

**ENGINEERING CONTROLS EVALUATION WORK  
PLAN**

**FOR**

**BUFFALO BUSINESS PARK SITE  
1800 BROADWAY STREET  
NYSDEC SITE #V00663-9  
CITY OF BUFFALO, ERIE COUNTY, NEW YORK**

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**MARCH 2022**  
(REVISION 01)

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**FIGURES**

FIGURE 1	.....	GROUNDWATER MONITORING
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FIGURE 2 .....SUB-SLAB DEPRESSURIZATION LOCATIONS

## ACRONYM LIST

ASP	ANALYTICAL SERVICES PROTOCOL
BGS	BELOW GROUND SURFACE
BGS	BELOW GROUND SURFACE
BBP	BUFFALO BUSINESS PARK
BSA	BUFFALO SEWER AUTHORITY
CAMP	COMMUNITY AIR MONITORING PLAN
COC	CONTAMINANTS OF CONCERN
CPP	CITIZEN PARTICIPATION PLAN
CRA	CONESTOGA-ROVERS & ASSOCIATES
DCE	1,2-DICHLOROETHANE
DER	DEPARTMENT OF ENVIRONMENTAL REMEDIATION
DNAPL	DENSE NON-AQUEOUS PHASE LIQUID
DUSR	DATA USABILITY AND SUMMARY REPORT
EDD	ELECTRONIC DATA DELIVERABLE
ELAP	ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM
HASP	HEALTH AND SAFETY PLAN
IRM	INTERIM REMEDIAL MEASURES
MS/MSD	MATRIX SPIKE / MATRIX SPIKE DUPLICATE
NYSDEC	NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
NYSDOH	NEW YORK STATE DEPARTMENT OF HEALTH
OM&M PLAN	OPERATION, MONITORING AND MAINTENANCE PLAN
PAH	POLYCYCLIC AROMATIC HYDROCARBONS
PCE	TETRACHLOROETHYLENE
PID	PHOTO-IONIZATION DETECTOR
RAWP	REMEDIAL ACTION WORK PLAN
RI	REMEDIAL INVESTIGATION

ROD	RECORD OF DECISION
SCO	SOIL CLEANUP OBJECTIVES
SITE	1800 BROADWAY, BUFFALO, NEW YORK
SSDS	SUB-SLAB DEPRESSURIZATION SYSTEM
SVOC	SEMI-VOLATILE ORGANIC COMPOUNDS
TCE	TRICHLOROETHENE
U.S. EPA	UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
VC	VINYL CHLORIDE
VOC	VOLATILE ORGANIC COMPOUNDS

**CERTIFICATION STATEMENT**

I H. Nevin Bradford, III, P.E. certify that I am currently a NYS registered professional engineer and that this 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).



\_\_\_\_ P.E.

February 7, 2022 DATE



## **1 INTRODUCTION**

This work plan provides a description of the procedures that will be implemented to assess the effectiveness of the engineering controls at the 1800 Broadway Street (the Site). This work plan has been prepared in accordance with New York State Department of Environmental Conservation (NYSDEC) Division of Environmental Remediation “Technical Guidance for Site Investigation and Remediation” (DER-10). To effectively characterize the environmental conditions, this work plan discusses the following:

- Current and historic site conditions;
- Contaminants of concern and the extent of the contamination;
- Engineering control evaluation scope of work, and;
- Quality controls and protocols for analytical sampling.

The Site contains two operable units: Unit 1 was an area of soil contamination which has been remediated by removal of contaminated soils; and Unit 2 is an area of groundwater contamination located in the same area where the soil contamination was located. In addition to the groundwater remedial program, there was concern regarding the potential for vapor intrusion into one of the buildings located south of the area of groundwater contamination.

Remediation of the groundwater contamination at the Site consists of a groundwater pumping system using three wells (MW-3BR, MW-4BR and MW-5 ABR) located within the groundwater contaminant plume. Wells are pumped using appropriate controllers to achieve drawdown of the water table and thus achieve hydraulic capture of contaminated groundwater. Wells are sampled periodically to evaluate if decreases in contaminant levels are being achieved.

Recent groundwater sampling conducted by C&S indicates that contamination may be increasing. The NYSDEC stated that “[a]lthough the present pumping system was approved by the Department in 2009-2010, it is the responsibility of the site owner/consultant to evaluate and upgrade/modify the system as necessary to increase efficiency of the ongoing groundwater remediation. An increase in VOC concentrations in the groundwater may also lead to an increase in soil vapor intrusion potential.” This sections below describes the scope of the evaluation to determine the effectiveness of the site specific engineering controls.

