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FEASIBILITY STUDY AND REMEDIAL ALTERNATIVES ANALYSIS

251 Walsh Road Site
251 Walsh Avenue
New Windsor, New York
DEC Site ID #336077

Prepared For:

Contract# D009808, Work Assignment No. 18
New York State Department of Environmental Conservation
Division of Environmental Remediation
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HRP #: DEC1018.P3

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251 Walsh Road Site
251 Walsh Avenue
New Windsor, New York
DEC Site ID #336077

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I, Thomas S. Seguljic, certify that I am currently a [NYS registered professional engineer or Qualified Environmental Professional as defined in 6 NYCRR Part 375] and that this Report 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) and that all activities were performed in full accordance with the DER-approved work plan and any DER-approved modifications.

Thomas S. Seguljic, P.E., P.G.

1.0 INTRODUCTION

This report presents a Feasibility Study (FS) prepared by HRP Associates, Inc. (HRP) in connection with the 251 Walsh Road Site (Site #336077, hereinafter referred to as the Site), located at 251 Walsh Avenue, New Windsor, New York (**Figure 1**). This work was completed under New York State Department of Environmental Conservation (NYSDEC) work assignment number D009808-18.

A Remedial Investigation (RI) was completed at the Site between October 2021 through June 2024. The purpose of the RI was to identify and characterize the potential source(s) of contamination and define the nature and extent of impacts at the Site. RI Sample locations are shown on **Figure 2.**

The Feasibility Study (FS) and Alternative Analysis (AA) discussed herein was completed to evaluate potential remedial alternatives given the results and conclusions involved in the RI.

This report summarizes the findings of the RI report and identifies, evaluates, and recommends a remedy to address the impacts identified in the RI.

1.1 Site History

The 1.2 acre site is situated on tax parcel – Section 13, Block 5 Lot 58, sublot 2 and is occupied by an 18,000 square foot, single story industrial facility constructed of under blocks on a concrete slab. The current building contains multiple access points and a loading dock of the northern side of the building. The building is centrally located with the remainder of the property being mostly paved with some minor landscaping along Walsh Avenue. The Site is currently used by a variety of businesses.

The site was formerly a radio parts manufacturing facility however the exact date of construction is unknown. A 1913 Sanborn fire insurance map shows a "Radio Coil Manufacturing" facility building located on the current Site. The 2015 Site Characterization Report states that between the 1940s and the 1970s the facility manufactured electronic components that were cleaned with solvents. The solvents were reportedly stored in an exterior shed located on the north side of the building in the rear parking lot area. The exact location of this shed could not be determined but a review of the 1913 and 1913/modified 1950 Sanborn maps for the Site indicate the shed may have been located near the northeast corner of the current Site boundary.

2.0 PHYSICAL CHARACTERISTICS OF THE STUDY AREA

2.1 Topography

Topography at the Site is generally flat and lies at an elevation of approximately 145 feet above mean sea level. The surrounding topography slopes downwards to the north towards Quassaic Creek. The Site is covered by pavement surrounding the building with a gravel parking/vegetated strip on the northern side of the building.

2.2 Hydrology

2.2.1 Surface Water

Quassaic Creek is the closest surface body water located approximately 1,000 feet north of the Site (**Figure 1**). Quassaic Creek flows in an easterly direction approximately 1 mile before discharging into the Hudson River. The Quassaic Creek is classified by the NYSDEC as a Class "B" waterbody. According to 6 NYCRR Part 701: "The best usages of Class B waters are primary and secondary contact recreation and fishing. These waters shall be suitable for fish, shellfish and wildlife propagation and survival."

2.2.2 Wetlands

No obvious wetlands were observed on-site during the RI. According to the New York State Environmental Resource Mapper (ERM), no New York State regulated freshwater wetlands are present at, or adjacent to, the Site. The nearest NYSDEC regulated wetland is R3RBH, a freshwater wetland, located approximately 600 feet southeast of the Site. R3RBH is riverine, and measures approximately 1.47 acres according to the ERM.

2.2.3 Floodplains

The Site is located in an area designated as FEMA Flood Zone 36071C0332E where base flood elevations have been determined. The Site has been designated as "Zone X," indicating a minimal flood hazard over a 100-year period.

2.3 Geology

2.3.1 Soils and Surficial Geology

Based on RI soil sampling, Site soils generally consisted of 5 feet of sand and gravel overlaying up to 5 feet of clay silt and fine gravel. The overburden materials were consistent with alluvial/glacial gravels, sands, and silts underlain by till (upwards of 10 ft bg) overlying bedrock.

Surficial geology at the Site is mapped as glacially deposited till. The till is described as poorly sorted and has thickness variable from 1 to 50 meters (approximately 3-164 feet) (Cadwell et. al., 1986). According to the United States Department of Agriculture Natural Resources Conservation Service Web Soil Survey, 100% of the Site area is mapped as Hoosick gravelly sandy loam, featuring 3 to 8 percent slopes. A typical soil profile consists of gravelly sandy loam from 0 to 6 inches, very gravelly sandy loam from 6 to 28 inches, and very gravelly sand from 28 to 60 inches.

2.3.2 Bedrock Geology

Existing bedrock logs do not describe the bedrock geology, only noting the existence of competent rock. According to the Lower Hudson Valley Bedrock Map, bedrock is likely Ordovician Taconic Melange which has been defined as Early Cambrian through Middle Ordovician aged pelite with interbedded, poorly sorted, pebbles and clasts. Bedrock was encountered approximately 40 to 60 feet below grade (ft bg) during bedrock monitoring well installation.

2.3.3 Hydrogeology

Liquid level gauging of overburden monitoring wells recorded groundwater depths during the RI sampling event that ranged from 4.75 ft bg (MW-101 OB) to 11.71 ft bg (MW-102 OB). Bedrock monitoring wells recorded groundwater depths during the RI sampling that ranged from 7.69 ft bg (MW-100 BR) to 20.07 ft bg (MW-103 BR). Groundwater within this locale appears to exist under unconfined conditions and flows to the north/northwest (**Figure 3**).

The nearest known water supply well is a Federal USGS Well located approximately 1.6 miles west of the Site. The well is associated with the Newburgh Water Department. Potable water at the Site is reportedly provided by a public water supply.

3.0 SUMMARY OF REMEDIAL INVESTIGATION AND EXPOSURE ASSESSMENT

In June of 2024, HRP prepared a Remedial Investigation Report (RIR), to document the nature and extent of contamination identified within soil and groundwater at the Site during the RI and previous investigations. The RI also evaluated on-site soil vapor, off-site soil vapor and indoor air impacts to nearby properties. Compounds detected in the various media tested during the RI were compared to the following New York State guidance documents and standards (SCGs):

- Groundwater: NYSDEC Division of Water Technical and Operational Guidance Series (TOGS 1.1.1); Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations dated October 1993; Revised June 1998; ERRATA Sheet dated January 1999; Addendum dated April 2000; and Addendum dated 2023. Surface water results were compared to the NYSDEC Class B surface water criteria for all samples collected from the Quassaic Creek (a class B stream).

- Soil: NYSDEC Regulation, 6 NYCRR Subpart 375-6, "Remedial Program Soil Cleanup Objectives" which applies to the development and implementation of the remedial programs for soil and other media set forth in subparts 375-2 through 375-4 [Inactive Hazardous Waste Disposal Site Remedial Program, Brownfield Cleanup Program, and Environmental Restoration Program] and includes the soil cleanup objective tables developed pursuant to ECL 27- 1415(6). To be consistent with the current uses of the Site as a warehouse soil analytical results for this investigation were compared against NYSDEC 6 NYCRR Part 375-6 Unrestricted Use (UU), Commercial Use (CU), Restricted Residential Use (RR), and the Protection of Groundwater (PGW) Soil Cleanup Objectives (SCOs).

  NYSDEC guidance document "Screening and Assessment of Contaminated Sediment" dated June 24, 2014 (FSGVs). Specifically, results were compared to the threshold criteria for the following Sediment Classification Categories: Class A (to presents little or no potential for risk to aquatic life), Class B (additional information is needed to determine the potential risk to aquatic life), and Class C (high potential for the sediments to be toxic to aquatic life).

- Soil Vapor: NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York dated October 2006 and Updated Soil Vapor/ Indoor Air Decision Matrices A and B. The guidance values on Matrix A correspond to Carbon Tetrachloride, 1,1-dichloroethene, cis-1,2-DCE, and TCE. The guidance values on Matrix B correspond to methylene Chloride, PCE and 1,1,1-TCA. The decision matrixes provide recommended actions based on the concertation of certain chemicals in the indoor air in conjunction with the concentrations found in the sub slab samples. Recommended actions include "No Further Action," "Identify Source(s) and Resample or Mitigate," "Monitor" and "Mitigate."

3.1 Contaminants of Concern

Based on the results of the RI and previous investigations, the primary contaminants of concern (COCs) are chlorinated volatile organic compounds (CVOCs), specifically PCE, TCE and cis-1,2-DCE. CVOCs are detected at concentrations above applicable criteria in on-site groundwater samples.

3.2 Nature and Extent of Site Contamination

Data collected during site assessment sampling activities indicate that historical on-site activities have caused low level CVOC impacts to soil, groundwater, and soil vapor throughout the Site based upon data generated by HRP. The primary COC are CVOCs, specifically PCE, TCE and cis-1,2-DCE that were detected in samples collected from monitoring wells MW-8, MW-9, MW-10, MW-100-OB and MW-103-OB. This area will also be the primary focus of the Feasibility Study.

3.2.1 Soil

Volatile organic compound (VOC) detections in soil were limited to the northern portion of the Site and were generally detected at concentrations not exceeding the applicable Unrestricted Use Soil Cleanup Objectives (UUSCOs). One soil sample, MW-10 (18-20 ft bg), had a detected tetrachloroethene (PCE) concentration of 11 ug/kg, which exceeded the UUSCOs (1.3 ug/kg). The soil data results were not indicative of a recent release of chlorinated solvents and the data did not indicate that an ongoing soil source area was present. The VOC soil results are presented on **Figure 4**.

3.2.2 Groundwater

VOC groundwater impacts were limited to the northern parking areas of the Site. The groundwater data indicates that a VOC dissolved phase groundwater plume may be emanating from the area near MW-100 OB/BR and has migrated down gradient to the areas of MW-8 and MW-10. The likely source of the groundwater VOC impacts was a historical surface or near surface release of chlorinated solvents that partitioned from the soil to the groundwater. The groundwater VOC concentrations decrease significantly with distance from MW-100 OB/BR and the VOC groundwater impacts do not appear to impact the adjacent properties based upon existing data. The VOC groundwater results are presented on **Figure 5**.

3.2.2.1 Groundwater Sampling (2025)

A round of focused groundwater sampling was completed in February, 2025 at the request of the NYSDEC. This sampling was focused upon collecting representative samples from monitoring wells MW-5, MW-7, MW-8, MW-9, MW-10, MW-100-OB and MW-103-OB because of their locations relative to the observed groundwater impacts. During the field mobilization in 2023, monitoring wells MW-5, MW-8, and MW-103-OB could not be located due to regrading that had occurred on the Site. In 2025, HRP mobilized to the Site with a GPR subcontractor in an attempt to locate the wells. HRP determined that the wells had been destroyed and were unable to be sampled. The 2025 sampling was completed because historic groundwater quality data indicated that natural attenuation may be occurring within the groundwater column as evidenced by the lower concentrations of PCE and TCE and their breakdown products or cis-1,2-dichloroethene (Cis-1,2-DCE) and trans-1,2-dochloroethene (trans-1,2-DCE) at some locations near the inferred source. The samples were sent for laboratory analysis of the following parameters:

- Total and dissolved iron by EPA Method 6010C;
- Total and dissolved manganese by EPA Method 6010C;
- Chloride and sulfate by EPA Method 300.0;
- Sulfide by SM4500-S2-F;
- Nitrate by EPA Method 353.2;
- Total organic carbon (TOC) by EPA Method 5310C;
- TCL VOCs +10 by EPA Method 8260;
- Total alkalinity by EPA Method 310.2;
- Methane, ethane, and ethene by EPA Method RSK 175.

Field readings were also measured for Oxygen Reducing Potential (ORP), Dissolved Oxygen (DO), pH, conductivity and temperature using a field probe. The results of this sampling event are detailed in section **3.2.2.2**.

3.2.2.2 Lab Quality Results - 2025 MNA Sampling

Results of the MNA sampling that occurred for MW-7, MW-9, MW-10, and MW-100-OB showed overall decreases in all VOC concentrations from the prior sampling mobilizations. Two wells had detections of PCE with the maximum concentration of 25 µg/L. All breakdown products of PCE also decreased from former years. The analysis of the alkalinity indicated that the groundwater at the Site has a high buffering capacity. There were no detections of ethane, ethene or sulfide and low levels of total and dissolved iron and manganese. Detections of sulfate ranged from 33-44 mg/L and chloride from 250-370 mg/L. Based on the positive ORP values and DO groundwater concentrations, the overburden aquifer is currently exhibiting aerobic and oxidizing conditions. The groundwater results are presented in **Table 1** and on **Figure 6**.

3.2.3 Soil Vapor

Several rounds of soil vapor sampling were completed as part of site assessment activities. CVOCs were not detected at concentrations exceeding the 2017 NYSDOH SVI Guidance values during the initial onsite SVI sampling conducted in 2021. Following a review of the SVI analytical results, HRP identified that ethanol, a non-promulgated VOC compound, was detected in multiple samples at concentrations ranging from 5,700-11,000 ug/m^3 The ethanol detections may have resulted from poo sample handling and analysis in the laboratory; however, the laboratory was unable to confirm this supposition.

HRP personnel mobilized to the Site in March, 2022 and collected a new set of onsite SVI samples to better quantify the soil vapor and indoor air quality on the Site. Several VOC compounds including TCE, PCE, and methylene chloride were detected in onsite sub slab vapor and indoor air samples at concentrations exceeding the applicable 2017 NYSDOH SVI Guidance. The detected VOC concentrations in the sub-slab and indoor samples SV-7/IA-7 and SV-11/IA-11 resulted in a NYSDOH recommendation of identify source(s) and resample or mitigate the source of the impacts. Offsite SVI samples collected from 255 Walsh Ave. (SV-15/IA-15) and 247 Walsh Ave. (SV-4Comm/IA-Comm) contained several detected VOC compounds at concentrations exceeding the laboratory reporting limit. Methylene chloride was detected in sample SV-15/IA-15 at a concentration that resulted in a NYSDOH recommendation to identify source(s) and resample or mitigate the source of the impacts. The offsite SVI sample SV-4Comm/IA-Comm resulted in a recommendation of no further action. The detected VOC concentrations in the indoor air sample collected from 275 Walsh Ave. were all within the "no further action" indoor air thresholds as listed in the 2017 NYSDOH SVI Guidance.

The on-site soil vapor intrusion (SVI) sampling indicated that the VOC impacts in the soil and groundwater have impacted the Site's indoor air quality. Two of the eleven sub slab/indoor air samples (SV-7/IA-7 and SV-11/IA-11) contained detected VOC (PCE and trichloroethene [TCE], respectively) concentrations that resulted in a recommendation of identify source(s) and resample or mitigate per the NYSDOH decision matrix. One of the three off-site SVI samples, SV-15/IA-15 had detected concentrations of methylene chloride (11 ug/m^3 sub slab and 12 ug/m^3 indoor air) that resulted in a recommendation of identify source(s) and resample or mitigate. Methylene chloride was not detected in any of the on-site sub slab, groundwater or soil samples. These results indicate that the off-site methylene chloride detections are not related to the on-site VOC impacts and may have been caused by indoor air impacts from chemicals kept on the off-site property. All other offsite SVI samples resulted in a recommendation of no further action. The results of the off-site SVI sampling indicate that the Site has not impacted the indoor air quality of the adjacent properties that permitted access. Downgradient properties did not provide access of SVI sampling. The on-site and off-site SVI results are presented on **Figure 7.**

3.2.4 Surface Water and Sediments

The surface water and sediment samples indicate that the nearby Quassaic Creek has been impacted by SVOCs and metals. As stated in the RI, the composition and levels of onsite contaminants differ significantly from those found in the creek. The SVOC and metal impacts detected in the creek surface water and sediment samples are likely related to the former paper mill that was located adjacent to the creek and not from the Site based upon existing data.

3.2.5 Data Gaps

Based on the analytical results of the RI, there are no significant data gaps that impact the evaluation of remedial options for the Site.

3.3 Qualitative Human Health Exposure Assessment

An exposure pathway describes how an individual may be exposed to contaminants originating from the Site. As defined by the NYSDEC, an exposure pathway has five elements: 1) a contaminant source, 2) contaminant release and transport mechanisms, 3) a point of exposure, 4) a route of exposure, and 5) a receptor population. An exposure pathway is complete when all five elements of an exposure pathway exist. An exposure pathway is considered a potential pathway when one or more of the elements currently does not exist but could in the future. This is presented herein even though soil impacts were only observed in one sample and do not pose a long term risk under current site conditions.

3.4 Soil

The five exposure pathway elements for on-site soils are evaluated below

Exposure Pathway Element	Analysis
Contaminant Source	CVOC, SVOC, and metal impacts to Site soils have been delineated and are limited to subsurface soils. No exceedances of CSCOs were observed in the samples analyzed for CVOCs and metals. A single exceedance of SVOCs was observed under the parking lot and exceeded CSCOs. Surface soil in the strip of wooded area on the northern boundary of the site was not sampled due to lack of exceedances in soil across the site. The CVOC soil source is contained in the norther position of the site. The SVOC soil source area is limited to the western edge of the property.
Contaminant Release and Transport Mechanism	Contaminants in on-site soils could be transported to an exposed population via volatilization into the soil vapor or leaching into the groundwater.
Point of Exposure	There is currently no direct exposure pathway to impacted soils as impacts are limited to subsurface soils. During possible future development of remedial respirable dust. During possible future development or remedial activities, specifically disturbance of soils, the potential for exposures to

	subsurface and surface soils would increase for on-site workers utility workers, trespassers, and visitors.
Route of Exposure	Potential routes of exposure to soils included dermal contact, ingestion and inhalation of soil particulates.
Receptor Population	The receptor population is limited to future Site workers.

Based on the above analysis an exposure pathway is not expected to exist unless future construction activities take place which disturbs on-site subsurface soils.

