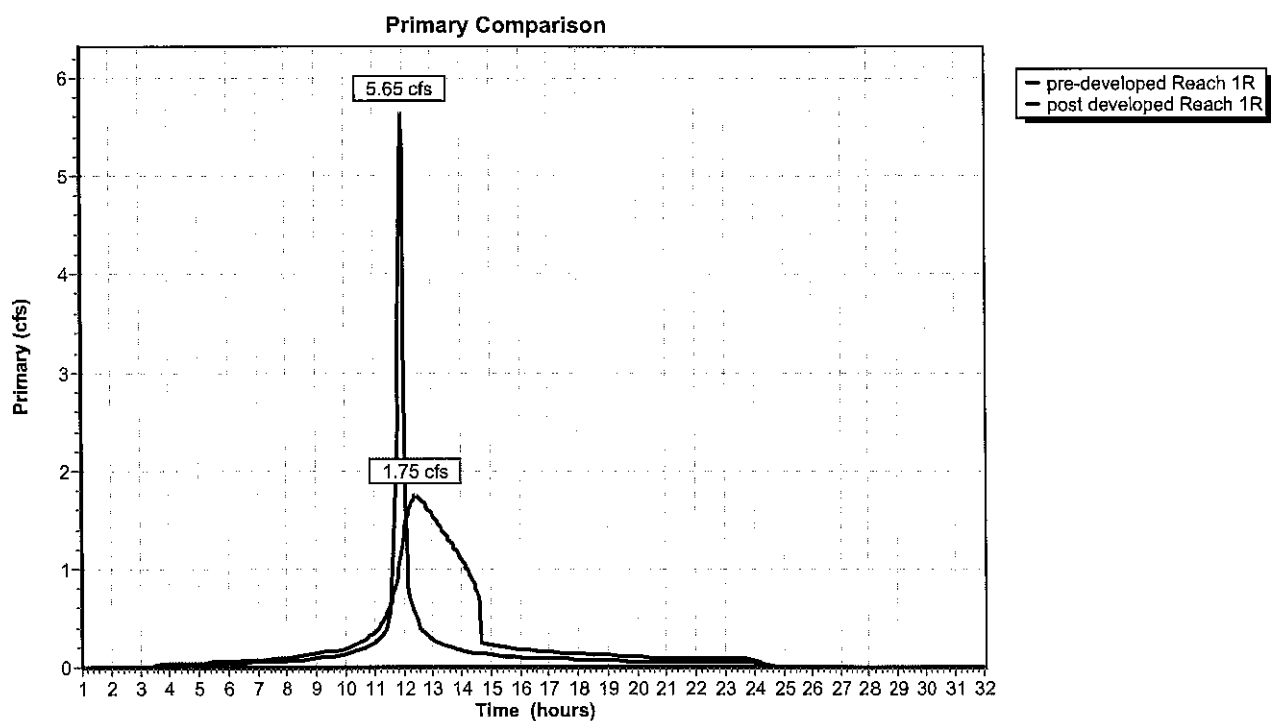
post developed

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Type II 24-hr 25 YEAR Rainfall=4.00"

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PROJECT NAME/LOCATION:
DESCRIPTION: [ADDITIONAL REUSE]
THE CROSSROADS AT GENESEE

19 DOAT STREET
BUFFALO, NY 14211

PROJECT NUMBER: **1734**
I.E. PROJECT NUMBER: 17-42

STRUCTURAL / CIVIL
TREDO ENGINEERS
755 SENECA ST. STE 202
BUFFALO, NY 14210
716-876-7147

SECTION

ARCHITECT OF RECORD

HHL Architects
172 Allen Street, Buffalo, New York 14201
716.885.0743 ■ F: 716.885.6414
HHLArchitects.com