## **1.1 Site Description**

The Buffalo Business Park property is located in the Buffalo, New York, County of Erie (see Figure 1) and is identified as Block 1, Lots 5.1 and 5.2 on the County of Erie Tax Map. The Buffalo Business Park property is an approximately 22 acre area bounded by NYSDOT property to the north and east, Broadway Street to the south, and TOPS Market to the west.

Buffalo Business Park (BBP) entered into a VCA with the NYSDEC to remediate a 1.004-acre portion of property located in Buffalo, New York ("Site"). This VCA required the Remedial Party, Buffalo Business Park, to investigate and remediate contaminated media at the Site.

The Site consists of a 1 Acre portion of the Buffalo Business Park property located at 1800 Broadway in Buffalo, New York. The site is located at the entrance to the property and consists primarily of parking and driveway areas and a portion of the commercial/industrial building fronting on Broadway.

**Figure 1** shows the location of the Site.

## **1.2 Site History**

The Site and the vicinity were historically used for railroad transport/tracks associated with the Pullman Car Company from 1900 until at least 1950.

Previous investigations identified the presence of VOCs in site soils and groundwater including tetrachloroethene in soil, and tetrachloroethene, trichloroethene, cis-1,2-dichloroethene, trans-1,2-dichloroethene, methylene chloride and vinyl chloride in groundwater. Based on this information, the site was divided into two operable units for purposes of investigation and remediation:

- Operable Unit #1, consisting of that area of site with defined contaminated soils; and
- Operable Unit #2, consisting of that area of the site with defined groundwater contamination.

In October 2003, a remedial action work plan (RAWP) was prepared to excavate soils from Operable Unit #1 at the site, described as an area of soil contamination. This remedy proposed the excavation of impacted soils and treatment in an ex-situ soil vapor extraction system. This RAWP was submitted to the NYSDEC for review and was subsequently approved on August 10, 2005. The approved remedy was subsequently reviewed and modified to consist of excavation of contaminated soil with off-site disposal. The revised RAWP was subsequently approved by the NYSDEC on January 10, 2006.

## **1.3 Site Geography, Geology, and Hydrogeology**

Several environmental studies have previously been conducted at BBP from which subsurface conditions have been generally characterized. The overburden materials are approximately 14 feet in thickness at BBP. They generally consist of fill materials that are variable in thickness to a depth of approximately two feet. Fill material is generally described as sands and gravel with some ash, brick, wood and railroad ties which is consistent with its past use as a rail yard. This is underlain by native materials consisting of brown gravelly sands with some silt. This material is laterally variable, but is generally 14

to 16 feet in thickness. Bedrock is at approximately 14 feet below ground surface (BGS), and consists of gray, crystalline Limestone (Onondaga Limestone.)

Groundwater is present in the overburden with groundwater flow direction to the southwest and southeast. Groundwater in bedrock reportedly flows to the southeast; however, the overburden and bedrock hydraulic zones are likely connected given the highly permeable nature of the overburden gravelly sands.

## 2 SUMMARY OF ENVIRONMENTAL CONDITIONS

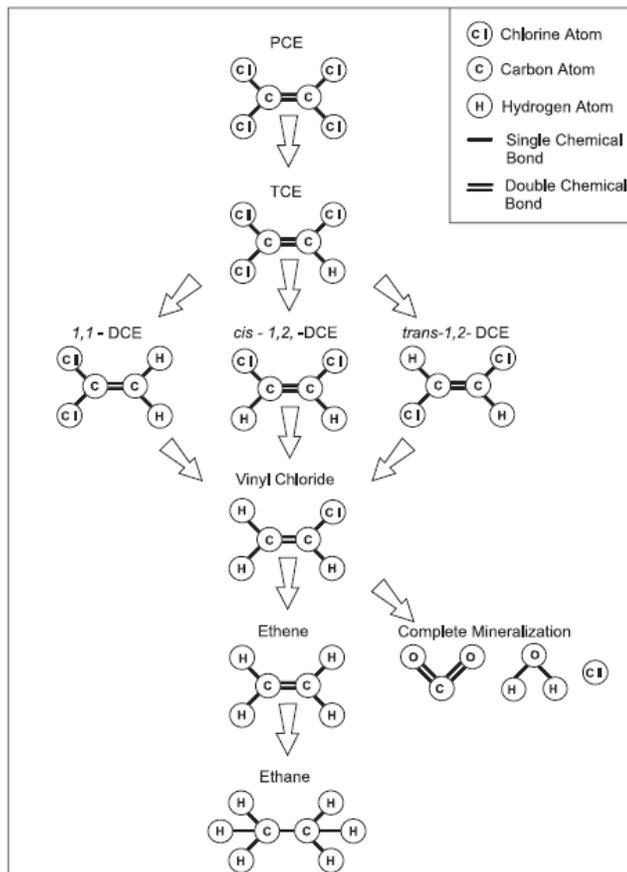
### 2.1 Nature and Extent of Contamination