3.5 Groundwater

The five exposure pathway elements for the overburden and bedrock groundwater on and around the Site are evaluated below:

Exposure Pathway Element	Analysis
Contaminant Source	CVOC and SVOC impacts to groundwater are limited to the overburden aquifer in the area north and west of the building and are understood to be residual impacts related to historical releases. Neither CVOC nor SVOC impacts have been identified in bedrock groundwater. Metals have been detected at elevated concentrations in the groundwater, but are suspected to be caused by groundwater interference with bedrock or are naturally occurring.
Contaminant Release and Transport Mechanism	Groundwater flows north, based on the nature and extent of CVOC impacts observed during 2021 and 2023 sampling events, the concentration of CVOCs in the groundwater reduced between the sampling periods. SVOC groundwater impacts are limited to the western portion of the Site and there is no evidence of off-site contaminant transport. During transport it is expected that the concentrations of contaminants in the groundwater will likely reduce due to natural attenuation and dilution. Should on-site data in the contaminant source zone or northern boundary monitoring wells indicate the assumptions above (natural attenuation and dilution) are not occurring, additional actions may be taken. These actions will inform on groundwater contamination migration.
Point of Exposure	There is currently no direct exposure pathway to groundwater impacts at or around the Site. The Site and surrounding area are served by public drinking water sourced from the town of New Windsor. There are no known drinking water supply wells. Receptors could come into contact with on-site groundwater if private wells are installed at the property. An additional potential exposure exists if ground intrusive activities are completed at the Site. During possible future development or during remedial action, the potential for direct exposure to groundwater would increase for on-site workers.
Route of Exposure	Potential routes of exposure to groundwater include dermal contact and ingestion of groundwater.
Receptor Population	The receptor population is limited to future Site workers or occupants.

Based on the above analysis an exposure pathway is not expected to exist unless on-site construction activities take place in which groundwater is encountered or if a new water supply well is constructed at the Site.

3.6 Soil Vapor

The five exposure pathway elements for the soil vapor on and around the Site are evaluated below:

Exposure Pathway Element	Analysis
Contaminant Source	Based on the compounds detected, CVOCs and SVOC impacts exist in soil vapor beneath the slab of the main Site building.
Contaminant Release and Transport Mechanism	Based on groundwater results from monitoring wells, these VOC impacts are not migrating through off-site groundwater. Therefore, soil vapor migration onto off-site properties is not anticipated.
Point of Exposure	Data collected to date indicates that soil vapor intrusion is occurring in some areas of the building.
Route of Exposure	Potential routes of exposure to soil vapor includes the inhalation of contaminants in indoor air.
Receptor Population	The receptor population is limited to Site workers and occupants, visitors, and future Site workers or occupants.

Based on the above analysis an exposure pathway exists and detected concentrations of select CVOCs (PCE, TCE and methylene chloride) many pose a potential threat to the on-sire warehouse building occupants and surrounding impacted properties. **Surface Water and Sediment**

3.7 Fish and Wildlife Resources Impact Analysis

HRP's review of the NYSDEC ERM, and other available maps and resources identified the following ecologically significant areas within a half mile radius of the Site.

There is a stream, Quassaic Creek, located within a 0.5-mile radius of the Site that is listed as within a half mile if an environmentally sensitive area listed as "rare plants and animals." The Hudson River is approximately 4,000 feet east of the Site.

The Site and surrounding area are in a mixed commercial and residential setting. The ecological features are limited to wooded areas except for the waterbodies stated above. Based on the nature and extent of soil and groundwater impacts, the ecologically significant areas described above are not close enough to the Site to be impacted.

4.0 REMEDIAL ACTION OBJECTIVES (RAOS)

4.1 Remedial Goals

Goals for the remedial program have been established through the remedy selection process stated in 6 NYCRR Part 375. For the purpose of the FS, it has been assumed that Site usage will remain light industrial/manufacturing as is currently occurring. At a minimum, the remedy selected must eliminate or mitigate all significant threats to public health and/or the environment presented by the hazardous substances disposed at the Site through the proper application of scientific and engineering principles.

In addition, and with deference to the overall goal of eliminating or mitigating significant threats to public health and/or the environment presented by the hazardous substances disposed at the Site, the cleanup activities' broader impacts on the community and the environment must be evaluated to work towards NYSDEC Sustainability and Greenhouse Gas (GHG) reduction goals as outlined in NYSDEC policies (CP-75-DEC Sustainability, DER-31 Green Remediation, CP-49 Climate Change Climate Change and DEC Action and CP-75 Sustainability). The remedial action objectives (RAOs) for public health and environmental protection for the Site follow.

4.1.1 Soil Remedial Action Objectives

RAOs for Public Health Protection

- Prevent ingestion direct contact with contaminant soil.
- Prevent inhalation exposure to contaminates volatilizing from soil.

RAOs for Environmental Protection

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

4.1.2 Groundwater RAOs

RAOs for Public Health Protection

- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.
- Prevent contact with, or inhalation of, volatiles from contaminated groundwater.

RAOs for Environmental Protection

- Restore groundwater aquifer to pre-disposal/pre-release conditions, to the extent practicable.
- Remove the source of groundwater contamination.

4.2 Green and Sustainable Remediation Objectives

Remediation of Inactive Hazardous Waste Disposal Sites have the potential to impact vegetation/habitat, generate waste, emit GHG and air toxics, and require a considerable amount of energy and other resources. To ensure that NYSDEC continues to lead-by-example as NYS transitions to the low-carbon sustainable economy of the future, Green and Sustainable Remediation (GSR) objectives are documented in this FS.

This Site evaluation was completed under a focused FS which targeted mitigation of the low-level groundwater impacts observed during previous site assessment activities. While the goal of the FS is to address unacceptable risk from hazardous substance releases, consideration of the cleanup activities' broader impacts on the community and the environment is consistent with the NYSDEC sustainability and GHG reduction goals as outlined in NYSDEC policies (e.g., CP-75-DEC Sustainability, DER-31 Green Remediation, CP-49 Climate Change Climate Change and DEC Action and CP-75 Sustainability). During this FS, HRP will identify and recommend Green and Sustainable Remediation principals and techniques to the extent feasible including but not limited to:

- Considering the environmental impacts of treatment technologies and remedy stewardship over the long-term when choosing a site remedy.
- Reducing direct and indirect Greenhouse Gases (GHG) and other emissions.
- Increasing energy efficiency and minimizing use of non-renewable energy.
- Conserving and efficiently managing resources and materials.
- Reducing waste, increasing recycling, and increasing reuse of materials which would otherwise be considered a waste.
- Maximizing habitat value and creating habitat when possible.
- Fostering green and healthy communities and working landscapes which balance ecological, economic, and social goals; and
- Integrating the remedy with the Site's end use where possible and encouraging green and sustainable re-development.

To accomplish this goal, during the remedy selection, each proposed remedial alternative that passes the Threshold Criteria will be subjected to a Balancing Criteria review that identifies potential environmental impacts/reductions and impediments (i.e., permitting, zoning, public acceptance, etc.) associated with:

- Material and Waste
- Water
- Energy
- Air Emissions
- Infrastructure Resilience and Green Infrastructure
- Green Procurement
- Sustainable Transportation
- Species and Habitat Protection
- Educational Programming and Outreach

Once the negative environmental impacts of the remedy are identified, Green and Sustainable Remediation options to reduce these negative impacts will be identified including but not limited to:

- Maximizing the reuse of materials and recycled materials during remediation design.
- Using local sources for backfill, topsoil and other materials and transporting waste materials to the closest qualified waste facility.
- Using right-sized machinery, implementation of an engine idle reduction plan and ensure equipment is properly maintained to assure operational efficiency.
- Using fuel-efficient on-road and construction vehicles fueled by biodiesel blends and ultra-low sulfur that minimize emission of particulate matter and SO_4.
- Minimizing the type and quantity of wastes generated and requiring off-site disposal by recycling and reusing materials.
- Minimizing water use on-site and use treated groundwater discharge to replenish the aquifer or assist with groundwater collection or habitat creation.
- Managing stormwater on-site to encourage native vegetation and minimize disturbance or transport of topsoil.
- Implementing energy-efficient practices and equipment and utilizing renewable sources of energy.
- Limiting disturbance of existing vegetation, stream bank, etc., maximize use of native vegetation and habitat and pervious surfaces.
- Considering local stakeholders to select remedies that develop green and healthy communities which balance ecological, economic, and social goals.
- Minimizing dust generation by limiting the speed of trucks and other vehicles in the work area.
- Identifying traffic routes that minimize idling time and minimize noises and dust impacts on the surrounding community.

The Spreadsheets for Environmental Footprint Analyses (SEFA) are included as **Tables 2 through 8**. Climate screening checklist and site location relative to disadvantaged communities is included herein.

5.0 DEVELOPMENT AND ANALYSIS OF ALTERNATIVES

In accordance with DER-10, an initial screening was performed to develop a list of potential remedial technologies applicable to Site conditions, contaminants, and contaminated media. Applicable technologies passing the initial screen were then formulated into remedial alternatives that undergo a detailed comparative analysis. Potential remediation technologies are screened and described below.

5.1 General Response Actions

General Response Actions are broad non-technology specific categories to address site-specific contaminants and media. Identified actions are then further refined into potential remedial technologies for screening and development into remedial alternatives as presented in **Section 6**.

Groundwater is the primary media that needs to be addressed by this FS. The general area of concern is located around MW-100 OB/BR, MW-10 as shown on **Figure 5.**

5.1.1 Groundwater

General Response Actions to address the RAOs for groundwater include the following:

- Institutional controls (e.g., environmental easement, groundwater use restrictions)
- Monitored natural attenuation (MNA)
- Passive treatment (ORC socks or other passive treatment technology)
- In-situ treatment (e.g., chemical oxidation, enhanced bioremediation, permeable reactive barrier)
- Ex-situ treatment (e.g., pump-and-treat)

5.2 Identification and Screening of Technologies

The screening of remedial technology types and process options is based on effectiveness for remediating impacted groundwater at this Site. Technologies considered for screening include institutional controls/engineering controls (IC/EC), monitored natural attenuation (MNA), passive treatment, in-situ treatment, and ex-situ treatment.

5.2.1 Institutional/Engineering Controls (IC/EC) and SMP

Engineering Controls (EC) are a physical barrier or method employed to actively or passively contain, stabilize, or monitor contamination, restrict the movement of contamination to ensure the long-term effectiveness of a remedial program, or eliminate potential exposure pathways to contamination. ECs include, but are not limited to, pavement, caps, covers, subsurface barriers, vapor barriers, slurry walls, building ventilation systems, fences, access controls, provision of alternative water supplies via connection to an existing public water supply, adding treatment technologies to such water supplies, and installing filtration devices on private water supplies.

Institutional Controls (IC) are any non-physical means of enforcing a restriction on the use of real property that limits human or environmental exposure, restricts the use of groundwater, provides notice to potential owners, operators, or members of the public, or prevents actions that would interfere with the effectiveness of a remedial program or with the effectiveness and/or integrity of site management activities at or pertaining to a remedial site. ICs accomplish their goal by limiting land or resource use and/or by providing information that helps modify or guide human behavior at the Site. The IC/ECs would be presented and enforced as part of a Site Management Plan (SMP) which will be bound to the Site through an environmental easement. ICs, ECs and an SMP are retained for further consideration as they are implementable, and if paired with additional remedial technologies, effective to meet the RAOs at the Site.

5.2.2 Monitored Natural Attenuation

MNA does not provide a treatment for the impacted media however it provides additional data of the groundwater as the contamination naturally degrades and disperses. If there is evidence of natural degradation occurring and no pathway in which the contaminated media can come in contact with humans, MNA paired with ICs provides a cost effective and less invasive form of meeting RAOs at the Site.

5.2.3 Passive Treatment

Passive treatment systems involves the treatment of impacted media through chemical or biological processes without requiring additional infrastructure or power supply. Evaluated passive treatment technologies included permeable reactive barriers and chemical/biological treatment.

Permeable reactive barriers are applicable for dissolved-phase contaminants by treating groundwater as it passes through a barrier of reactive media. The primary purpose of a permeable reactive barrier is for point source treatment of the contamination to protect downgradient receptors from mobile subsurface contamination. Although there is no evidence of groundwater impacts in the area of downgradient receptors, the implementation of this remedy would meet RAOs at this Site, is readily implementable and therefore this technology is retained for further consideration in developing remedial alternatives.

Chemical treatment involves application of chemicals through injection into groundwater to treat and remove VOC contaminates via chemical oxidation. No external infrastructure or electrical sources are required, contaminants are treated following application both short- and long-term, depending upon the chemical or substrate used. CVOCs are amenable to chemical treatment and this technology is readily implementable, therefore this technology is retained for further consideration in developing remedial alternatives.

5.2.4 In-Situ Treatment

In-situ treatment technologies include biological, thermal, and physical/chemical treatment processes. These processes involve treating the contaminant mass in place to reduce concentrations or mobility and are specifically designed for Site conditions. Evaluated in-situ treatment technologies include thermal treatment, permeable reactive barriers, air sparging and chemical/biological treatment.

Thermal treatment requires substantial infrastructure and electrical power to heat soil to volatilize, collect, and treat contaminants. Due to the relatively low contaminant concentrations, thermal treatment will not be practical at the Site. Therefore, thermal treatment is not considered further.

Air sparging involves injecting gas (usually air or oxygen) under pressure into the saturated zone to volatilize contaminants in groundwater. Volatilized vapors migrate into the vadose zone where they are extracted by vacuum, generally a soil vapor extraction system. Air sparging is generally effective in coarse soil types but may still function well with the on-site fine-grained material. Air sparging is implementable and has the potential to be effective at meeting RAOs at the Site, therefore this technology is retained for further consideration in developing remedial alternatives.

5.2.5 Ex-situ Treatment

Ex-situ Treatment involves the removal of the contaminated media off-site where it can be treated and potentially reused. Examples of ex-situ treatment includes excavation of contaminated soils with soil washing and pump and treat systems. Due to the nature and extent of the on-site impacts, these technologies are not practical at the Site and are therefore not considered further.

5.3 Development of Remedial Alternatives

Technologies passing the preliminary screen were combined to develop the following five primary remedial alternatives and the media most affected by each alternative:

- Alternative 1: No Further Action
- Alternative 2: Continued on-site monitoring of natural attenuation (MNA) with institutional controls
- Alternative 3: Emplacement of Oxygen Releasing Compounds (ORC) Socks or similar passive treatment material
- Alternative 4: Carbon or similar in-situ subsurface injection to promote natural degradation- ORC, Persulfox, ISCO or combination of remedies
- Alternative 5: Air Sparge, Soil Vapor Extraction, Engineering and Institutional Controls, and a Site Management Plan

Each alternative is presented in an increasing order of complexity. Each alternative is discussed below as to how it may be implemented at the Site to address RAOs.

5.3.1 Alternative 1: No Action

The No Action alternative is evaluated as a procedural requirement and as a basis for comparison. This alternative would leave the Site in its present condition and would not provide any additional protection to human health or the environment. The No Action alternative would not involve any surface soil, subsurface soil, groundwater, or soil vapor remedial activity. In addition, the No Action alternative would not place any IC/ECs on the Site property, such as future land use restrictions, groundwater use limitations and maintaining the integrity of the Site cover.

5.3.2 Alternative 2: Continued onsite monitoring of natural attenuation (MNA) with institutional controls

This alternative would seek to disrupt potential future exposure pathways through the imposition of ICs. This alternative would include continued monitoring of the on-site CVOCs and their breakdown through natural attenuation. VOC groundwater impacts are limited to the northwestern portion of the Site and there is no evidence of off-site contaminant transport. During transport it is expected that the concentrations of contaminants in the groundwater will likely reduce due to natural attenuation and dilution based upon observed site conditions. Should on-site data in the contaminant source zone or northern boundary monitoring wells indicate the assumptions above (natural attenuation and dilution) are not occurring, additional remedies would be implemented. Existing groundwater data indicates that groundwater impacts may be degrading via natural attenuation and dispersion (**Figure 5**).

5.3.3 Alternative 3: Emplacement of Oxygen Releasing Compounds (ORC) Socks or similar passive treatment material

This alternative implements the passive treatment of the CVOCs through the introduction of an ORC filter sock or similar passive treatment material. This alternative would utilize the pre-existing wells and/or installation of dedicated treatment wells on-site and work to speed up the attenuation of the CVOCs through the increased oxygen availability in the subsurface. Due to the localized nature of contamination in the northwestern area of the Site and predominantly affecting the groundwater, this alternative would be cost effective and minimally intrusive. Proposed locations for sock installation and proposed locations of dedicated treatment wells are depicted on **Figure 8**. Initial breakdown of CVOCs is documented on-site and the introduction of an ORC sock or similar passive treatment material would increase the rate of breakdown.

5.3.4 Alternative 4: Carbon or similar in-situ subsurface injection to promote natural degradation-ORC, Persulfox, ISCO or combination of remedies

This alternative introduces activated carbon or similar in-situ subsurface injection into the system which acts to absorb the impacted groundwater and the addition of a catalyst to increase the breakdown of the contaminates of concern. The catalyst utilizes the active bacteria in the subsurface that breaks down the contaminates into their less toxic substituents. With this alternative, temporary injection points would need to be installed, and groundwater monitoring would be conducted congruently to verify attenuation is occurring. Conceptual locations of the injection points are depicted on **Figure 9**. The types, volume, quantity chemistry and related calculations will need to be completed during field and/or bench scale pilot testing of this technology.

5.3.5 Alternative 5: Air Sparge, Soil Vapor Extraction, Engineering and Institutional Controls, and a Site Management Plan

Air sparging can be used to enhance the rate of mass removal of dissolved-phase VOCs from groundwater. Soil Vapor Extraction (SVE) can be used to actively reduce VOC soil concentrations from vadose zone soils in the overburden. The vapor removed by the SVE system will be treated with granulated activated carbon or other discharge treatment options.

Engineering controls will include the SVE system as well as monitoring of soil vapor and groundwater conditions through an SMP. This approach would be effective at removing VOC contaminant mass from groundwater if air permeability testing of the Site soils supports the implementation of air sparge and SVE. Air sparging is generally effective in coarse soil types but may still function well with the observed on-site fine-grained material. If Alternative 5 is the selected remedy, a pilot test will be used to assess the air permeability of the on-site soils. Conceptual locations of the SVE wells and the air sparging system are depicted on **Figure 10**. Periodic groundwater monitoring will be used to confirm CVOC groundwater concentrations after the remedial activities are complete.