DRAWING TITLE		DESIGN DEVELOPMENT	
EXISTING CONDITIONS & SITE DEMOLITION PLAN		NO. DATE DESCRIPTION	

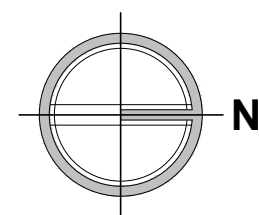
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STATE OF NEW YORK
JAMES H. HARRIS, P.E.
LICENSED PROFESSIONAL ENGINEER
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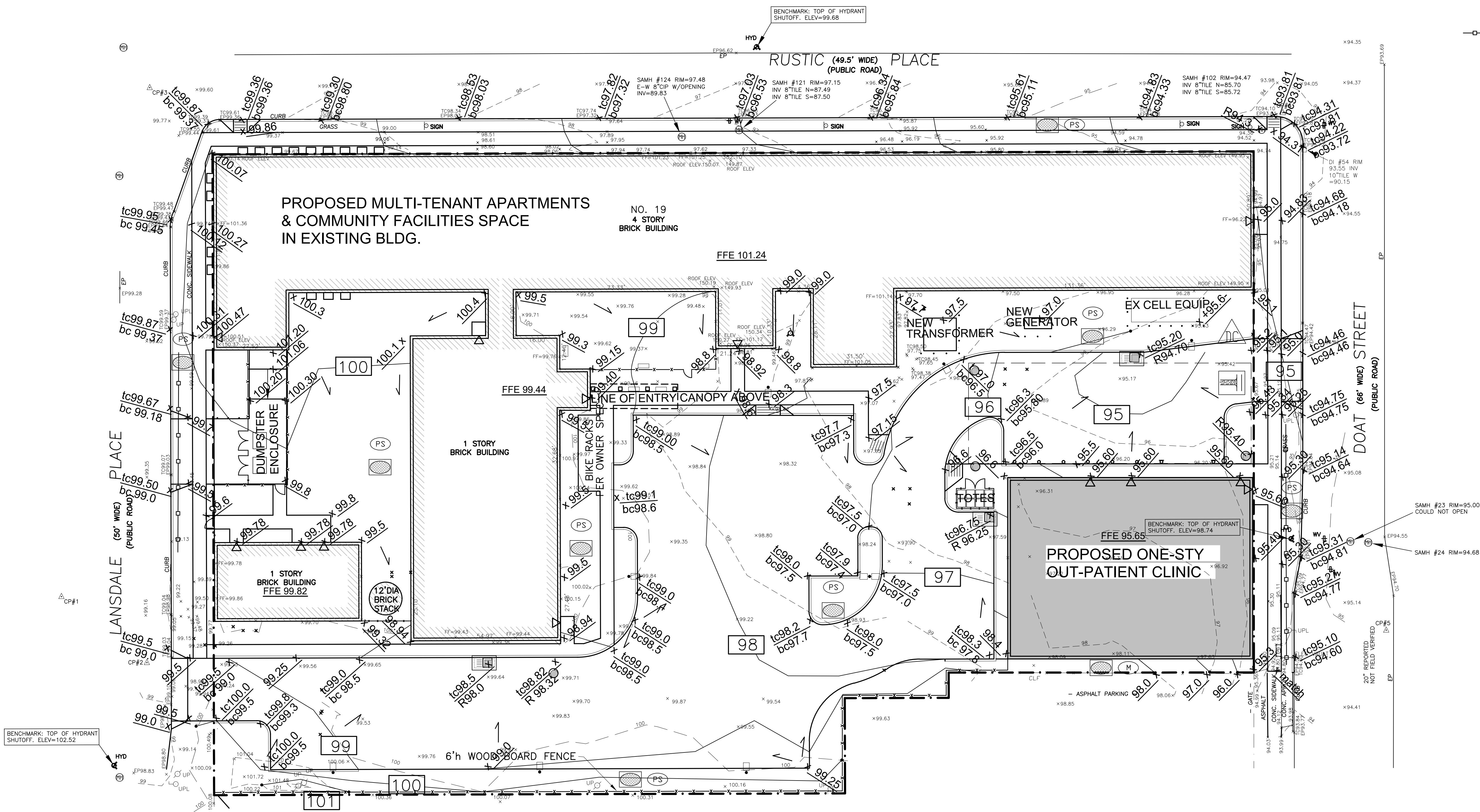
ISSUE DATE: 9.12.2019

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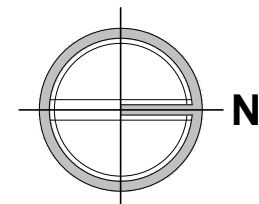
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- EROSION CONTROL LEGEND:**
- SILT FENCE/12" SILT SOCK
 - DUST CONTROL
 - STABILIZED CONSTRUCTION ENTRANCE
 - EXCAVATED DROP INLET PROTECTION
 - MULCHING
 - PERMANENT SEEDING
 - TOPSOILING

SITE GRADING AND EROSION CONTROL PLAN

1" = 20'



LEGEND:

- | | | | |
|--|--|--------|--|
| | • ELEV | • ELEV | • ELEV |
| | DENOTES PROPOSED CATCH BASIN/MANHOLE | | DENOTES EXISTING STORM SEWER DROP INLET |
| | DENOTES PROPOSED CLEANOUT | | DENOTES EXISTING STORM SEWER MANHOLE |
| | DENOTES CONNECTION TO EXISTING UTILITY | | DENOTES EXISTING SANITARY SEWER MANHOLE |
| | DENOTES PROPOSED LIGHT POLE | | DENOTES EXISTING HYDRANT |
| | DENOTES PROPOSED ROOF DRAIN | | DENOTES EXISTING LIGHT POLE |
| | DENOTES NEW CONTOURS | | DENOTES EXISTING WATER VALVE |
| | DHE | | DENOTES EXISTING CHAIN LINK FENCE |
| | ST | | DENOTES EXISTING UTILITY POLE AND OVERHEAD UTILITIES |
| | SAN | | DENOTES EXISTING STORM SEWER LINE |
| | W | | DENOTES EXISTING SANITARY SEWER LINE |
| | E | | DENOTES EXISTING WATER LINE |
| | G | | DENOTES EXISTING ELECTRIC LINE |
| | ST | | DENOTES EXISTING GAS LINE |
| | SAN | | DENOTES PROPOSED STORM SEWER LINE |
| | W | | DENOTES PROPOSED SANITARY SEWER LINE |
| | | | DENOTES PROPOSED WATER LINE |