Chlorinated solvents, primarily, trichloroethene and its daughter compounds, were identified as the contaminants of concern (COC) for this Site. TCE is a man-made volatile organic compound used for degreasing metal and electronic parts. Remedial considerations for TCE include its low solubility value and heavy molecular weight. TCE is in a class of chemicals called dense non-aqueous phase liquids (DNAPL) that sink through the water column until they encounter an impermeable barrier.

Groundwater contaminant plumes with TCE can undergo a process of reductive dechlorination, during which chlorine atoms are stripped from TCE and daughter compounds are produced. The rate of dechlorination can vary based on:

- Amount of TCE in the subsurface;
- Amount of organic material present in the subsurface; and
- Type and concentration of electron acceptors available in the system.

The process of TCE reductive dechlorination is shown below:



There are three principal contaminants present in groundwater: tetrachloroethene, trichloroethene and dichloroethene. Vinyl chloride is also present in some wells at lesser concentrations. Three of these compounds (trichloroethene, dichloroethene and vinyl chloride) are degradation products of tetrachloroethene. Review and comparison of the 2021 groundwater analytical results shows the following:

- **MW-2BR.** Four volatile organic compounds (VOCs) were present in the groundwater sample. In 2021, Dichloroethene was present at slightly higher concentration of 190 micrograms per liter (ug/l) than in 2020 (133 ug/l). Tetrachloroethene was present at 44 ug/l, this was not detected since 2017 (42 ug/l). Trichloroethene was present at 16 ug/l, this was not detected since 2016 (69 ug/l). Vinyl chloride was present at 15 ug/l which is similar to the concentration detected in 2020 (14.7 ug/l).
- **MW-3BR.** Three VOCs were present in the groundwater sample. In 2021, Dichloroethene was present at significantly higher concentration of 5,900 ug/l than in 2020 (2,390 ug/l). Tetrachloroethene was present at 3,000 ug/l, which is similar to the concentration detected 2020 (3,170 ug/l). Trichloroethene was present at 1,800 ug/l, which is a slightly higher concentration detected 2020 (995 ug/l).
- **MW-4BR.** Three VOCs were present in the groundwater. The concentration of Dichloroethene was slightly lower in 2021 (2,400 ug/l) compared to the 2020 concentration (2,760 ug/l). The 2021 concentration of Tetrachloroethene significantly increased (4,900 ug/l) versus 2020 (1,960 ug/l). In 2021, Trichloroethene significantly increased (1,300 ug/l) versus 2020 (877 ug/l). Lastly, vinyl chloride was not detected which is a significant decrease from 2020 (52.5 ug/l).
- **MW-5BR.** One VOCs was present in the groundwater sample. The 2021 concentration of dichloroethene (4,700 ug/l) significantly decreased from the 2020 concentration of 6,080 ug/l. Tetrachloroethene, trichloroethene and vinyl chloride was not detected in the 2021 groundwater sample.
- **MW-5ABR.** Two VOCs was present in the 2021 groundwater sample. Dichloroethene (12,000 ug/ l) increased concentration over 2020 (6,070 ug/l). Tetrachloroethene was detected at 320 ug/l which is similar to the 353 ug/l concentration is 2020.

### **3 OBJECTIVES, SCOPE AND RATIONALE**

The goal for this evaluation is to assess the effectiveness of the current remedial measures and determine if further remedial measures are warranted.