6.0 DETAILED EVALUATION OF ALTERNATIVES

This section presents an evaluation of the remedial alternatives to identify advantages and disadvantages and evaluate the extent that each alternative meets the remedial objectives. Potential remedial alternatives are compared to criteria defined in 6 NYCRR Part 375. The first two evaluation criteria are termed "Threshold Criteria" and must be satisfied for an alternative to be considered for selection.

Threshold Criteria:

- Overall Protectiveness of Public Health and the Environment - This criterion is an overall evaluation of each alternative's ability to protect public health and the environment.

- Compliance with SCGs - Compliance with SCGs addresses whether a remedy will meet environmental laws, regulations, and other standards and criteria.

- Green and Sustainable Remediation.

If an evaluated remedial alternative meets the above Threshold Criteria, it was further evaluated using the Balancing Criteria below:

- Long-Term Effectiveness and Permanence - This criterion evaluates the long-term effectiveness of the remedial alternatives after implementation. If waste or treated residuals remain on-site after the selected remedy has been implemented, the following items are evaluated: 1) the magnitude of the remaining risks, 2) the adequacy of the engineering and/or institutional controls intended to limit the risk, and 3) the reliability of these controls.

- Reduction of Toxicity, Mobility, and Volume through Treatment - For this criterion, preference is given to alternatives that permanently and significantly reduce the toxicity, mobility, and volume of the contamination at the Site.

- Short-Term Impact and Effectiveness - This criterion evaluates potential short-term impacts on the community, workers, and the environment during remedial construction. The length of time needed to achieve RAOs is also estimated and compared against the other alternatives.

- Implementibility - This criterion evaluates the technical and administrative feasibility to implement each remedial alternative. Technical feasibility includes difficulties associated with the implementation of the remedy and the ability to monitor its effectiveness. Administrative feasibility includes the availability of the necessary personnel and materials along with potential difficulties in obtaining specific operating approvals, access for construction, institutional controls, etc.

- Cost Effectiveness - Capital costs and annual operation, maintenance, and monitoring costs are estimated for each remedial alternative and compared on a present worth basis. In addition, a long-term evaluation of costs is evaluated to weigh the cost/benefit ratio of applying a more active remedy versus a passive remedy over time, particularly if all other factors are equal to discern a preferred remedy for selection.

- Land Use - This criterion evaluates each remedial alternative with respect to the current, intended, and reasonably anticipated future land use.

- Community Acceptance - Community concerns regarding selection of a remedial alternative will be considered.

- Green and Sustainable Remediation: Potential Indirect Environmental Impact of the Remedy - For this criterion, preference is given to alternatives that have the potential to remediate the Site with the lowest potential negative Environmental impact, such as CO_2 emissions.

Community and State acceptance are also considered through the receipt and review of public comments. The Record of Decision (ROD) for the Site will address community and State acceptance.

6.1 Individual Analysis of Alternatives

6.1.1 Alternative 1: No Action

Threshold Criteria

Overall Protectiveness of Public Health and the Environment: Alternative 1 is not protective of human health and the environment. All contaminated groundwater will remain with no measures to monitor, treat, remove, or otherwise decrease contaminant levels. There are no potential exposure pathways for groundwater contamination unless a private well were to be installed.

Compliance with SCGs: Chemical-specific SCGs and site-specific cleanup levels will be achieved for groundwater however there will be no data ensuring the duration of time.

Balancing Criteria

Alternative 1, "No Action" does not meet the Threshold Criteria of being protective of human health and the environment or being compliant with SCGs and is removed from future consideration; therefore, the balancing criteria were not evaluated. Estimated capital and long-term costs for Alternative 1 are presented in **Table 2**.

6.1.2 Alternative 2: Continued on-site monitoring of natural attenuation (MNA) with institutional controls

Threshold Criteria

Overall Protectiveness of Public Health and the Environment: Alternative 2 is not an active remedy for Site contamination and an environmental easement will be needed for the property. However, this alternative monitors the degradation of Site contaminates to the point at which the Site becomes compliant with SCGs and can be closed. There is a lack of evidence of off-site contamination related to the Site, surrounding properties utilize City provided water and the implementation of institutional controls (e.g., land use restrictions) will decrease the likelihood of human exposure.

Compliance with SCGs: Chemical-specific SCGs and Site-specific cleanup levels are anticipated to be achieved for groundwater over a 5-year period.

Balancing Criteria

Alternative 2, "Continued on-site monitoring with institutional and engineering controls" would meet the Threshold Criteria of being compliant with SCGs following a 5-year period. There will not be a short-term impact to the Site as no infrastructure would be necessary. This alternative is cost effective, does not alter the current land use of the Site, although restrictions on future use may be applied and does not require the implementation of additional drilling or infrastructure. This alternative will have the lowest carbon footprint of the alternatives with emissions of Green House Gasses (GHGs) via fleet vehicles transportation to and from the site and impacts related to laboratory operations. **(Tables 2 and 7).**

Estimated capital and long-term costs for Alternative 2 are presented in **Table 3**.

6.1.3 Alternative 3: Emplacement of Oxygen Releasing Compounds (ORC) Socks or similar passive treatment material

Threshold Criteria

Overall Protectiveness of Public Health and the Environment: Alternative 3 is protective of public health and the environment by reducing contaminant mass through in-situ treatment in overburden groundwater. Alternative 3 increases the rate of attenuation of the contaminate plume on-site, thereby reducing potential transport of contaminants to the vapor-phases. The potential for short-term exposure to VOC impacted groundwater by on-site workers and remediation personnel via ingestion is mitigated by use of PPE and adherence to a Health and Safety Plan (HASP).

Compliance with SCGs: Alternative 3 is estimated to achieve chemical-specific SCGs and Site-specific cleanup in the dissolved-phase by reducing CVOC contaminant concentrations in groundwater through in-situ chemical oxidation treatment.

Balancing Criteria

Long-Term Effectiveness and Permanence: Alternative 3 provides long-term effectiveness and permanence. Contaminant mass present in groundwater will be removed using chemical treatment to increase attenuation of CVOCs. Dissolved-phase CVOC contaminants present in on-site groundwater will be treated via the in-situ application of a chemical amendment which will oxidize the contaminants to less hazardous constituents. Once the remedy has been implemented the impact of any contamination remaining on-site will be controlled with IC.

Reduction of Toxicity, Mobility, and Volume Through Treatment: Alternative 3 will reduce the contaminant mass through chemical oxidation treatment. Decreased concentrations and mass will also reduce chemical toxicity and, indirectly, mobility. While there is no known Non-Aqueous Phase Liquid (NAPL) at the Site to consider a reduction in mobility, presumably, reduction in contaminant concentrations in groundwater will reduce the extent of the plume over time.

Short-Term Impact and Effectiveness: Alternative 3 could have a short-term impact during remedial construction. The potential for short-term exposure to impacted groundwater by on-site workers via ingestion during installation of dedicated treatment wells and passive treatment remedy is mitigated by the use of PPE and adherence to a HASP. Property access would be limited during remedial construction, which is estimated to take two to three days. Off-site impacts via odors, dust, vapors, and noise will be minimal. A Community Air Monitoring Plan (CAMP) will be implemented during construction and if necessary, dust, vapor or odor mitigation will be employed.

Implementibility: Alternative 3 is readily implementable using preexisting wells, or the installation of approximately 4 dedicated treatments wells using traditional drilling along with standard equipment installation. The in-situ chemical oxidation amendments are commercially available for nationwide distribution.

Cost Effectiveness: Estimated capital and long-term costs for Alternative 3 are presented in **Table 4**.

Land Use: Alternative 3 does not alter the current land use of the Site, although restrictions on future use may be applied through institutional controls.

Green and Sustainable Remediation Elements: Alternative 3 will result in minimal direct and indirect emissions of GHGs due to the minimally intrusive work occurring. The potential ancillary environmental impacts as well as the green and sustainable best management practices associated with Alternative 3 is provided below:

Potential Ancillary Environmental Impacts	
Material and Waste	Soil generated during installation of additional wells if required Waste materials associated with treatment well installation
Water	Not Applicable
Energy	Fuel to power drilling equipment
Air	Dust generated during remedial construction

	Emissions associated with drilling equipment
Habitat Protection	Not Applicable
Green and Sustainable Best Management Practices	
Material and Waste	Utilize appropriate methods to reduce amount of soil requiring management. Utilize preexisting wells when possible
Water	Not Applicable
Energy	Consider the use of energy efficient equipment.
Air	Minimize dust emission during installation of dedicated treatment wells.
Infrastructure Resilience and Green Infrastructure	Not Applicable
Green Procurement	Utilize existing monitoring wells when possible.
Sustainable Transportation	Utilize fuel efficient equipment that use Ultra-Low Sulfur Diesel and source NA materials from shortest distance.
Species and Habitat Protection	Not Applicable

6.1.4 Alternative 4: Carbon or similar in-situ subsurface injection to promote natural degradation-ORC, Persulfox, ISCO or combination of remedies

Threshold Criteria

Overall Protectiveness of Public Health and the Environment: Alternative 4 is protective of public health and the environment through installation of activated carbon or similar in-situ injections to absorb contaminant mass and promote natural degradation. This alternative reduces the potential transport of contaminants in the dissolved-phase by absorption and in-situ chemical treatment, treating and converting contaminants to less-toxic byproducts. The potential for short-term exposure to VOC impacted groundwater by on-site workers and remediation personnel via ingestion during construction is mitigated by use of PPE and adherence to a HASP. Conventional measures are effective and readily implementable to mitigate fugitive dust and emissions during remediation construction. Long-term groundwater monitoring may be necessary to monitor degradation of contaminates.

Compliance with SCGs: Alternative 4 is estimated to achieve chemical-specific SCGs and Site-specific cleanup levels by absorbing contaminants, and reducing dissolved-phase concentrations through in-situ chemical oxidation treatment.

Balancing Criteria

Long-Term Effectiveness and Permanence: Alternative 4 provides long-term effectiveness and permanence by treating contaminants to reduce concentrations to near pre-release conditions. Dissolved-phase CVOC contaminants present in on-site groundwater will be absorbed and treated via the in-situ application of a chemical amendment which will promote attenuation of the contaminants to innocuous byproducts. Once the remedy has been implemented the impact of any contamination remaining on-site will be controlled with IC.

Reduction of Toxicity, Mobility, and Volume Through Treatment: Alternative 4 will reduce the contaminant mass through absorption and in-situ chemical oxidation treatment. Decreased concentrations and mass will also reduce chemical toxicity and mobility, indirectly.

Short-Term Impact and Effectiveness: Alternative 4 will have a short-term impact during remediation construction. The potential for short-term exposure to impacted groundwater by on-site workers via ingestion during construction is mitigated by use of PPE and adherence to a HASP. Conventional measures are effective and readily implementable to mitigate fugitive dust and emissions during remediation construction. Property access would be limited during remedial construction, which is estimated to take up to a week. Off-site impacts via odors, dust, vapors, and noise will be minimal. A CAMP will be implemented during construction and if necessary, dust, vapor or odor mitigation will be employed.

Implementibility: Alternative 4 is readily implementable with the installation of up to 10 dedicated injection wells using traditional drilling along with standard equipment installation and the reuse of these existing monitoring wells. The in-situ chemical treatment amendments are commercially available for nationwide distribution.

Cost Effectiveness: Estimated capital and long- term costs for Alternative 4 are presented in **Table 5**.

Land Use: Alternative 4 does not alter the current land use of the Site, although restrictions on future use may be applied through institutional controls.

Green and Sustainable Remediation Elements: Alternative 4 will result in the indirect emissions of GHGs via the short-term use of heavy equipment necessary to complete the installation of dedicated injection wells to apply the in-situ chemical treatment. The fuel consumed and the equipment required to complete the remedy results in an estimated 5-year CO_2 cost of 2,782 pounds. The potential ancillary environmental impacts as well as the green and sustainable best management practices associated with Alternative 4 are provided below:

Potential Ancillary Environmental Impacts	
Material and Waste	Soil generated during installation of additional wells if required Waste materials associated with treatment well installation
Water	Water use during chemical mixing and injection
Energy	Fuel to power drilling equipment
Air	Dust generated during remedial construction Emissions associated with drilling equipment
Habitat Protection	Not Applicable
Green and Sustainable Best Management Practices	
Material and Waste	Minimize excess soil generation by limiting the number of injection wells and utilizing pre-existing wells when possible
Water	Conduct bench tests to identify and optimize injectants, optimize design to ensure proper mixing
Energy	Consider the use of energy efficient equipment
Air	Minimize dust emission during injection well installation

Infrastructure Resilience and Green Infrastructure	Not Applicable
Green Procurement	Not Applicable
Sustainable Transportation	Utilize fuel efficient equipment that use Ultra-Low Sulfur Diesel and source NA materials from shortest distance
Species and Habitat Protection	Not Applicable

6.1.5 Alternative 5: Air Sparge, Soil Vapor Extraction, Engineering and Institutional Controls, and a Site Management Plan

Threshold Criteria

Overall Protectiveness of Public Health and the Environment: Alternative 5 is protective of public health and the environment by reducing contaminant mass in the groundwater through air sparging and a SVE system. This alternative will use air sparging to enhance the rate of mass removal of dissolved-phase CVOCs from groundwater. This alternative will also use SVE to actively reduce CVOC soil vapor concentrations in the overburden. This alternative will reduce dissolved CVOCs in groundwater, thereby reducing future potential transport of contaminants to the vapor phases. The potential for short-term exposure to VOC impacted groundwater by on-site workers and remediation personnel via ingestion during construction is mitigated by use of personal protective equipment (PPE) and adherence to a HASP. Conventional measures are effective and readily implementable to mitigate fugitive dust and emissions during remediation construction.

Compliance with SCGs: Alternative 5 is estimated to achieve compliance with chemical specific SCGs and site-specific cleanup levels in groundwater by reducing contaminant concentrations through physical treatment via SVE and air sparging. Over time, reduction of contaminate mass in groundwater will reduce, then be eliminated. The air sparge system will actively reduce CVOC concentrations in the downgradient groundwater plume. In addition, remediation of CVOCs in groundwater will eliminate potential vapor intrusion pathway. Periodic groundwater monitoring will be used to confirm CVOC groundwater concentrations after the remedial activities are complete.

Balancing Criteria

Long-Term Effectiveness and Permanence: Alternative 5 provides long-term effectiveness and permanence. Contaminant mass present in groundwater will be removed using physical treatment to transfer the contaminant mass in the groundwater into the vapor phase where it will be treated with granular activated carbon. The granular activated carbon can be recycled to improve the sustainability of the remedial system. Once the remedy has been implemented, the impact of any contamination remaining on-site will be controlled with IC.

Reduction of Toxicity, Mobility, and Volume Through Treatment: Alternative 5 will enhance the rate of mass removal of CVOCs from groundwater and transfer the CVOC vapor into vadose zone. The impacted soil vapor will then be removed by the SVE system and treated with granulated activated carbon before being released into the atmosphere. Based on low groundwater concentrations, this alternative will have an estimated active treatment duration of approximately five years followed by a period of monitoring to confirm CVOC concentrations in groundwater and soil vapor have been sufficiently reduced. Decreased concentrations and mass will also reduce chemical toxicity and, indirectly, mobility.

Short-Term Impact and Effectiveness: Alternative 5 will have a short-term impact during remedial construction. The potential for short-term exposure to impacted groundwater by on-site workers via ingestion during construction is mitigated by the use of PPE and adherence to a HASP. Conventional measures are effective and readily implementable to mitigate fugitive dust and emissions during remediation construction. Property access would be limited during remedial construction, which is estimated to take up to three weeks. The scheduling of remedial system installation will be coordinated with the Site owner to limit construction delays. Off-site impacts via odors, dust, vapors, and noise will be minimal. A CAMP will be implemented during construction and if necessary, dust, vapor or odor mitigation will be employed.

Implementibility: Alternative 5 is readily implementable using traditional drilling techniques, along with standard equipment installation. Anticipating the installation of 4 sparge and soil vapor extraction wells and associated equipment trailers.

Cost Effectiveness: Estimated capital and long-term costs for Alternative 5 are presented in **Table 6**.

Land Use: Alternative 5 does not alter the current land use of the Site, although restrictions on future use may be applied through ICs.

Green and Sustainable Remediation Elements: Alternative 5 will result in the indirect emissions of Green House Gasses (GHGs) via the long-term use of electricity necessary to operate the SVE and air sparge systems. Alternative 5 will require an estimated 800 kWh each month to operate the SVE system and air sparge system. The electrical power consumed by the remedial system, and additional CO_2 emissions from monthly system maintenance results in an estimated 5-year CO_2 cost of 14,098 pounds. The potential ancillary environmental impacts as well as the green and sustainable best management practices associated with Alternative 5 is provided below:

Potential Ancillary Environmental Impacts	
Material and Waste	Soil generated during SVE, air sparge installation and limited surface soil excavation
Water	Waste materials associated with SVE Installation
Energy	Fuel to power drilling equipment
Air	Dust generated during remedial construction Emissions associated with electricity generation
Habitat Protection	Not Applicable
Green and Sustainable Best Management Practices	
Material and Waste	Utilize appropriate methods to reduce amount of soil requiring management, waste material generated and size of remediation system by conducting Pilot Test to optimize system design and using design to delineate soils required to be removed and incorporate Green BMPs into SVE design (use recycled materials, etc.) and on-site waste management (i.e., request reduced packaging).
Water	Not Applicable

Energy	Properly size SVE and consider the use of energy efficient equipment, installation of renewable energy system and /or purchase green energy.
Air	Minimize dust emission during SVE installation and install energy efficient SVE blowers and/or purchase green energy.
Infrastructure Resilience and Green Infrastructure	Not Applicable
Green Procurement	Utilize used blower motor and SVE piping with recycled content.
Sustainable Transportation	Utilize fuel efficient equipment that use Ultra-Low Sulfur Diesel and source NA materials from shortest distance.
Species and Habitat Protection	Not Applicable

6.2 Comparative Analysis of Alternatives

Alternatives 1 does not meet the Threshold Criteria and was eliminated from further consideration. Alternatives 2 through 5 were evaluated relative to each other using the balancing criteria. The breakdown of the Green Remediation Score and the estimated 5-year CO_2 cost for each alternative evaluation is provided in **Table 7**. A complete summary of the alternative evaluation is provided in **Table 8**, and a discussion of the relative evaluation is below.