#### **3.1 Site Specific Engineering Controls**

The engineering controls for this Site are:

- **Sub-Slab Depressurization System:** An active sub-slab depressurization system (SSDS) has been installed to mitigate potential vapor intrusion concerns within the western end of the New York Frame building (southeast of Operable Unit 2). The system is comprised of two sub-slab vapor extraction pits, each with a vertical riser that extends upward and penetrates the roof structure, exhausting to the outdoor air above the roof level. Each riser is equipped with a mitigation fan to create a negative pressure beneath the foundation. The active sub-slab depressurization system will not be discontinued unless prior written approval is granted by the NYSDEC.
- **Groundwater Pumping System:** Groundwater monitoring wells MW3-BR, MW4-BR and MW5A-BR are operated as pumping wells. The groundwater pumping system will not be discontinued unless prior written approval is granted by the NYSDEC. In the event that monitoring data indicates that the groundwater pumping system is no longer required, a proposal to discontinue the system will be submitted by Buffalo Business Park. Conditions that warrant discontinuing the groundwater pumping system include contaminant concentrations in groundwater that: (1) reach levels that are consistently below ambient water quality standards, (2) have become asymptotic to a low level over an extended period of time as accepted by the NYSDEC, or (3) the NYSDEC has determined that the groundwater pumping system has reached the limit of its effectiveness. This assessment will be based in part on post-remediation contaminant levels in groundwater collected from monitoring wells located throughout the site. Systems will remain in place and operational until permission to discontinue their use is granted in writing by the NYSDEC.

#### **3.2 Standards, Criteria, and Guidance**

The remedy must conform to promulgated standards and criteria that are directly applicable or that are relevant and appropriate. The standards, criteria and guidance (SCGs) that will be, or will likely be, directly applicable to the site's remediation include those listed below. A more complete listing of SCGs can be found at:

<http://www.dec.ny.gov/regulations/61794.html>

- Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York (6 NYCRR) Part 375 – Environmental Remediation Programs
- 6 NYCRR Part 364 - Waste Transporters
- 6 NYCRR Part 700-706 - Water Quality Regulations for Surface Waters and Groundwater

- 6 NYCRR Part 750-757 - Implementation of NPDES Program in New York State
- 6 NYCRR Part 608 - Use and Protection of Waters
- 6 NYCRR Part 663 - Freshwater Wetlands Permit Requirements
- 6 NYCRR Part 664 - Freshwater Wetlands Maps and Classifications
- 12 NYCRR Part 56 - Asbestos
- NYSDEC guidance document “DER-10 – Technical Guidance for Site Investigation and Remediation”, dated May 2010, as updated by its errata sheet
- NYSDEC guidance document “CP-51: Soil Cleanup Guidance Policy”, dated October 2010 (CP-51)
- NYSDEC Division of Water (DOW) Technical and Operational Guidance Series (TOGS)
- NYSDEC DOW guidance document “Technical and Operational Guidance Series (TOGS) 1.1.1 - Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations”, including its errata sheets and addenda
- NYSDEC DOW guidance document “New York State Standards and Specifications for Erosion and Sediment Control”, dated November 2016
- NYSDEC Division of Fish and Wildlife (DFW) guidance document “Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites”, dated October 1994
- NYSDEC DFW guidance document “Screening and Assessment of Contaminated Sediment”, dated June 2014
- New York State Department of Health (NYSDOH) guidance document “Guidance for Evaluating Soil Vapor Intrusion in New York”, dated October 2006, as updated
- Title 29 of the Code of Federal Regulation (CFR) Part 1910.120 - Hazardous Waste Operations and Emergency Response
- Title 33 of the United States Code 466 Section 404 - Clean Water Act
- 33 CFR Parts 320 -330 - Regulatory Programs of the Corps of Engineers

#### **4 ENGINEERING CONTROL EVALUATION**

The following steps will be implemented to assess the effectiveness of the remedial measures:

- Assess physical condition of all existing wells, pumps, and controllers;
- Groundwater sampling from all functional groundwater monitoring wells;
- Review of historic data (groundwater levels and analytical results) and interpolation of the historic data to create a contaminant plume model.
- Visually assess the condition and operation of the existing sub-slab depressurization systems present in the
- Conduct pressure field extension testing to measure pressure gradients created beneath the slab of the by the SSDS systems,

#### **5 GROUNDWATER PUMPING SYSTEM EVALUATION**

This section of the Work Plan includes:

- Groundwater Monitoring
- Sampling Program
- Laboratory Analysis

##### **5.1 Groundwater Monitoring**

A groundwater monitoring program has been designed to provide the data necessary to demonstrate the effectiveness of the treatment program. Groundwater monitoring will be conducted on an annual basis following the procedures in this Work Plan.

###### 5.1.1 Monitoring Well Network

The Site contains a total of six monitoring wells and six offsite monitoring wells installed between 2004 and 2010. The monitoring wells below have been shown to be directly within the contaminant plume or immediately adjacent to it.

MW1-BR	MW7-BR
MW2-BR	MW8-BR
MW3-BR	MW5-ABR
MW4-BR	OS-1
MW5-BR	OS-2
MW6-BR	OS-3

###### 5.1.2 Groundwater Monitoring

Groundwater levels will be recorded from the 12 monitoring wells list above when the pumping system is on and off.

To characterize groundwater conditions at the Site, 11 existing monitoring wells will be sampled when the pumping system has been turned off for one to three days. The groundwater samples will be analyzed for Target Compound List (TCL) VOCs. The locations of the monitoring wells to be sampled are shown in **Figure 1**.

Groundwater sampling will be conducted using low-flow purging and sampling techniques. Before purging the well, water levels will be measured using an electric water level sounder capable of measuring to the 0.01-foot accuracy. Peristaltic or bladder pumps using manufacturer-specified tubing will be used for purging and sampling groundwater. Calibration, purging and sampling procedures will be performed as specified by the USEPA<sup>1</sup> for low-flow sampling. Decontamination will be conducted after each well is sampled to reduce the likelihood of cross contamination. Calibration times, purging volumes, water levels and field measurements will be recorded in a field log.

Purge fluids will be treated with activated carbon prior to being allowed to infiltrate the ground surface of the Site.

## **5.2 Contaminant Plume Modeling**

The modeling program is designed to provide graphical tools to evaluate the movement of groundwater contamination over time. Historic analytical data combined with recent analytical data (see above) will be used to develop an interpolated model of contaminant concentrations across the Site. Historical data will be presented to show the movement of the contaminant plume over time.

The modeling will be presented as maps showing iso-contours of TCE and its daughter compounds and statistical analysis of contaminant concentrations over time.

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<sup>1</sup> U.S. EPA Region 1 Low Stress (low-flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells, January 19, 2010.

## 6 SUB-SLAB DEPRESSURIZATION SYSTEM EVALUATION

The sub-slab depressurization system will be inspected to confirm proper operation, to identify areas/items in need of repair or replacement, and to review facility and site conditions that could affect the operation and effectiveness of the system. The inspection of the mitigation systems will include:

- A visual inspection of the complete system (e.g., vent fans, piping, wiring, labeling on system, etc.) for evidence of wear, heat stress, cracks, or degradation;
- An inspection of all surfaces to which vacuum is applied;
- Measurement of in-pipe vacuum in the piping between the extraction points and each mitigation fan;
- Identification, documentation, and repair any leaks in accordance with Sections 4.3.1(a) and 4.3.4(a) of the New York State Department Of Health (NYSDOH) Guidance, as follows:
  - With the systems running, smoke tubes shall be used to check for leaks through pipe fittings, mitigation fan housing, concrete cracks, floor joints and at the suction points
  - Any leaks identified will be re-sealed until smoke is no longer observed flowing through the opening)
- Test operation of fans by disconnecting power supply to fan;
- Inspection of the exhaust or discharge points to verify that no air intakes have been located nearby; and
- Interview of facility maintenance personnel and an appropriate occupant seeking comments and observations regarding the operation of the systems.

In addition to the visual inspection, pressure-field extension testing will be performed to measure the degree of negative pressure and aerial extent of the negative pressure field exerted beneath the slab by the mitigation system. The pressure field extension testing will be performed by drilling small diameter holes through the foundation slab at various distances from the sub-slab extraction points. A temporary micro-manometer will be used to measure pressure differential at each slab penetration. The data will be used to estimate the effective radius of influence of each extraction point.

The sub-slab system is shown on **Figure 2**.

## 7 QUALITY ASSURANCE AND QUALITY CONTROL PROTOCOLS

To ensure that suitable and verifiable data results are obtained from the information collected at the Site, quality assurance procedures are detailed in this section.