6.2.1 Long-Term Effectiveness and Permanence

All remaining alternatives provide long-term effectiveness and permanence of remedy, however the rate to achieve permanence is variable. Although duration of attenuation is potentially longer, Alternative 2 is the least intrusive, cost-effective solution and would require minimal IC to mitigate the risk until remaining contamination meets SCGs.

6.2.2 Reduction of Toxicity, Mobility, and Volume through Treatment

Contaminant toxicity, mobility, and volume will reduce for alternatives 2 through 5. Existing data collected during Site assessment indicate the presence of low level CVOC with no direct exposure pathways and no evidence of off-site transport. For these reasons, alternative 2 poses the most efficient and cost-effective alternative to reduce toxicity, mobility and volume of contaminants.

6.2.3 Short-Term Impact and Effectiveness

Alternative 2 has the lowest potential to create human exposure to contaminated groundwater and requires no infrastructure or construction which eliminates the potential for nuisance (noise or dust during construction) to the community. Additionally, alternative 2 would not inhibit any working hours to the property owner.

6.2.4 Feasibility

Alternative 2 is the most feasible option as it is the easiest to implement, most cost effective and does not alter the land.

Alternatives 5 requires the most additional on-site infrastructure to install and operate the air sparge and SVE system. Alternative 3 would require less additional infrastructure than alternatives 4 and 5 because alternative 3 would only require the addition of temporary treatment wells.

6.2.5 Cost Effectiveness

Alternative 2 was found to be the most cost-effective approach in comparison to Alternatives 3, 4 and 5. Alternative 2 scored the highest and cost at least 23% less than the other alternatives.

6.2.6 Land Use

All alternatives would not change the current land use in any significant way. In all cases IC would need to be applied to restrict future uses.

6.2.7 Green and Sustainable Remediation: Potential Indirect Environmental Impact of the Remedy

Alternative 5 will have the highest potential environmental impact through CO_2 emissions. The electrical demand required by this remedy far exceeds alterative 3 and 4 and results in the higher potential emissions. Alternative 2 has the lowest overall environmental impact of the 4 viable alternatives due to not requiring additional drilling or materials.

7.0 REMEDY SELECTION

The recommended alternative is Alternative 2: Continued on-site monitoring of natural attenuation (MNA) with institutional controls. Alternative 2 is not an "active" remedy for Site contamination however there is no evidence of contamination migrating off-site, on-site contamination are low level CVOCs and there is no direct exposure pathways to the contaminated groundwater. Current data indicates that attenuation has occurred from 2021 to 2025. Although this alternative does not actively lower the contamination found on-site, it monitors the degradation of Site contaminates to the point at which the Site becomes compliant with SCGs and can be closed. The implementation of institutional controls (e.g., land use restrictions) will decrease the likelihood of human exposure. Alternative 2 is estimated to achieve compliance with chemical specific SCGs and site-specific cleanup levels in groundwater.

In addition to achieving compliance with SCGs, Alternative 2 provides the best balance of the balancing criteria (Long-Term Effectiveness and Permanence; Green Remediation; Reduction of Toxicity, Mobility, and Volume through Treatment; Short-Term Impact and Effectiveness; Feasibility; Cost Effectiveness; and Land Use).

8.0 REFERENCES

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FIGURES

0 1,000 2,000 4,000 6,000 8,000
Feet

1 inch = 2,000 feet

N

USGS Quadrangle Information
Quad ID: 41074-D1
Name: Bay Cornwall, New York
Date Rev: 1976
Date Pub: 1981

Figure 1
Site Location Map
251 Walsh Avenue
New Windsor, New York
HRP # DEC1018.P3
Scale 1" = 2,000'

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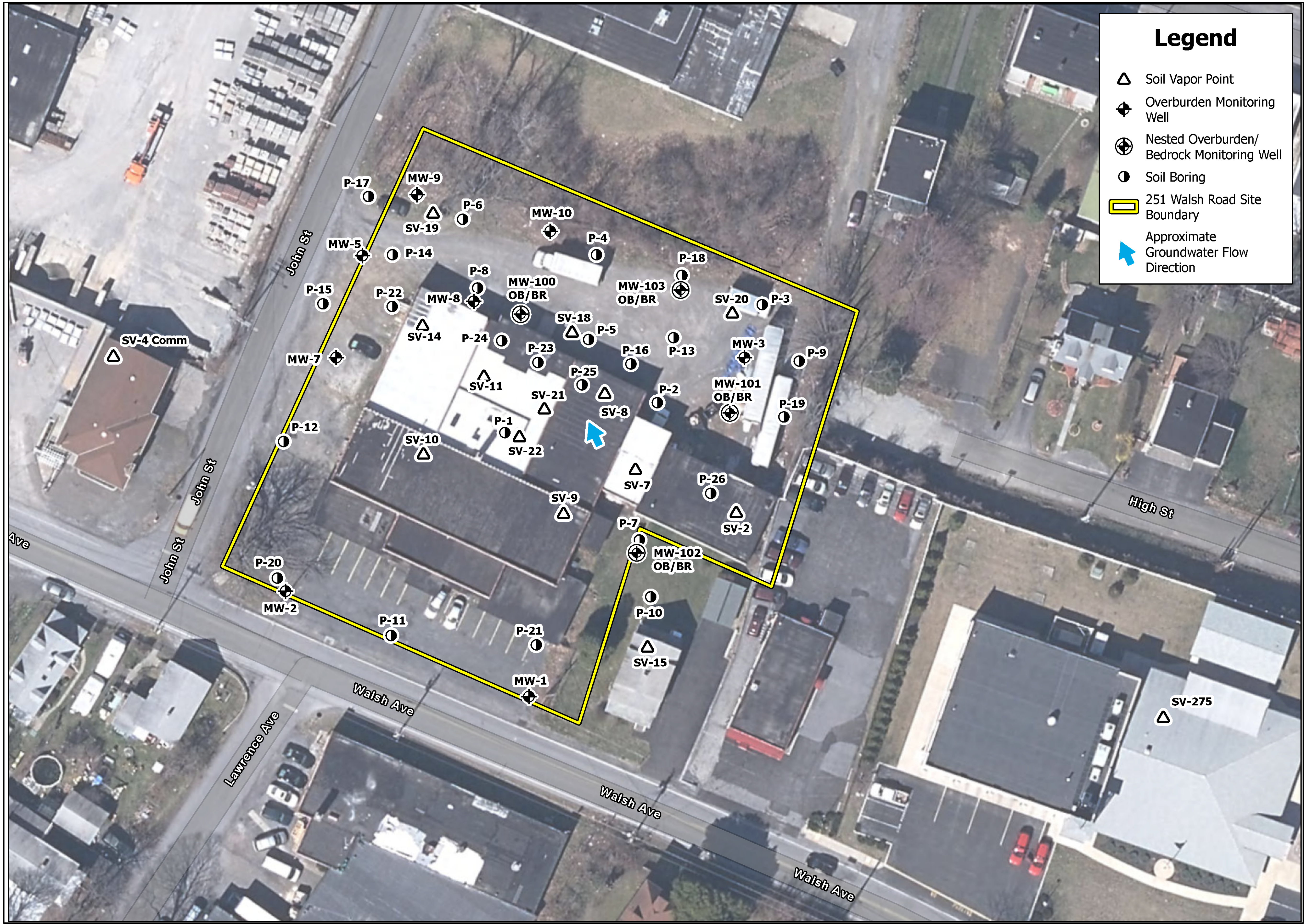
Path: S:\Data\NYDEC - NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION\NEW WINDSOR, NY\251 WALSH ROAD, NEW WINDSOR, NY\DEC1018P3\GIS\Figure 1 - Site Location.mxd



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Revisions	
No.	Date

Designed By: LLT

Drawn By: CMS

Reviewed By: DCS

Issue Date: 1/22/2024

Project No: DEC1018.P3

Sheet Size: 11x17

Site Plan
Soil, Groundwater and Soil Vapor Locations

251 Walsh Rd Site
C#36077
251 Walsh Avenue,
New Windsor, New York

Figure No.

2

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Revisions		
No.	Date	

Designed By: CMS

Drawn By: LLT

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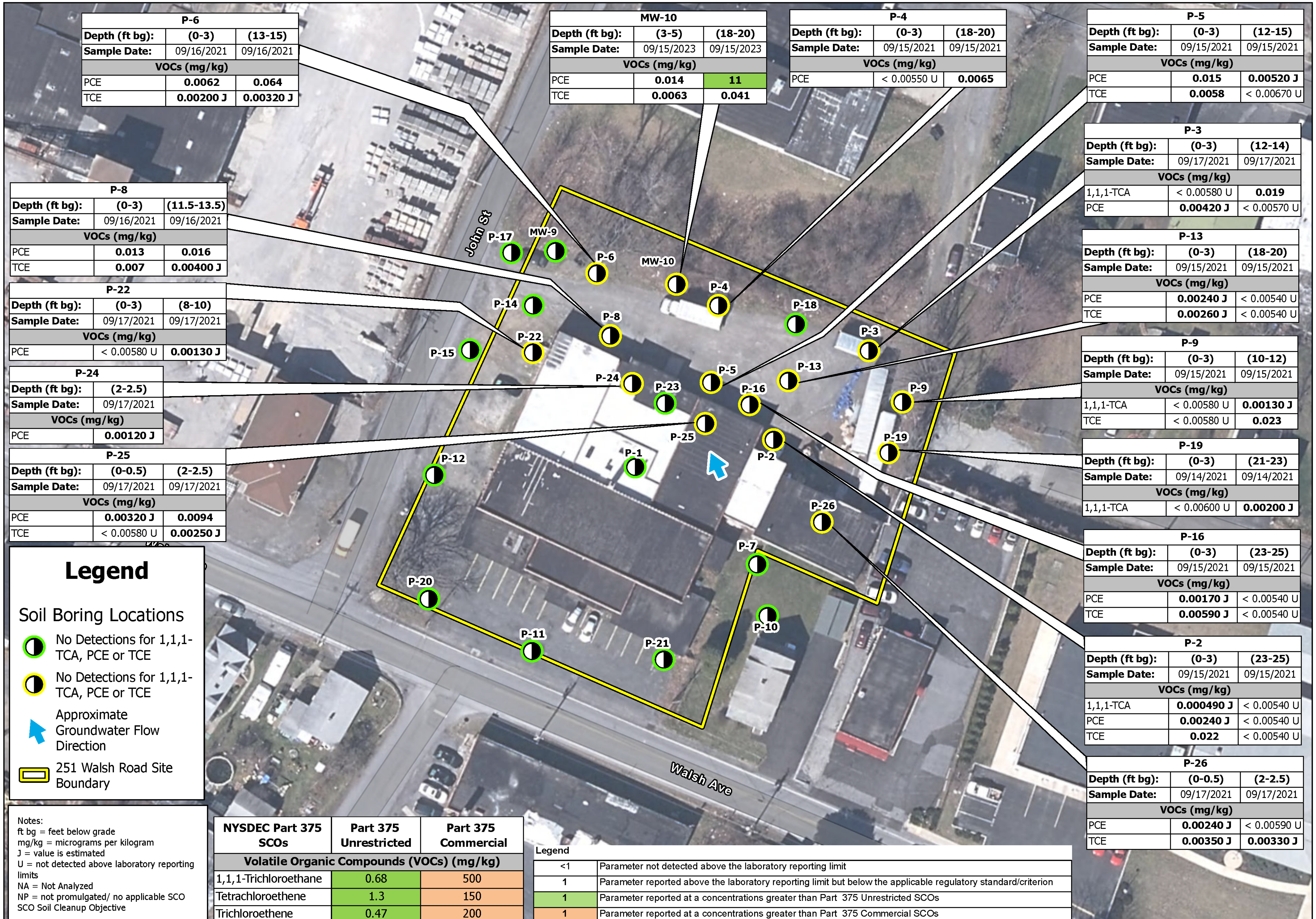
Relative Overburden Groundwater Elevations

251 Walsh Road Site
251 Walsh Avenue
New Windsor, New York

Figure No.

3



P-6		
Depth (ft bg):	(0-3)	(13-15)
Sample Date:	09/16/2021	09/16/2021
VOCs (mg/kg)		
PCE	0.0062	0.064
TCE	0.00200 J	0.00320 J

MW-10		
Depth (ft bg):	(3-5)	(18-20)
Sample Date:	09/15/2023	09/15/2023
VOCs (mg/kg)		
PCE	0.014	11
TCE	0.0063	0.041

P-4		
Depth (ft bg):	(0-3)	(18-20)
Sample Date:	09/15/2021	09/15/2021
VOCs (mg/kg)		
PCE	< 0.00550 U	0.0065

P-5		
Depth (ft bg):	(0-3)	(12-15)
Sample Date:	09/15/2021	09/15/2021
VOCs (mg/kg)		
PCE	0.015	0.00520 J
TCE	0.0058	< 0.00670 U

P-3		
Depth (ft bg):	(0-3)	(12-14)
Sample Date:	09/17/2021	09/17/2021
VOCs (mg/kg)		
1,1,1-TCA	< 0.00580 U	0.019
PCE	0.00420 J	< 0.00570 U

P-13		
Depth (ft bg):	(0-3)	(18-20)
Sample Date:	09/15/2021	09/15/2021
VOCs (mg/kg)		
PCE	0.00240 J	< 0.00540 U
TCE	0.00260 J	< 0.00540 U

P-9		
Depth (ft bg):	(0-3)	(10-12)
Sample Date:	09/15/2021	09/15/2021
VOCs (mg/kg)		
1,1,1-TCA	< 0.00580 U	0.00130 J
TCE	< 0.00580 U	0.023

P-19		
Depth (ft bg):	(0-3)	(21-23)
Sample Date:	09/14/2021	09/14/2021
VOCs (mg/kg)		
1,1,1-TCA	< 0.00600 U	0.00200 J

P-16		
Depth (ft bg):	(0-3)	(23-25)
Sample Date:	09/15/2021	09/15/2021
VOCs (mg/kg)		
PCE	0.00170 J	< 0.00540 U
TCE	0.00590 J	< 0.00540 U

P-2		
Depth (ft bg):	(0-3)	(23-25)
Sample Date:	09/15/2021	09/15/2021
VOCs (mg/kg)		
1,1,1-TCA	0.000490 J	< 0.00540 U
PCE	0.00240 J	< 0.00540 U
TCE	0.022	< 0.00540 U

P-26		
Depth (ft bg):	(0-0.5)	(2-2.5)
Sample Date:	09/17/2021	09/17/2021
VOCs (mg/kg)		
PCE	0.00240 J	< 0.00590 U
TCE	0.00350 J	0.00330 J

P-8		
Depth (ft bg):	(0-3)	(11.5-13.5)
Sample Date:	09/16/2021	09/16/2021
VOCs (mg/kg)		
PCE	0.013	0.016
TCE	0.007	0.00400 J

P-22		
Depth (ft bg):	(0-3)	(8-10)
Sample Date:	09/17/2021	09/17/2021
VOCs (mg/kg)		
PCE	< 0.00580 U	0.00130 J

P-24	
Depth (ft bg):	(2-2.5)
Sample Date:	09/17/2021
VOCs (mg/kg)	
PCE	0.00120 J

P-25		
Depth (ft bg):	(0-0.5)	(2-2.5)
Sample Date:	09/17/2021	09/17/2021
VOCs (mg/kg)		
PCE	0.00320 J	0.0094
TCE	< 0.00580 U	0.00250 J

Legend

Soil Boring Locations

- No Detections for 1,1,1-TCA, PCE or TCE
- No Detections for 1,1,1-TCA, PCE or TCE
- Approximate Groundwater Flow Direction
- 251 Walsh Road Site Boundary

Notes:
ft bg = feet below grade
mg/kg = micrograms per kilogram
J = value is estimated
U = not detected above laboratory reporting limits
NA = Not Analyzed
NP = not promulgated/ no applicable SCO
SCO Soil Cleanup Objective

NYSDEC Part 375 SCOs	Part 375 Unrestricted	Part 375 Commercial
Volatile Organic Compounds (VOCs) (mg/kg)		
1,1,1-Trichloroethane	0.68	500
Tetrachloroethene	1.3	150
Trichloroethene	0.47	200

Legend	
<1	Parameter not detected above the laboratory reporting limit
1	Parameter reported above the laboratory reporting limit but below the applicable regulatory standard/criterion
1	Parameter reported at a concentrations greater than Part 375 Unrestricted SCOs
1	Parameter reported at a concentrations greater than Part 375 Commercial SCOs

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Revisions	
No.	Date

Designed By: LLT

Drawn By: CMS

Reviewed By: DS

Issue Date: 12/22/2023

Project No: DEC1018.P3

Sheet Size: 11x17

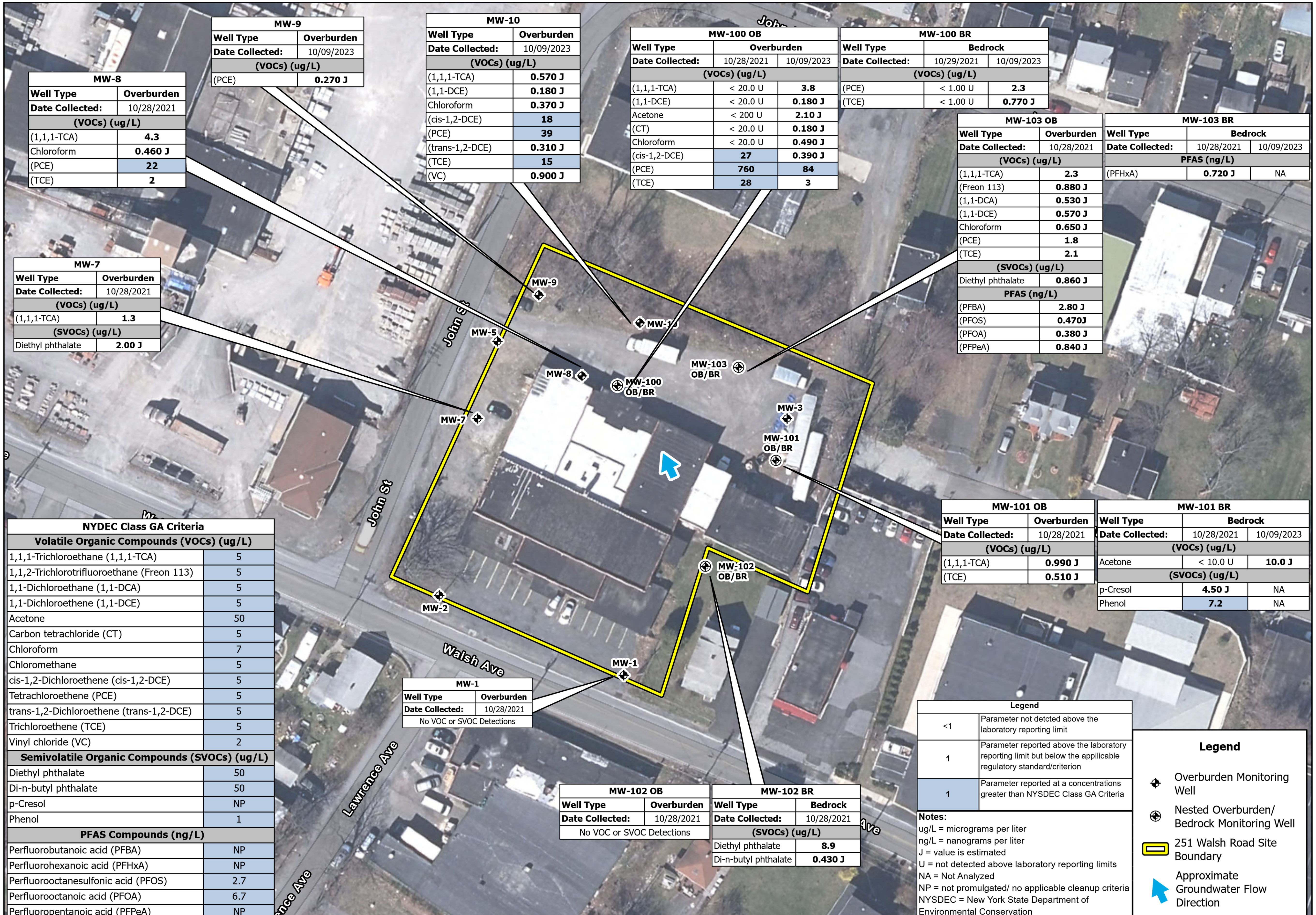
Soil Laboratory Analytical Results 1,1,1-TCA, PCE and TCE (Detections Only)

251 Walsh Rd Site C#36077
251 Walsh Avenue, New Windsor, New York

Figure No.

4

Path: S:\Data\NYDEC - NYSDEC\NEW WINDSOR\251 WALSH ROAD, NEW WINDSOR, NY\DEC1018P3\GIS\WalshRoad\WalshRoad2.aprx



MW-9	
Well Type	**Overburden**
Date Collected:	10/09/2023
(VOCs) (ug/L)	
(PCE)	**0.270 J**

MW-10	
Well Type	**Overburden**
Date Collected:	10/09/2023
(VOCs) (ug/L)	
(1,1,1-TCA)	**0.570 J**
(1,1-DCE)	**0.180 J**
Chloroform	**0.370 J**
(cis-1,2-DCE)	**18**
(PCE)	**39**
(trans-1,2-DCE)	**0.310 J**
(TCE)	**15**
(VC)	**0.900 J**

MW-100 OB		
Well Type	**Overburden**	
Date Collected:	10/28/2021	10/09/2023
(VOCs) (ug/L)		
(1,1,1-TCA)	< 20.0 U	**3.8**
(1,1-DCE)	< 20.0 U	**0.180 J**
Acetone	< 200 U	**2.10 J**
(CT)	< 20.0 U	**0.180 J**
Chloroform	< 20.0 U	**0.490 J**
(cis-1,2-DCE)	**27**	**0.390 J**
(PCE)	**760**	**84**
(TCE)	**28**	**3**

MW-100 BR		
Well Type	**Bedrock**	
Date Collected:	10/29/2021	10/09/2023
(VOCs) (ug/L)		
(PCE)	< 1.00 U	**2.3**
(TCE)	< 1.00 U	**0.770 J**

MW-8	
Well Type	**Overburden**
Date Collected:	10/28/2021
(VOCs) (ug/L)	
(1,1,1-TCA)	**4.3**
Chloroform	**0.460 J**
(PCE)	**22**
(TCE)	**2**

MW-103 OB	
Well Type	**Overburden**
Date Collected:	10/28/2021
(VOCs) (ug/L)	
(1,1,1-TCA)	**2.3**
(Freon 113)	**0.880 J**
(1,1-DCA)	**0.530 J**
(1,1-DCE)	**0.570 J**
Chloroform	**0.650 J**
(PCE)	**1.8**
(TCE)	**2.1**
(SVOCs) (ug/L)	
Diethyl phthalate	**0.860 J**
PFAS (ng/L)	
(PFBA)	**2.80 J**
(PFOS)	**0.470J**
(PFOA)	**0.380 J**
(PFPeA)	**0.840 J**

MW-103 BR		
Well Type	**Bedrock**	
Date Collected:	10/28/2021	10/09/2023
PFAS (ng/L)		
(PFHxA)	**0.720 J**	NA

MW-7	
Well Type	**Overburden**
Date Collected:	10/28/2021
(VOCs) (ug/L)	
(1,1,1-TCA)	**1.3**
(SVOCs) (ug/L)	
Diethyl phthalate	**2.00 J**

MW-101 OB	
Well Type	**Overburden**
Date Collected:	10/28/2021
(VOCs) (ug/L)	
(1,1,1-TCA)	**0.990 J**
(TCE)	**0.510 J**

MW-101 BR		
Well Type	**Bedrock**	
Date Collected:	10/28/2021	10/09/2023
(VOCs) (ug/L)		
Acetone	< 10.0 U	**10.0 J**
(SVOCs) (ug/L)		
p-Cresol	**4.50 J**	NA
Phenol	**7.2**	NA

NYDEC Class GA Criteria	
Volatile Organic Compounds (VOCs) (ug/L)	
1,1,1-Trichloroethane (1,1,1-TCA)	5
1,1,2-Trichlorotrifluoroethane (Freon 113)	5
1,1-Dichloroethane (1,1-DCA)	5
1,1-Dichloroethene (1,1-DCE)	5
Acetone	50
Carbon tetrachloride (CT)	5
Chloroform	7
Chloromethane	5
cis-1,2-Dichloroethene (cis-1,2-DCE)	5
Tetrachloroethene (PCE)	5
trans-1,2-Dichloroethene (trans-1,2-DCE)	5
Trichloroethene (TCE)	5
Vinyl chloride (VC)	2
Semivolatile Organic Compounds (SVOCs) (ug/L)	
Diethyl phthalate	50
Di-n-butyl phthalate	50
p-Cresol	NP
Phenol	1
PFAS Compounds (ng/L)	
Perfluorobutanoic acid (PFBA)	NP
Perfluorohexanoic acid (PFHxA)	NP
Perfluorooctanesulfonic acid (PFOS)	2.7
Perfluorooctanoic acid (PFOA)	6.7
Perfluoropentanoic acid (PFPeA)	NP

MW-1	
Well Type	**Overburden**
Date Collected:	10/28/2021
No VOC or SVOC Detections	

MW-102 OB	
Well Type	**Overburden**
Date Collected:	10/28/2021
No VOC or SVOC Detections	

MW-102 BR	
Well Type	**Bedrock**
Date Collected:	10/28/2021
(SVOCs) (ug/L)	
Diethyl phthalate	**8.9**
Di-n-butyl phthalate	**0.430 J**

Legend	
<1	Parameter not detected above the laboratory reporting limit
1	Parameter reported above the laboratory reporting limit but below the applicable regulatory standard/criterion
1	Parameter reported at a concentrations greater than NYSDEC Class GA Criteria

Notes:
ug/L = micrograms per liter
ng/L = nanograms per liter
J = value is estimated
U = not detected above laboratory reporting limits
NA = Not Analyzed
NP = not promulgated/ no applicable cleanup criteria
NYSDEC = New York State Department of Environmental Conservation

Legend

Overburden Monitoring Well
Nested Overburden/ Bedrock Monitoring Well
251 Walsh Road Site Boundary
Approximate Groundwater Flow Direction

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Revisions	
No.	Date

Designed By: AJN
Drawn By: AJN
Reviewed By: DS

Issue Date: 03/07/2025
Project No: DEC1018.P3
Sheet Size: 11x17

Groundwater Laboratory Analytical Results VOCs, SVOCs and PFAS

251 Walsh Rd Site
C#36077
251 Walsh Avenue,
New Windsor, New York

Figure No.
5

Path: \\hrp-ny-fs2\shared\Data\NYDEC - NYSDEC\NEW WINDSOR\251 WALSH ROAD, NEW WINDSOR, NY\DEC1018P3\GIS\WalshRoad\WalshRoad2.aprx

Sample ID:	MW-9
Date Collected:	02/11/2025
Anions (ug/l)	
Chloride	370000
Sulfate	44000
Dissolved Gasses (ug/l)	
Methane	2.80 J
GenChem (ug/l)	
Alkalinity, Bicarbonate (As CaCO3)	300000
Metals (ug/l)	
Iron (Total)	728
Iron (Dissolved)	13.2 J
Manganese (Total)	430
Manganese (Dissolved)	177
TOC (ug/l)	
Total Organic Carbon	1100
(VOCs) (ug/l)	
Acetone	2.20 J

Sample ID:	MW-10
Date Collected:	02/11/2025
Anions (ug/l)	
Chloride	190000
Nitrogen, Nitrate-Nitrite	760
Sulfate	41000
Dissolved Gasses (ug/l)	
Methane	1.90 J
GenChem (ug/l)	
Alkalinity, Bicarbonate (As CaCO3)	250000
Metals (ug/l)	
Iron (Total)	2580
Iron (Dissolved)	31.9 J
Manganese (Total)	1500
Manganese (Dissolved)	22.1
TOC (ug/l)	
Total Organic Carbon	870 J
(VOCs) (ug/l)	
1,1,1-Trichloroethane	1.30
1,1,2-Trichlorotrifluoroethane (Freon 113)	0.380 J
1,1-Dichloroethane	0.350 J
Acetone	2.30 J
cis-1,2-Dichloroethene	2.10
Tetrachloroethene	23.0
Trichloroethene	2.90

Sample ID:	MW-7
Date Collected:	02/11/2025
Anions (ug/l)	
Chloride	85000
Nitrogen, Nitrate-Nitrite	400
Sulfate	37000
Dissolved Gasses (ug/l)	
Methane	3.10 J
GenChem (ug/l)	
Alkalinity, Bicarbonate (As CaCO3)	320000
Metals (ug/l)	
Iron (Total)	164
Iron (Dissolved)	10.0 J
Manganese (Total)	145
Manganese (Dissolved)	1.70 J
TOC (ug/l)	
Total Organic Carbon	700 J
(VOCs) (ug/l)	
1,1,1-Trichloroethane	1.30

Sample ID:	MW-100-OB
Date Collected:	02/11/2025
Anions (ug/l)	
Chloride	220000
Nitrogen, Nitrate-Nitrite	1800
Sulfate	33000
GenChem (ug/l)	
Alkalinity, Bicarbonate (As CaCO3)	290000
Metals (ug/l)	
Iron (Total)	3730
Iron (Dissolved)	24.2 J
Manganese (Total)	223
TOC (ug/l)	
Total Organic Carbon	870 J
(VOCs) (ug/l)	
1,1,1-Trichloroethane	0.270 J
Acetone	2.40 J
Tetrachloroethene	25.0
Trichloroethene	0.920 J

Notes:
MNA = Monitored Natural Attenuation
ug/L = micrograms per liter
J = value is estimated
NYSDEC = New York State Department of Environmental Conservation

Legend

- Overburden Monitoring Well
- Nested Overburden/ Bedrock Monitoring Well
- 251 Walsh Road Site Boundary
- Approximate Groundwater Flow Direction

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Revisions		
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Drawn By: AJN
Reviewed By: DS

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Project No: DEC1018.P3
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Groundwater Laboratory Analytical Results MNA 2025

251 Walsh Rd Site
C#36077
251 Walsh Avenue,
New Windsor, New York

Figure No.
6

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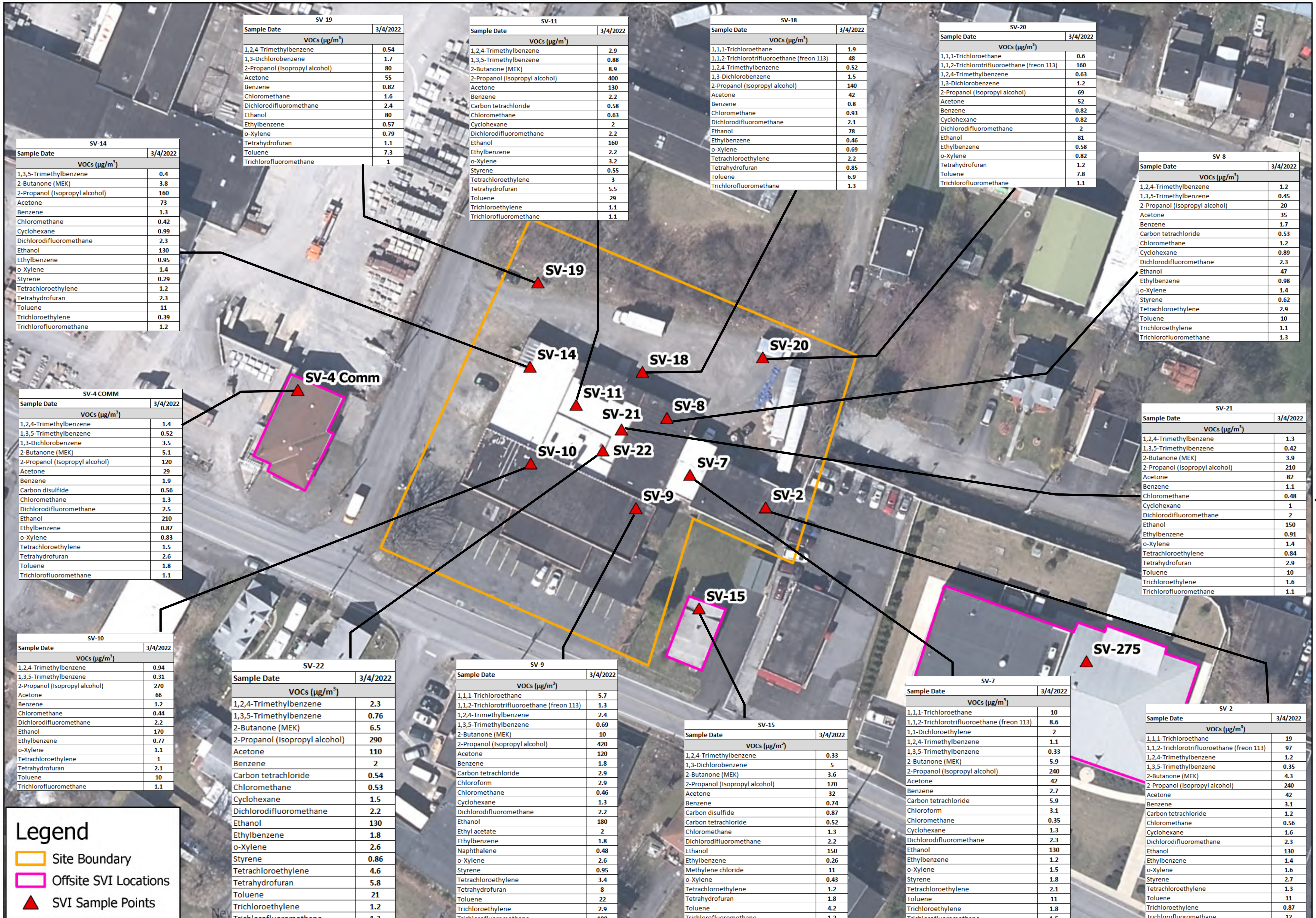

SV-19	
Sample Date	3/4/2022
VOCs ($\mu g/m^3$)	
1,2,4-Trimethylbenzene	0.54
1,3-Dichlorobenzene	1.7
2-Propanol (Isopropyl alcohol)	80
Acetone	55
Benzene	0.82
Chloromethane	1.6
Dichlorodifluoromethane	2.4
Ethanol	80
Ethylbenzene	0.57
o-Xylene	0.79
Tetrahydrofuran	1.1
Toluene	7.3
Trichlorofluoromethane	1

SV-11	
Sample Date	3/4/2022
VOCs ($\mu g/m^3$)	
1,2,4-Trimethylbenzene	2.9
1,3,5-Trimethylbenzene	0.88
2-Butanone (MEK)	8.9
2-Propanol (Isopropyl alcohol)	400
Acetone	130
Benzene	2.2
Carbon tetrachloride	0.58
Chloromethane	0.63
Cyclohexane	2
Dichlorodifluoromethane	2.2
Ethanol	160
Ethylbenzene	2.2
o-Xylene	3.2
Styrene	0.55
Tetrachloroethylene	3
Tetrahydrofuran	5.5
Toluene	29
Trichloroethylene	1.1
Trichlorofluoromethane	1.1

SV-18	
Sample Date	3/4/2022
VOCs ($\mu g/m^3$)	
1,1,1-Trichloroethane	1.9
1,1,2-Trichlorotrifluoroethane (freon 113)	48
1,2,4-Trimethylbenzene	0.52
1,3-Dichlorobenzene	1.5
2-Propanol (Isopropyl alcohol)	140
Acetone	42
Benzene	0.8
Chloromethane	0.93
Dichlorodifluoromethane	2.1
Ethanol	78
Ethylbenzene	0.46
o-Xylene	0.69
Tetrachloroethylene	2.2
Tetrahydrofuran	0.85
Toluene	6.9
Trichlorofluoromethane	1.3

SV-20	
Sample Date	3/4/2022
VOCs ($\mu g/m^3$)	
1,1,1-Trichloroethane	0.6
1,1,2-Trichlorotrifluoroethane (freon 113)	160
1,2,4-Trimethylbenzene	0.63
1,3-Dichlorobenzene	1.2
2-Propanol (Isopropyl alcohol)	69
Acetone	52
Benzene	0.82
Cyclohexane	0.82
Dichlorodifluoromethane	2
Ethanol	81
Ethylbenzene	0.58
o-Xylene	0.82
Tetrahydrofuran	1.2
Toluene	7.8
Trichlorofluoromethane	1.1