### 7.1 **Sampling Methods, Analytical Procedures and Documentation**

#### 7.1.1 Sampling Methods

Sampling procedures will be conducted in accordance with the NYSDEC *Sampling Guidelines and Protocols Manual*. Collection of representative samples will include the following procedures:

- Ensuring that the sample taken is representative of the material being sampled;
- Using proper sampling, handling and preservation techniques;
- Properly identifying the collected samples and documenting their collection in field records;
- Maintaining chain-of-custody; and
- Properly preserving samples after collection.

#### Water Sampling

Groundwater sampling will be conducted in accordance with USEPA guidance for low-flow purging and sampling, as described in **Section 5**.

Water samples will be collected in 40 ml vials and immediately placed on ice. The water will be analyzed for VOCs on a standard turnaround time.

In addition to collecting VOC samples for laboratory analysis, groundwater chemistry will be continuously monitored during sample collection. Groundwater chemistry will be monitored for the following:

- pH;
- Turbidity;
- Oxidation Reduction Potential;
- Specific Conductance;
- Dissolved Oxygen; and
- Temperature.

#### QA/QC Sampling

Duplicate samples will be collected from a minimum of 5% of the locations, and will be selected randomly. Additionally, Quality Assurance/Quality Control (QA/QC) samples will be collected, and the following describes the minimum number of groundwater QA/QC samples.

- Trip blank – 1 per shipment;
- Blind Duplicate – 1 per monitoring event, and;
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) – 1 MS / 1 MSD per monitoring event.

### 7.1.2 Analytical Procedures

#### Laboratory Analysis

Laboratory analysis will be conducted by a third-party laboratory that is accredited by the NYSDOH Environmental Laboratory Accreditation Program (ELAP). Laboratory analytical methods will include the most current NYSDEC Analytical Services Protocol (ASP).

Soil and groundwater samples sent to a certified laboratory will be analyzed in accordance with EPA SW-846 methodology for the following contaminants:

- VOCs (EPA Method 8260).

Category B deliverable will be requested to be used in a third-party data validation.

#### Data Usability

Data Usability Summary Report (DUSR) will be performed by a third-party data consultant using the most recent methods and criteria from the U.S. EPA. The DUSR will assess all sample analytical data, blanks, duplicates and laboratory control samples and evaluate the completeness of the data package.

### 7.1.3 Documentation

#### Custody Procedures

As outlined in *NYSDEC Sampling Guidelines and Protocols*, a sample is in custody under the following conditions:

- It is in your actual possession;
- It is in your view after being in your physical possession;
- It was in your possession and then you locked or sealed it up to prevent tampering;  
or
- It is in a secure area.

The environmental professional will maintain all chain-of-custody documents that will be completed for all samples that will leave the Site to be tested in the laboratory.

## Reporting

Based on the results of the work described above, one report will be prepared to describe the methodologies and results of the engineering controls evaluation. The portions of the report will describe:

- Investigative methods;
- Observations and findings;
- Inspection/monitoring observations of the remedial measures;
- Analytical results; and
- Assessment on groundwater concentrations in proximity to the SSDS.

The documents will be submitted to the NYSDEC for review and approval.

## **8 SCHEDULE**

Below is an anticipated schedule of milestones for the remediation of the Site.

<b><u>Anticipated Date</u></b>	<b><u>Milestone</u></b>
Early February 2022	Remedial Action Work Plan Submission
Early March 2022	Work Plan Approved
Mid-April 2022	Groundwater Monitoring
Early July 2022	Develop Contaminant Plume Model
Early September 2022	Vapor Intercept System Evaluation (if needed)
Early October 2022	Periodic Review Report Submission
Late October 2022	Periodic Review Report Acceptance by DEC

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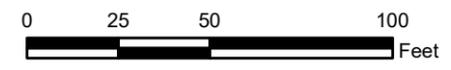
## **FIGURES**

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**Legend**

-  VOLUNTEER CLEANUP PROGRAM BOUNDARY
-  PROPERTY BOUNDARY
-  GROUNDWATER MONITORING WELL



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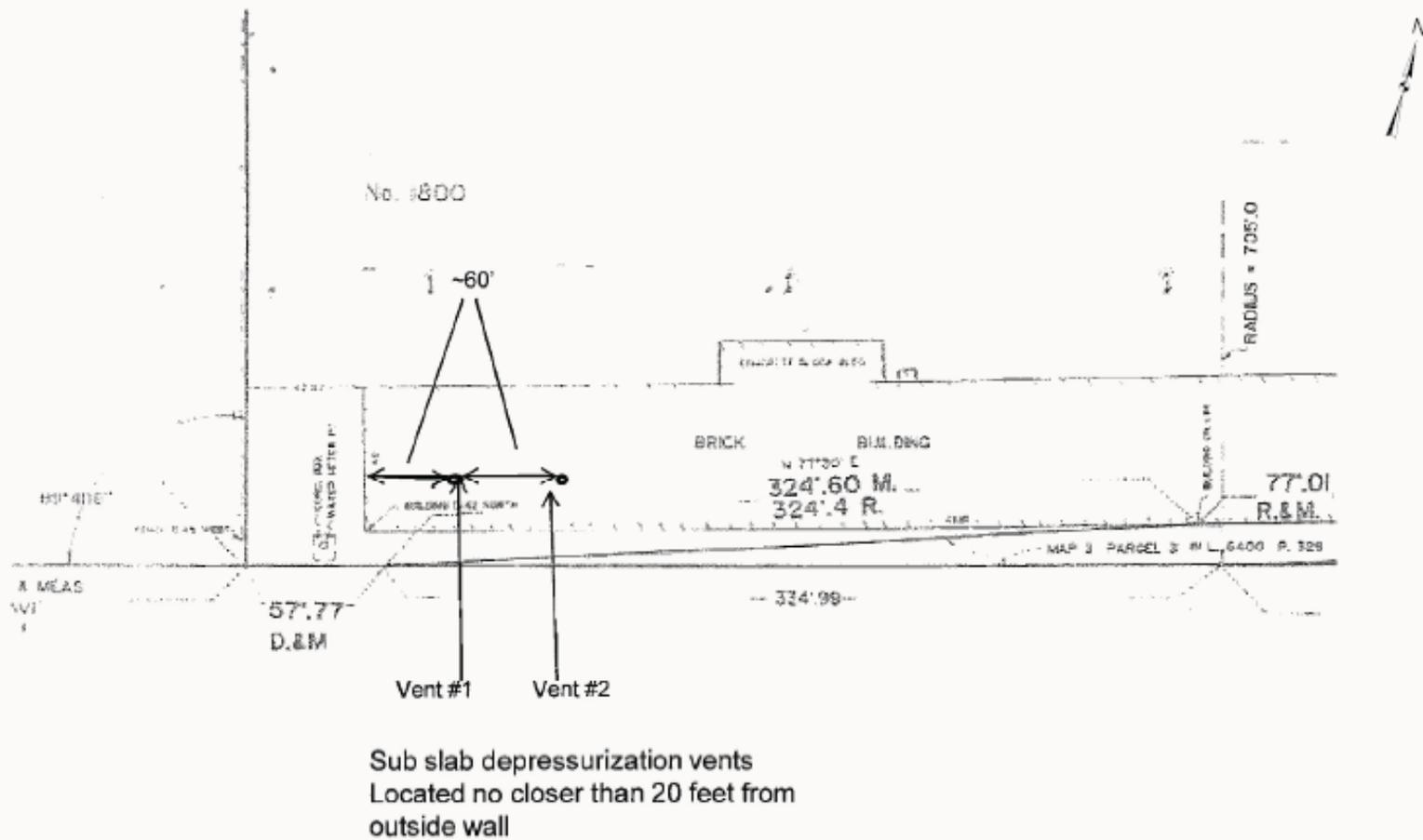


**BUFFALO BUSINESS PARK  
 VOLUNTARY CLEANUP PROGRAM  
 SITE #V00663-9  
 BUFFALO, NEW YORK**

MARK	DATE	DESCRIPTION
REVISIONS		
	PROJECT NO:	Y05.001.002
	DATE:	1/24/2022
	DRAWN BY:	C. MARTIN
	DESIGNED BY:	C. MARTIN
	CHECKED BY:	D. RIKER
<small>NO ALTERATION PERMITTED HEREON EXCEPT AS PROVIDED UNDER SECTION 7209 SUBDIVISION 2 OF THE NEW YORK EDUCATION LAW</small>		

**GROUNDWATER MONITORING**

**FIGURE 1**



BUFFALO BUSINESS PARK

SUB-SLAB DEPRESSURIZATION LOCATIONS



BUFFALO BUSINESS PARK/VCP

FIGURE 2