SV-14	
Sample Date	3/4/2022
VOCs ($\mu g/m^3$)	
1,3,5-Trimethylbenzene	0.4
2-Butanone (MEK)	3.8
2-Propanol (Isopropyl alcohol)	160
Acetone	73
Benzene	1.3
Chloromethane	0.42
Cyclohexane	0.99
Dichlorodifluoromethane	2.3
Ethanol	130
Ethylbenzene	0.95
o-Xylene	1.4
Styrene	0.29
Tetrachloroethylene	1.2
Tetrahydrofuran	2.3
Toluene	11
Trichloroethylene	0.39
Trichlorofluoromethane	1.2

SV-8	
Sample Date	3/4/2022
VOCs ($\mu g/m^3$)	
1,2,4-Trimethylbenzene	1.2
1,3,5-Trimethylbenzene	0.45
2-Propanol (Isopropyl alcohol)	20
Acetone	35
Benzene	1.7
Carbon tetrachloride	0.53
Chloromethane	1.2
Cyclohexane	0.89
Dichlorodifluoromethane	2.3
Ethanol	47
Ethylbenzene	0.98
o-Xylene	1.4
Styrene	0.62
Tetrachloroethylene	2.9
Toluene	10
Trichloroethylene	1.1
Trichlorofluoromethane	1.3

SV-4 COMM	
Sample Date	3/4/2022
VOCs ($\mu g/m^3$)	
1,2,4-Trimethylbenzene	1.4
1,3,5-Trimethylbenzene	0.52
1,3-Dichlorobenzene	3.5
2-Butanone (MEK)	5.1
2-Propanol (Isopropyl alcohol)	120
Acetone	29
Benzene	1.9
Carbon disulfide	0.56
Chloromethane	1.3
Dichlorodifluoromethane	2.5
Ethanol	210
Ethylbenzene	0.87
o-Xylene	0.83
Tetrachloroethylene	1.5
Tetrahydrofuran	2.6
Toluene	1.8
Trichlorofluoromethane	1.1

SV-21	
Sample Date	3/4/2022
VOCs ($\mu g/m^3$)	
1,2,4-Trimethylbenzene	1.3
1,3,5-Trimethylbenzene	0.42
2-Butanone (MEK)	3.9
2-Propanol (Isopropyl alcohol)	210
Acetone	82
Benzene	1.1
Chloromethane	0.48
Cyclohexane	1
Dichlorodifluoromethane	2
Ethanol	150
Ethylbenzene	0.91
o-Xylene	1.4
Tetrachloroethylene	0.84
Tetrahydrofuran	2.9
Toluene	10
Trichloroethylene	1.6
Trichlorofluoromethane	1.1

SV-10	
Sample Date	3/4/2022
VOCs ($\mu g/m^3$)	
1,2,4-Trimethylbenzene	0.94
1,3,5-Trimethylbenzene	0.31
2-Propanol (Isopropyl alcohol)	270
Acetone	66
Benzene	1.2
Chloromethane	0.44
Dichlorodifluoromethane	2.2
Ethanol	170
Ethylbenzene	0.77
o-Xylene	1.1
Tetrachloroethylene	1
Tetrahydrofuran	2.1
Toluene	10
Trichlorofluoromethane	1.1

SV-22	
Sample Date	3/4/2022
VOCs ($\mu g/m^3$)	
1,2,4-Trimethylbenzene	2.3
1,3,5-Trimethylbenzene	0.76
2-Butanone (MEK)	6.5
2-Propanol (Isopropyl alcohol)	290
Acetone	110
Benzene	2
Carbon tetrachloride	0.54
Chloromethane	0.53
Cyclohexane	1.5
Dichlorodifluoromethane	2.2
Ethanol	130
Ethylbenzene	1.8
o-Xylene	2.6
Styrene	0.86
Tetrachloroethylene	4.6
Tetrahydrofuran	5.8
Toluene	21
Trichloroethylene	1.2
Trichlorofluoromethane	1.3

SV-9	
Sample Date	3/4/2022
VOCs ($\mu g/m^3$)	
1,1,1-Trichloroethane	5.7
1,1,2-Trichlorotrifluoroethane (freon 113)	1.3
1,2,4-Trimethylbenzene	2.4
1,3,5-Trimethylbenzene	0.69
2-Butanone (MEK)	10
2-Propanol (Isopropyl alcohol)	420
Acetone	120
Benzene	1.8
Carbon tetrachloride	2.9
Chloroform	2.9
Chloromethane	0.46
Cyclohexane	1.3
Dichlorodifluoromethane	2.2
Ethanol	180
Ethyl acetate	2
Ethylbenzene	1.8
Naphthalene	0.48
o-Xylene	2.6
Styrene	0.95
Tetrachloroethylene	3.4
Tetrahydrofuran	8
Toluene	22
Trichloroethylene	2.9
Trichlorofluoromethane	190

SV-15	
Sample Date	3/4/2022
VOCs ($\mu g/m^3$)	
1,2,4-Trimethylbenzene	0.33
1,3-Dichlorobenzene	5
2-Butanone (MEK)	3.6
2-Propanol (Isopropyl alcohol)	170
Acetone	32
Benzene	0.74
Carbon disulfide	0.87
Carbon tetrachloride	0.52
Chloromethane	1.3
Dichlorodifluoromethane	2.2
Ethanol	150
Ethylbenzene	0.26
Methylene chloride	11
o-Xylene	0.43
Tetrachloroethylene	1.2
Tetrahydrofuran	1.8
Toluene	4.2
Trichlorofluoromethane	1.2

SV-7	
Sample Date	3/4/2022
VOCs ($\mu g/m^3$)	
1,1,1-Trichloroethane	10
1,1,2-Trichlorotrifluoroethane (freon 113)	8.6
1,1-Dichloroethylene	2
1,2,4-Trimethylbenzene	1.1
1,3,5-Trimethylbenzene	0.33
2-Butanone (MEK)	5.9
2-Propanol (Isopropyl alcohol)	240
Acetone	42
Benzene	2.7
Carbon tetrachloride	5.9
Chloroform	3.1
Chloromethane	0.35
Cyclohexane	1.3
Dichlorodifluoromethane	2.3
Ethanol	130
Ethylbenzene	1.2
o-Xylene	1.5
Styrene	1.8
Tetrachloroethylene	2.1
Toluene	11
Trichloroethylene	1.8
Trichlorofluoromethane	1.5

SV-2	
Sample Date	3/4/2022
VOCs ($\mu g/m^3$)	
1,1,1-Trichloroethane	19
1,1,2-Trichlorotrifluoroethane (freon 113)	97
1,2,4-Trimethylbenzene	1.2
1,3,5-Trimethylbenzene	0.35
2-Butanone (MEK)	4.3
2-Propanol (Isopropyl alcohol)	240
Acetone	42
Benzene	3.1
Carbon tetrachloride	1.2
Chloromethane	0.56
Cyclohexane	1.6
Dichlorodifluoromethane	2.3
Ethanol	130
Ethylbenzene	1.4
o-Xylene	1.6
Styrene	2.7
Tetrachloroethylene	1.3
Toluene	11
Trichloroethylene	0.87
Trichlorofluoromethane	12

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Reviewed By: DS

Issue Date: 04/25/2022
Project No: DEC1018.P3
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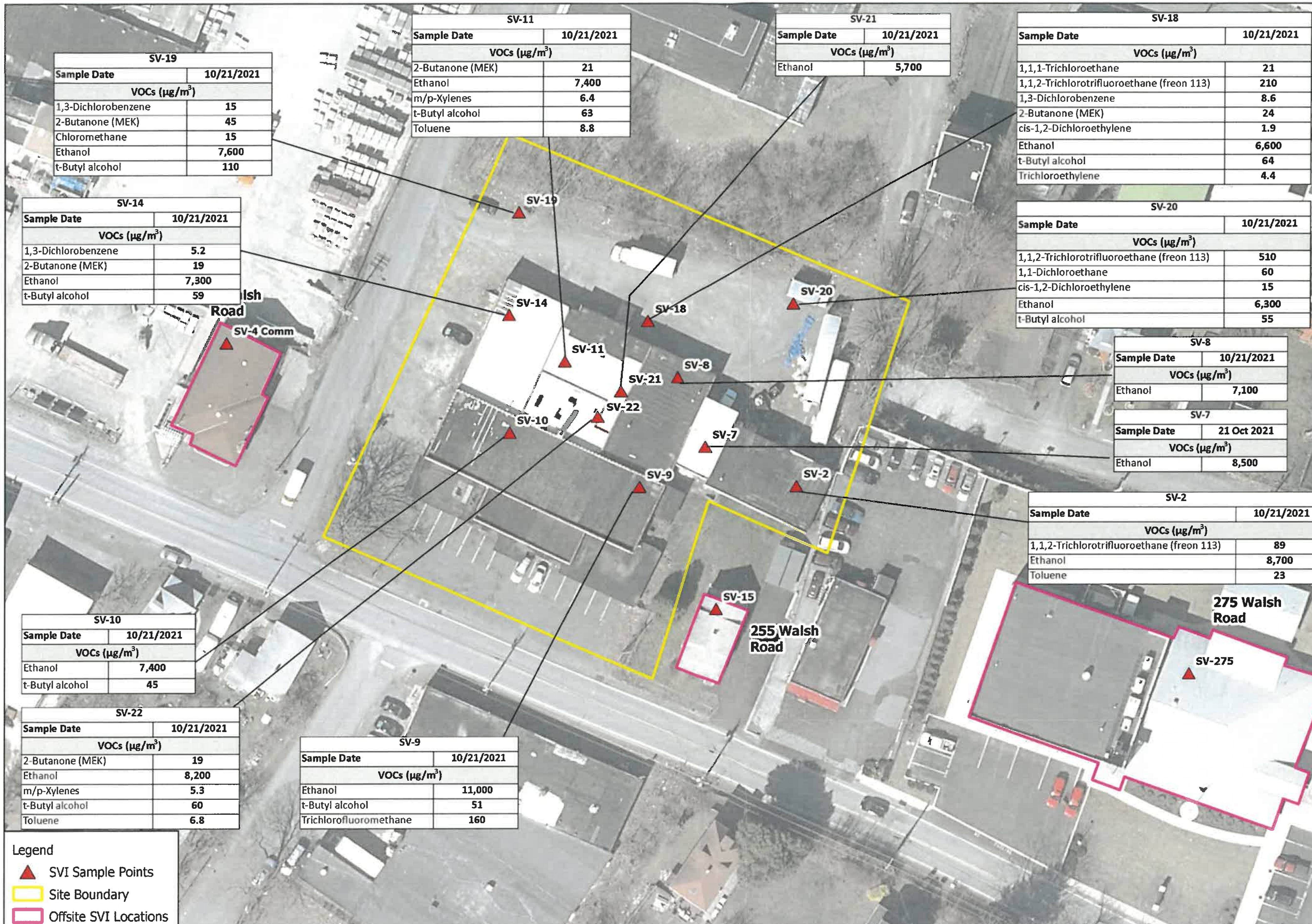
Soil Vapor Detections VOCs- 2022

Walsh Road Site
251 Walsh Road
New Windsor, New York

FIGURE NO.
7



SV-19	
Sample Date	10/21/2021
VOCs (µg/m^3)	
1,3-Dichlorobenzene	15
2-Butanone (MEK)	45
Chloromethane	15
Ethanol	7,600
t-Butyl alcohol	110

SV-14	
Sample Date	10/21/2021
VOCs (µg/m^3)	
1,3-Dichlorobenzene	5.2
2-Butanone (MEK)	19
Ethanol	7,300
t-Butyl alcohol	59

SV-11	
Sample Date	10/21/2021
VOCs (µg/m^3)	
2-Butanone (MEK)	21
Ethanol	7,400
m/p-Xylenes	6.4
t-Butyl alcohol	63
Toluene	8.8

SV-21	
Sample Date	10/21/2021
VOCs (µg/m^3)	
Ethanol	5,700

SV-18	
Sample Date	10/21/2021
VOCs (µg/m^3)	
1,1,1-Trichloroethane	21
1,1,2-Trichlorotrifluoroethane (freon 113)	210
1,3-Dichlorobenzene	8.6
2-Butanone (MEK)	24
cis-1,2-Dichloroethylene	1.9
Ethanol	6,600
t-Butyl alcohol	64
Trichloroethylene	4.4

SV-20	
Sample Date	10/21/2021
VOCs (µg/m^3)	
1,1,2-Trichlorotrifluoroethane (freon 113)	510
1,1-Dichloroethane	60
cis-1,2-Dichloroethylene	15
Ethanol	6,300
t-Butyl alcohol	55

SV-8	
Sample Date	10/21/2021
VOCs (µg/m^3)	
Ethanol	7,100

SV-7	
Sample Date	21 Oct 2021
VOCs (µg/m^3)	
Ethanol	8,500

SV-2	
Sample Date	10/21/2021
VOCs (µg/m^3)	
1,1,2-Trichlorotrifluoroethane (freon 113)	89
Ethanol	8,700
Toluene	23

SV-10	
Sample Date	10/21/2021
VOCs (µg/m^3)	
Ethanol	7,400
t-Butyl alcohol	45

SV-22	
Sample Date	10/21/2021
VOCs (µg/m^3)	
2-Butanone (MEK)	19
Ethanol	8,200
m/p-Xylenes	5.3
t-Butyl alcohol	60
Toluene	6.8

SV-9	
Sample Date	10/21/2021
VOCs (µg/m^3)	
Ethanol	11,000
t-Butyl alcohol	51
Trichlorofluoromethane	160

Legend
- SVI Sample Points
- Site Boundary
- Offsite SVI Locations

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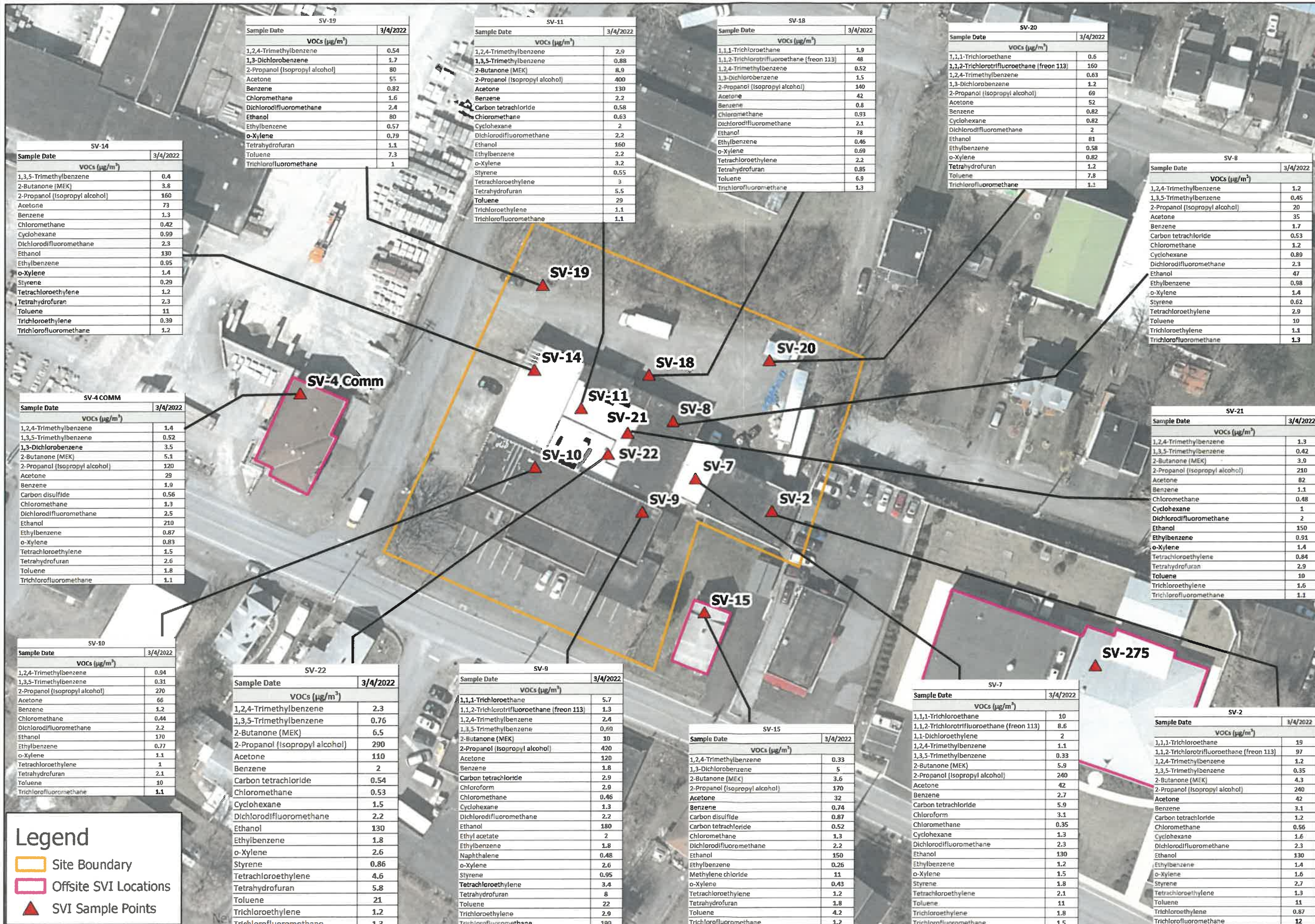
Soil Vapor Detections VOCs

Walsh Road Site
Site #336077
251 Walsh Road
New Windsor, New York

FIGURE NO.
7A



SV-19

Sample Date	3/4/2022
VOCs (µg/m³)	
1,2,4-Trimethylbenzene	0.54
1,3-Dichlorobenzene	1.7
2-Propanol (Isopropyl alcohol)	80
Acetone	55
Benzene	0.82
Chloromethane	1.6
Dichlorodifluoromethane	2.4
Ethanol	80
Ethylbenzene	0.57
o-Xylene	0.79
Tetrahydrofuran	1.1
Toluene	7.3
Trichlorofluoromethane	1

SV-11

Sample Date	3/4/2022
VOCs (µg/m³)	
1,2,4-Trimethylbenzene	2.9
1,3,5-Trimethylbenzene	0.88
2-Butanone (MEK)	8.9
2-Propanol (Isopropyl alcohol)	400
Acetone	130
Benzene	2.2
Carbon tetrachloride	0.58
Chloromethane	0.63
Cyclohexane	2
Dichlorodifluoromethane	2.2
Ethanol	160
Ethylbenzene	2.2
o-Xylene	3.2
Styrene	0.55
Tetrachloroethylene	3
Tetrahydrofuran	5.5
Toluene	29
Trichloroethylene	1.1
Trichlorofluoromethane	1.1

SV-18

Sample Date	3/4/2022
VOCs (µg/m³)	
1,1,1-Trichloroethane	1.9
1,1,2-Trichlorotrifluoroethane (freon 113)	48
1,2,4-Trimethylbenzene	0.52
1,3-Dichlorobenzene	1.5
2-Propanol (Isopropyl alcohol)	140
Acetone	42
Benzene	0.8
Chloromethane	0.93
Dichlorodifluoromethane	2.1
Ethanol	78
Ethylbenzene	0.46
o-Xylene	0.69
Tetrachloroethylene	2.2
Tetrahydrofuran	0.85
Toluene	6.9
Trichlorofluoromethane	1.3

SV-20

Sample Date	3/4/2022
VOCs (µg/m³)	
1,1,1-Trichloroethane	0.6
1,1,2-Trichlorotrifluoroethane (freon 113)	160
1,2,4-Trimethylbenzene	0.63
1,3-Dichlorobenzene	1.2
2-Propanol (Isopropyl alcohol)	69
Acetone	52
Benzene	0.82
Cyclohexane	0.82
Dichlorodifluoromethane	2
Ethanol	81
Ethylbenzene	0.58
o-Xylene	0.82
Tetrahydrofuran	1.2
Toluene	7.8
Trichlorofluoromethane	1.1

SV-14

Sample Date	3/4/2022
VOCs (µg/m³)	
1,3,5-Trimethylbenzene	0.4
2-Butanone (MEK)	3.8
2-Propanol (Isopropyl alcohol)	160
Acetone	73
Benzene	1.3
Chloromethane	0.42
Cyclohexane	0.99
Dichlorodifluoromethane	2.3
Ethanol	130
Ethylbenzene	0.95
o-Xylene	1.4
Styrene	0.29
Tetrachloroethylene	1.2
Tetrahydrofuran	2.3
Toluene	11
Trichloroethylene	0.39
Trichlorofluoromethane	1.2

SV-8

Sample Date	3/4/2022
VOCs (µg/m³)	
1,2,4-Trimethylbenzene	1.2
1,3,5-Trimethylbenzene	0.45
2-Propanol (Isopropyl alcohol)	20
Acetone	35
Benzene	1.7
Carbon tetrachloride	0.53
Chloromethane	1.2
Cyclohexane	0.89
Dichlorodifluoromethane	2.3
Ethanol	47
Ethylbenzene	0.98
o-Xylene	1.4
Styrene	0.62
Tetrachloroethylene	2.9
Toluene	10
Trichloroethylene	1.1
Trichlorofluoromethane	1.3

SV-4 COMM

Sample Date	3/4/2022
VOCs (µg/m³)	
1,2,4-Trimethylbenzene	1.4
1,3,5-Trimethylbenzene	0.52
1,3-Dichlorobenzene	3.5
2-Butanone (MEK)	5.1
2-Propanol (Isopropyl alcohol)	120
Acetone	29
Benzene	1.9
Carbon disulfide	0.56
Chloromethane	1.3
Dichlorodifluoromethane	2.5
Ethanol	210
Ethylbenzene	0.87
o-Xylene	0.83
Tetrachloroethylene	1.5
Tetrahydrofuran	2.6
Toluene	1.8
Trichlorofluoromethane	1.1

SV-21

Sample Date	3/4/2022
VOCs (µg/m³)	
1,2,4-Trimethylbenzene	1.3
1,3,5-Trimethylbenzene	0.42
2-Butanone (MEK)	3.9
2-Propanol (Isopropyl alcohol)	210
Acetone	82
Benzene	1.1
Chloromethane	0.48
Cyclohexane	1
Dichlorodifluoromethane	2
Ethanol	150
Ethylbenzene	0.91
o-Xylene	1.4
Tetrachloroethylene	0.84
Tetrahydrofuran	2.9
Toluene	10
Trichloroethylene	1.6
Trichlorofluoromethane	1.1

SV-10

Sample Date	3/4/2022
VOCs (µg/m³)	
1,2,4-Trimethylbenzene	0.94
1,3,5-Trimethylbenzene	0.31
2-Propanol (Isopropyl alcohol)	270
Acetone	66
Benzene	1.2
Chloromethane	0.44
Dichlorodifluoromethane	2.2
Ethanol	170
Ethylbenzene	0.77
o-Xylene	1.1
Tetrachloroethylene	1
Tetrahydrofuran	2.1
Toluene	10
Trichlorofluoromethane	1.1

SV-22

Sample Date	3/4/2022
VOCs (µg/m³)	
1,2,4-Trimethylbenzene	2.3
1,3,5-Trimethylbenzene	0.76
2-Butanone (MEK)	6.5
2-Propanol (Isopropyl alcohol)	290
Acetone	110
Benzene	2
Carbon tetrachloride	0.54
Chloromethane	0.53
Cyclohexane	1.5
Dichlorodifluoromethane	2.2
Ethanol	130
Ethylbenzene	1.8
o-Xylene	2.6
Styrene	0.86
Tetrachloroethylene	4.6
Tetrahydrofuran	5.8
Toluene	21
Trichloroethylene	1.2
Trichlorofluoromethane	1.3

SV-9

Sample Date	3/4/2022
VOCs (µg/m³)	
1,1,1-Trichloroethane	5.7
1,1,2-Trichlorotrifluoroethane (freon 113)	1.3
1,2,4-Trimethylbenzene	2.4
1,3,5-Trimethylbenzene	0.69
2-Butanone (MEK)	10
2-Propanol (Isopropyl alcohol)	420
Acetone	120
Benzene	1.8
Carbon tetrachloride	2.9
Chloroform	2.9
Chloromethane	0.46
Cyclohexane	1.3
Dichlorodifluoromethane	2.2
Ethanol	180
Ethyl acetate	2
Ethylbenzene	1.8
Naphthalene	0.48
o-Xylene	2.6
Styrene	0.95
Tetrachloroethylene	3.4
Tetrahydrofuran	8
Toluene	22
Trichloroethylene	2.9
Trichlorofluoromethane	190

SV-15

Sample Date	3/4/2022
VOCs (µg/m³)	
1,2,4-Trimethylbenzene	0.33
1,3-Dichlorobenzene	5
2-Butanone (MEK)	3.6
2-Propanol (Isopropyl alcohol)	170
Acetone	32
Benzene	0.74
Carbon disulfide	0.87
Carbon tetrachloride	0.52
Chloromethane	1.3
Dichlorodifluoromethane	2.2
Ethanol	150
Ethylbenzene	0.26
Methylene chloride	11
o-Xylene	0.43
Tetrachloroethylene	1.2
Tetrahydrofuran	1.8
Toluene	4.2
Trichlorofluoromethane	1.2

SV-7

Sample Date	3/4/2022
VOCs (µg/m³)	
1,1,1-Trichloroethane	10
1,1,2-Trichlorotrifluoroethane (freon 113)	8.6
1,1-Dichloroethylene	2
1,2,4-Trimethylbenzene	1.1
1,3,5-Trimethylbenzene	0.33
2-Butanone (MEK)	5.9
2-Propanol (Isopropyl alcohol)	240
Acetone	42
Benzene	2.7
Carbon tetrachloride	5.9
Chloroform	3.1
Chloromethane	0.35
Cyclohexane	1.3
Dichlorodifluoromethane	2.3
Ethanol	130
Ethylbenzene	1.2
o-Xylene	1.5
Styrene	1.8
Tetrachloroethylene	2.1
Toluene	11
Trichloroethylene	1.8
Trichlorofluoromethane	1.5

SV-2

Sample Date	3/4/2022
VOCs (µg/m³)	
1,1,1-Trichloroethane	19
1,1,2-Trichlorotrifluoroethane (freon 113)	97
1,2,4-Trimethylbenzene	1.2
1,3,5-Trimethylbenzene	0.35
2-Butanone (MEK)	4.3
2-Propanol (Isopropyl alcohol)	240
Acetone	42
Benzene	3.1
Carbon tetrachloride	1.2
Chloromethane	0.56
Cyclohexane	1.6
Dichlorodifluoromethane	2.3
Ethanol	130
Ethylbenzene	1.4
o-Xylene	1.6
Styrene	2.7
Tetrachloroethylene	1.3
Toluene	11
Trichloroethylene	0.87
Trichlorofluoromethane	12

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Issue Date: 01/26/2022 | Project No: DEC1018.P3 | Sheet Size: 11x17

Soil Vapor Detections VOCs- 2022

Walsh Road Site
251 Walsh Road
New Windsor, New York

FIGURE NO.
7B

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MOVE YOUR ENVIRONMENT FORWARD

PROJECT TITLE: DEC New Windsor, NY			
PROJECT NUMBER: DEC1018P3		TASK NUMBER:	
SUBJECT: Soil Gas Point Install			
DESIGNED:	DATE:	CHECKED:	DATE:

SV 15 — 3/2/22 Cleared underground utilities with GPR prior to install. Concrete 2" thick. Drilled into soil beneath slab ~6" + backfilled with sand. Set temp. vapor pin in concrete

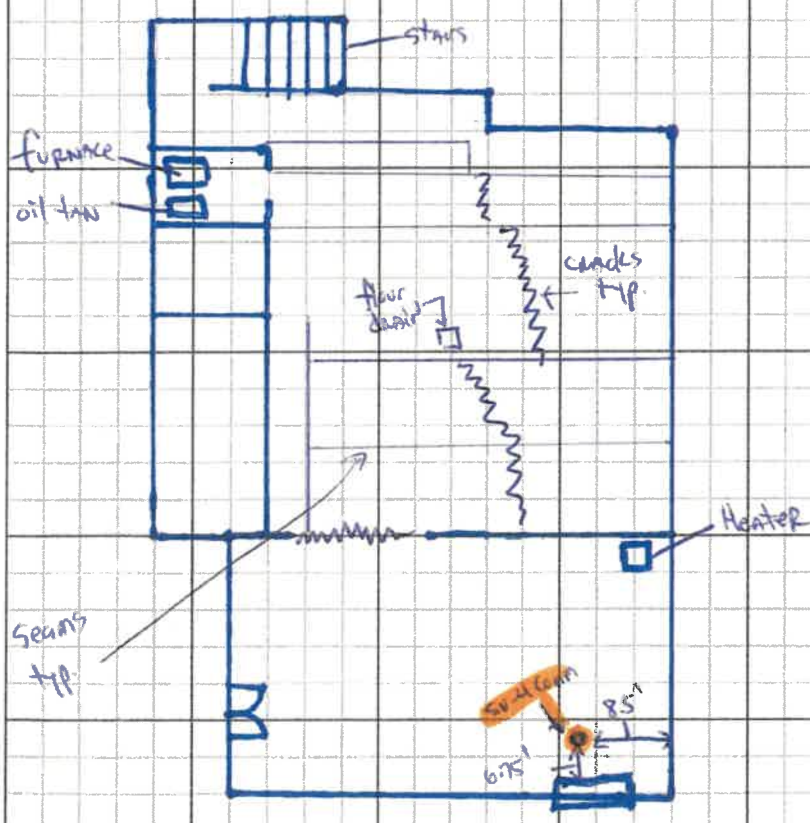
SV-4 Comm — 3/3/22 Cleared underground utilities on day before. Concrete 6" thick. Drilled into soil beneath slab ~6" + backfilled with sand. Set temp vapor pin in concrete

SV-20 — 3/3/22 Installed 1/4 stainless steel soil gas point w/ 1' screen to 4' below grade. Sand 2" above screen + bentonite to grade. Point removed post sampling

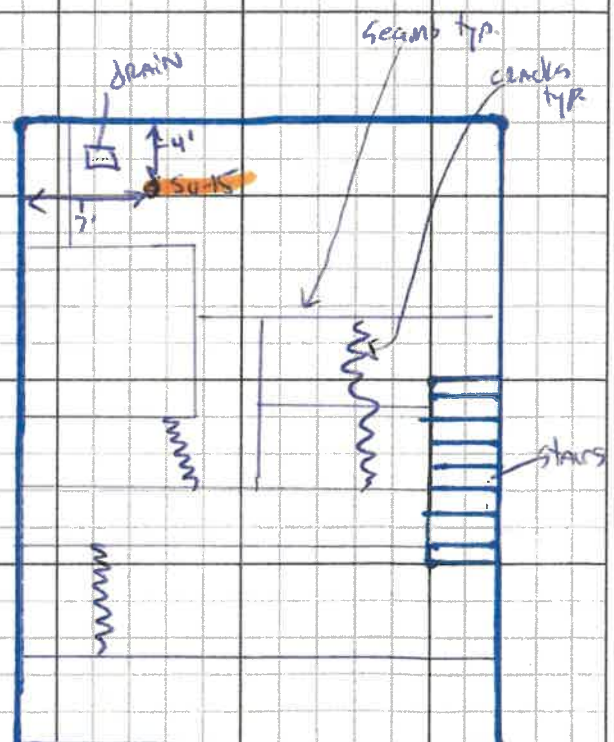
SV-18 — 3/3/22 SAA (Same as above)

SV-19 — 3/3/22 SAA

SV-4 Comm



SV-15



MOVE YOUR ENVIRONMENT FORWARD

PROJECT TITLE: DEC New Windsor, NY			
PROJECT NUMBER: DEC4018P3		TASK NUMBER:	
SUBJECT: Helium leak test			
DESIGNED:	DATE:	CHECKED:	DATE:

SV-15	3/2/22		Filled shroud with >20% helium. Purged soil gas point at 200mL/min for 5min + checked for helium. Helium = 0ppm PID = 0.0ppm
SV-4 Comm	3/3/22		SAA (Same as above) Helium = 1175ppm PID = 0.6ppm. Pulled point and reset w/ new sleeve + redid helium leak test. Helium = 100ppm PID = 1.0 ppm. Acceptable as guidance document indicates if leak is >10% of tracer, point should be reinstalled. Let point stabilize for >30min prior to sampling
SV-10	3/3/22		Filled shroud with >20% helium. Purged soil gas point at 200mL/min for 5min + checked for helium. Helium = 0ppm PID = 0.3ppm
SV-14	3/3/22	SAA	Helium = 0ppm PID = 0.1ppm
SV-9	3/3/22	SAA	Helium = 0ppm PID = 0.4ppm
SV-8	3/3/22	SAA	Helium = 100ppm - Acceptable per guidance doc PID = 0.0ppm
SV-7	3/3/22	SAA	Helium = 0ppm PID = 0.0ppm
SV-2	3/3/22	SAA	Helium = 50ppm - Acceptable per guidance doc PID = 0.1ppm
SV-20	3/3/22	SAA	Helium = 0ppm PID = 0.0ppm
SV-18	3/3/22	SAA	Helium = 0ppm PID = 0.0ppm
SV-19	3/3/22	SAA	Helium = 0ppm PID = 0.0ppm
SV-21	3/4/22	SAA	except allowed point to stabilize for >30min since sampling same day. Helium = 0ppm PID = 0.0ppm
SV-22	3/4/22	SAA	Helium = 0ppm PID = 0.0ppm
SV 11	3/4/22	SAA	Helium = 0ppm PID = 0.0ppm

HRP Associates, Inc.
197 Scott Swamp Road
Farmington, Connecticut 06032
(860) 674-9570

Date: 3/3 - 3/4/22
Time On-site:
Time Off-site:

Site Background Information

Site Name: DEC - New Windsor, NY
Job #: DEC1018.P3
Weather: P. Sunny 40°F

Field Team Leader:
Team Members: CJC, KG

Soil Gas Survey Information

Off Site Points

Soil Gas Point	Summa Can ID	Regulator ID	Start Time 3/3/22	Initial Van ("Hg)	Start Barometric Press (mmHg)	Start Temp (°F)	Stop Time 3/4/22	Final Vav ("Hg)	Stop Barometric Press ("mmHg)	Stop Temp (oF)
SV-15	9776	10053	10:52	28	756.4	47	11:30	5	769.1	48
IA-15	21206	5482	10:58	30	↓	↓	11:30	7	↓	↓
IA-15dup	20412	9927	10:58	28	↓	↓	11:30	3	↓	↓
SV-4 Comm	8258	11675	11:18	30	757.7	55	11:18	3	769.5	53
IA-4 Comm	8152	10195	11:19	31	↓	↓	11:19	4	↓	↓
IA-275	10783	11682	11:48	29	757.7	72	12:38	0	768.0	73
→ Fire house - indoor air only										

Notes: 3/3 Outside Baro = 757.2 mmHg @ 40°F
3/4 Outside Baro = 769.5 mmHg @ 30°F

All points 24hr samples with 1.4L Summa cans
All vapor pins on offsite properties removed + patched w/ bentonite + concrete post sampling

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Project No: DEC1018.P3

Sheet Size: 11x17

Alternative 3: Proposed Passive Treatment Installation Locations

251 Walsh Rd Site
C#36077
251 Walsh Avenue,
New Windsor, New York

Figure No.
8

Path: \\hrp-ny-fs2\shared\Data\NYDEC - NYSDEC\NEW WINDSOR\251 WALSH ROAD, NEW WINDSOR, NY\DEC1018P3\GIS\WalshRoad\WalshRoad2.aprx

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Issue Date: 03/24/2025

Project No: DEC1018.P3

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Alternative 4: Proposed Injection Locations

251 Walsh Rd Site
C#36077
251 Walsh Avenue,
New Windsor, New York

Figure No.

9

Path: \\hrp-ny-fs2\shared\Data\NY\NYDEC - NYSDEC\NEW WINDSOR\251 WALSH ROAD, NEW WINDSOR, NY\DEC1018P3\GIS\WalshRoad\WalshRoad2.aprx

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Reviewed By: DS

Issue Date: 03/24/2025

Project No: DEC1018.P3

Sheet Size: 11x17

Alternative 5: Proposed Soil Vapor Extraction (SVE) and Air Sparge System

251 Walsh Rd Site
C#36077
251 Walsh Avenue,
New Windsor, New York

Figure No.
10

Path: \\hrp-ny-fs2\shared\Data\NYDEC - NYSDEC\NEW WINDSOR\251 WALSH ROAD, NEW WINDSOR, NY\DEC1018P3\GIS\WalshRoad\WalshRoad2.aprx

TABLES

Table 1
Groundwater Laboratory Analysis (Detections Only)
MNA Parameters
Site #336077
251 Walsh Road, New Windsor, New York

Sample ID:	NYDEC Class GA Criteria	MW-7	MW-9	MW-10	MW-100-OB
Date Collected:		02/11/2025	02/11/2025	02/11/2025	02/11/2025
Lab Report Number:		25B0580	25B0580	25B0580	25B0580
Anions (ug/l)					
Chloride	250000	**85000**	**370000**	**190000**	**220000**
Nitrogen, Nitrate-Nitrite	10000	**400**	< 100 U	**760**	**1800**
Sulfate	250000	**37000**	**44000**	**41000**	**33000**
Dissolved Gasses (ug/l)					
Methane	NP	**3.10 J**	**2.80 J**	**1.90 J**	< 7.00 U
GenChem (ug/l)					
Alkalinity, Bicarbonate (As CaCO3)	NP	**320000**	**300000**	**250000**	**290000**
Metals (ug/l)					
Iron (Total)	300	**164**	**728**	**2580**	**3730**
Iron (Dissolved)	300	**10.0 J**	**13.2 J**	**31.9 J**	**24.2 J**
Manganese (Total)	300	**145**	**430**	**1500**	**223**
Manganese (Dissolved)	300	**1.70 J**	**177**	**22.1**	< 10.0 U
TOC (ug/l)					
Total Organic Carbon	NP	**700 J**	**1100**	**870 J**	**870 J**
Volatile Organic Compounds (VOCs) (ug/l)					
1,1,1-Trichloroethane	5	**1.30**	< 1.00 U	**1.30**	**0.270 J**
1,1,2-Trichlorotrifluoroethane (Freon 113)	5	< 1.00 U	< 1.00 U	**0.380 J**	< 1.00 U
1,1-Dichloroethane	5	< 1.00 U	< 1.00 U	**0.350 J**	< 1.00 U
Acetone	50	< 50.0 U	**2.20 J**	**2.30 J**	**2.40 J**
cis-1,2-Dichloroethene	5	< 1.00 U	< 1.00 U	**2.10**	< 1.00 U
Tetrachloroethene	5	< 1.00 U	< 1.00 U	**23.0**	**25.0**
Trichloroethene	5	< 1.00 U	< 1.00 U	**2.90**	**0.920 J**

Legend	
<1	Parameter not detected above the laboratory reporting limit
1	Parameter reported above the laboratory reporting limit but below the applicable regulatory standard/criterion
1 (shaded)	Parameter reported at a concentrations greater than NYSDEC Class GA Criteria

Notes:
ug/l = micrograms per liter
NP = not promulgated/ no applicable cleanup criteria
NYSDEC = New York State Department of Environmental Conservation

Table 2 - Alternative 1 Cost Analysis
No Action
251 Walsh Road Site, 251 Walsh Avenue, New Windsor New York
HRP# DEC1018.P3

Alternative	Description	Remedy Description	Task	Year												Total Cost	Total Present Value Cost at 7%
				Capital Costs	1	2	3	4	5	6	7	8	9	10-20	21-30		
1	No Action	This alternative would leave the Site in its present condition and would not provide any additional protection to human health or the environment. The No Action alternative would not involve any surface soil, subsurface soil, groundwater, or soil vapor remedial activity. In addition, the No Action alternative would not place any institutional or engineering controls on the Site property, such as future land use restrictions, groundwater use limitations, and/or continued operation of SSDS's. **This Alternative is not protective and does not meet SCGs.**	Record of Decision	$10,000													
			Total Cost by Year	$10,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$10,000**	
			Discount Factor @ 7%	1.00	0.935	0.873	0.816	0.763	0.713	0.666	0.623	0.582	0.544	4.079	1.815		
			Present Value by Year	$10,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		**$10,000**

Table 3 - Alternative 2 Cost Analysis
Continued onsite monitoring of natural attenuation (MNA) with institutional controls
251 Walsh Road Site, 251 Walsh Avenue, New Windsor New York
HRP# DEC1018.P3

Alternative	Description	Remedy Description	Task	Year						Total Cost	Total Present Value Cost at 7%
				Capital Costs	1	2	3	4	5		
2	Continued onsite monitoring of natural attenuation (MNA) Institutional controls	Monitored natural attenuation can be used to track the degradation of groundwater impacts at the Site to the point at which the Site becomes compliant with SCGs and can be closed. There is a lack of evidence of offsite contamination related to the Site, surrounding properties utilize City provided water and the implementation of institutional controls (e.g., land use restrictions) will decrease the likelihood of human exposure. This alternative would not seek to actively remove or treat the VOC contaminated media onsite but would disrupt the current or future exposure pathways through the imposition of Institutional Controls (ICs). ICs would be required to prevent future exposure pathways from developing by controlling exposure during potential future construction and limiting the use of groundwater. An Environmental Easement would be recorded to provide an enforceable legal instrument to ensure ICs are met.	Record of Decision	$10,000							
			Environmental Easement	$ 5,000							
			Annual GW Monitoring		$907	$907	$907	$907	$907		
			Annual Report		$4,500	$4,500	$4,500	$4,500	$4,500		
			Contingency (~20%)	$3,000	$1,080	$1,080	$1,080	$1,080	$1,080		
			Total Cost by Year	$18,000	$6,487	$6,487	$6,487	$6,487	$6,487	**$50,435**	
			Discount Factor @ 7%	1.00	0.935	0.873	0.816	0.763	0.713		
			Present Value by Year	$18,000	$6,063	$5,666	$5,295	$4,949	$4,625		**$44,598**

Table 4 - Alternative 3 Cost Analysis
Emplacement of Oxygen Releasing Compounds (ORC) Socks or similar passive treatment material
251 Walsh Road Site, 251 Walsh Avenue, New Windsor New York
HRP# DEC1018.P3

Alternative	Description	Remedy Description	Task	Year: Capital Costs	Year: 1	Year: 2	Year: 3	Year: 4	Year: 5	Total Cost	Total Present Value Cost at 7%
3	In Situ Passive Groundwater Treatment	This alternative includes the emplacement of a passive treatment material such as ORC sock which would increase the rate of attenuation of the contaminate plume on site, thereby reducing potential transport of contaminants to the vapor-phases. This alternative would utilize the pre-existing wells and/or installation of dedicated treatment wells on site and work to speed up the attenuation of the CVOCs through the increase oxygen availability in the subsurface.	Record of Decision	$10,000							
			Environmental Easement	$ 5,000							
			Site Management Plan (periodic review and updates)	$ 18,000					$2,500		
			Management	$ 35,000							
			Bonding and Insurance, Permitting	$ 5,000							
			Installation of dedicated treatment wells								
			Drilling Subcontractor	$ 2,250							
			Management	$ 5,000							
			Oversight	$ 5,000							
			Equipment and Installation	$ 5,000							
			Permitting	$ 5,000							
			Passive treatment material	$ 5,000							
			Annual GW Monitoring		$8,400	$8,400	$8,400	$8,400	$8,400		
			Data Validation		$2,300	$2,300	$2,300	$2,300	$2,300		
			Annual Report	$2,500	$2,500	$2,500	$2,500	$2,500	$2,500		
			Contingency (~20%)	$20,600	$2,600	$2,600	$2,600	$2,600	$3,100		
			Total Cost by Year	$123,350	$15,800	$15,800	$15,800	$15,800	$18,800	**$205,350**	
			Discount Factor @ 7%	1.00	0.935	0.873	0.816	0.763	0.713		
			Present Value by Year	$123,350	$14,766	$13,800	$12,898	$12,054	$13,404		**$190,272**

Table 5 - Alternative 4 Cost Analysis
Carbon or similar in-situ subsurface injection to promote natural degradation
251 Walsh Road Site, 251 Walsh Avenue, New Windsor New York
HRP# DEC1018.P3

Alternative	Description	Remedy Description	Task	Year: Capital Costs	1	2	3	4	5	Total Cost	Total Present Value Cost at 7%
4	In Situ Groundwater Treatment Carbon or similar in-situ subsurface injection	This alternative introduces activated carbon or similar in-situ subsurface injection into the system which acts to absorb the impacted groundwater and the addition of a catalyst to increase the breakdown of the contaminates of concern. Costs assume injection in up to 4 temporary wells. Costs assume 1 injection event. Assumes an in-situ application of activated carbon or similar treatment as a one time injection in the area of the down gradient groundwater plume (4 temporary injection wells). Assumes treatment objectives can be reached in 5 years. Costs assume annual groundwater monitoring for monitored natural attenuation parameters (VOCs, iron, manganese, sulfate, nitrate, field parameters) (4 locations) for a period of 3 years during treatment and annually for a period of 2 years following.	Record of Decision	$10,000							
			Final Engineering Report	$11,000							
			Environmental Easement	$ 5,000							
			Site Management Plan (periodic review and updates)	$ 10,000					$2,500		
			Groundwater Injections								
			Drilling Subcontractor	$ 25,000							
			Management	$ 35,000							
			Drilling Oversight	$ 1,200							
			GWM Injection		$3,500						
			Annual GW Monitoring		$8,400	$8,400	$8,400	$8,400	$8,400		
			Data Validation		$2,300	$2,300	$2,300	$2,300	$2,300		
			Annual Report	$2,500	$2,500	$2,500	$2,500	$2,500	$2,500		
			Contingency (~20%)	$12,700	$3,300	$2,600	$2,600	$2,600	$2,600		
			Total Cost by Year	$112,400	$20,000	$15,800	$15,800	$15,800	$18,300	**$198,100**	
			Discount Factor @ 7%	1.00	0.935	0.873	0.816	0.763	0.713		
			Present Value by Year	$112,400	$18,692	$13,800	$12,898	$12,054	$13,048		**$182,891**

Table 6 - Alternative 5 Cost Analysis
Air Sparge, Soil Vapor Extraction, Engineering and Institutional Controls, and a Site Management Plan
251 Walsh Road Site, 251 Walsh Avenue, New Windsor New York
HRP# DEC1018.P3

Alternative	Description	Remedy Description	Task	Year						Total Cost	Total Present Value Cost at 7%
				Capital Costs	1	2	3	4	5		
5	Air Sparge, Soil Vapor Extraction Engineering and Institutional Controls Site Management Plan	Soil vapor extraction (SVE) can be used to actively reduce sorbed contaminant mass in the overburden. Air sparging will directly treat the dissolve phase CVOC overburden groundwater plume. Vertical SVE wells have the greatest potential to reach the targeted zone for treatment and can be installing within the onsite warehouse in the soil source area. SVE can be used as an engineering control, as well as monitoring of soil vapor and groundwater conditions through an SMP. Periodic groundwater monitoring will be used to confirm the reduction of the CVOC groundwater concentrations through MNA after the remedial activities are complete. Costs assume a pilot test and design costs for the air sparge and SVE systems. Costs assume monthly O&M after an initial startup period (includes system testing for carbon breakthrough). Costs assume annual groundwater monitoring for MNA parameters (4 locations) for a period of 5 years. Assumes the SVE and air sparge systems will operate for a period of no longer than 3 years.	Record of Decision	$10,000							
			Remedial Design	$100,000							
			Final Engineering Report	$11,000							
			Environmental Easement	$ 5,000							
			Site Management Plan (periodic review and updates)	$ 18,000					$2,500		
			Installation of Vertical SVE								
			Drilling Subcontractor	$ 35,000							
			Management	$ 15,000							
			Oversight	$ 15,000							
			Equipment and Installation	$ 50,000							
			Waste Disposal	$ 10,000							
			Electrical	$ 5,000							
			Permitting	$ 5,000							
			Startup, Troubleshooting and O&M	$ 30,000							
			Installation of Air Sparge								
			Drilling Subcontractor	$ 35,000							
			Management	$ 15,000							
			Oversight	$ 15,000							
			Equipment and Installation	$ 50,000							
			Waste Disposal	$ 10,000							
			Electrical	$ 5,000							
			Permitting	$ 5,000							
			Startup, Troubleshooting and O&M	$ 10,000							
			Operation and Maintenance								
			SVE and air sparge Monthly O&M	$30,000	$57,600	$57,600	$14,400				
			Annual Indoor Air Testing	$15,000	$2,700	$2,700	$2,700	$2,700	$2,700		
			Semi-annual GW Monitoring	$15,000	$15,000	$15,000	$15,000	$15,000	$15,000		
			Annual GW Monitoring		$8,400	$8,400	$8,400	$8,400	$8,400		
			Data Validation		$5,000	$5,000	$5,000	$5,000	$5,000		
			Annual Report	$2,500	$2,500	$2,500	$2,500	$2,500	$2,500		
			Contingency (~20%)	$103,300	$18,200	$18,200	$9,600	$6,700	$7,200		
			Total Cost by Year	$619,800	$109,400	$109,400	$57,600	$40,300	$43,300	**$979,800**	
			Discount Factor @ 7%	1.00	0.935	0.873	0.816	0.763	0.713		
			Present Value by Year	$619,800	$102,243	$95,554	$47,019	$30,745	$30,872		**$926,233**

Table 7 - Green Remediation Comparative Summary of Alternatives
Soil Vapor Extraction, Air Sparge, Engineering Controls, with Site Management Plan
251 Walsh Road Site, 251 Walsh Avenue, New Windsor New York
HRP# DEC1018.P3

Alternative	Remedy Description	Threshold Criteria		Balancing Criteria										Total Score	Comments
		Overall Protectiveness of Public Health and the Environment	Compliance with the SCGs	Amount of Soil going to Landfill Due to Remedy	Fuel used to install remedy	CO2 equivalent cost to install remedy	ISCO injection CO2 equivalent cost to install remedy	Electricity used for operation and maintenance per year	Fuel used for operation and maintenance per year	CO2 equivalent cost for remedy over estimated duration of treatment	Electricity used for remedy over estimated duration of treatment	Fuel used for remedy over estimated duration of treatment	CO2 equivalent cost for remedy over estimated duration of treatment		
1 No Action	This alternative would leave the Site in its present condition and would not provide any additional protection to human health or the environment. The No Action alternative would not involve any surface soil, subsurface soil, groundwater, or soil vapor remedial activity. In addition, the No Action alternative would not place any institutional or engineering controls on the Site property	No	No	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Though the least expensive and most readily implementable option, this Alternative does not meet SCGs.
2 Continued onsite monitoring of natural attenuation (MNA) Institutional controls	Monitored natural attenuation can be used to track the degradation of groundwater impacts at the Site to the point at which the Site becomes compliant with SCGs and can be closed. There is a lack of evidence of offsite contamination related to the Site, surrounding properties utilize City provided water and the implementation of institutional controls (e.g., land use restrictions) will decrease the likelihood of human exposure. This alternative would not seek to actively remove or treat the VOC contaminated media onsite but would disrupt the current or future exposure pathways through the imposition of Institutional Controls (ICs). ICs would be required to prevent future exposure pathways from developing by controlling exposure during potential future construction and limiting the use of groundwater. An Environmental Easement would be recorded to provide an enforceable legal instrument to ensure ICs are met.	YES	YES	0	1 van ->15 miles per gallon of fuel 1 onsite visits per year for sampling 111 miles one way	14.8 gallons of fuel 332 pounds of CO2	NA	NA	NA	1,660 pounds of CO2 over lifetime of remedy (5 Year expected duration)	NA	74 gallons of fuel (5 Year expected duration)	Total CO2 (pounds) over lifetime of remedy 1,660 pounds of CO2 over lifetime of remedy (5 Year expected duration)	5	Alternative 2 is not an active remedy for Site contamination. However, this alternative monitors the degradation of Site contaminates to the point at which the Site becomes compliant with SCGs and can be closed. There is a lack of evidence of offsite contamination related to the Site, surrounding properties utilize City provided water and the implementation of institutional controls (e.g., land use restrictions) will decrease the likelihood of human exposure.
3 In Situ Passive Groundwater Treatment	This alternative includes the emplacement of a passive treatment material such as ORC sock which would increase the rate of attenuation of the contaminate plume on site, thereby reducing potential transport of contaminants to the vapor-phases. This alternative would utilize the pre-existing wells and/or installation of dedicated treatment wells on site and work to speed up the attenuation of the CVOCs through the increase oxygen availability in the subsurface.	YES	YES	1-2 yards	1 truck -> 5 miles per gallon of fuel 1 truck up to 10 yards of soil 1 trucks to remove 1-2 yards of soil Disposal facility is 100 miles from site 10 gallons for Geoprobe for 1 day to drill down four 4" wells to 20'	40 gallons of fuel/897.6 pounds of CO2 10 gallons of fuel/224.4 pounds of CO2	NA	NA	1 onsite visits per year for sampling 111 miles one way, 15 miles per gallon, 14.8 Gallons of fuel per year	74 gallons of fuel, 1,660 pounds of CO2, 332 pounds of CO2 (per year)	NA	124 gallons of fuel	2,782 pounds of CO2	4	This Alternative reduces the duration for long-term monitoring of groundwater, as active treatment of groundwater is included.
4 In Situ Groundwater Treatment Carbon or similar in-situ subsurface injection	This alternative introduces activated carbon or similar in-situ subsurface injection into the system which acts to absorb the impacted groundwater and the addition of a catalyst to increase the breakdown of the contaminates of concern. Costs assume injection in up to 4 temporary wells. Costs assume 1 injection event. Assumes an in-situ application of activated carbon or similar treatment as a one time injection in the area of the down gradient groundwater plume (4 temporary injection wells). Assumes treatment objectives can be reached in 5 years. Costs assume annual groundwater monitoring for monitored natural attenuation parameters (VOCs, iron, manganese, sulfate, nitrate, field parameters) (4 locations) for a period of 3 years during treatment and annually for a period of 2 years following.	YES	YES	1-2 yards	1 truck -> 5 miles per gallon of fuel 1 truck up to 10 yards of soil 1 trucks to remove 1-2 yards of soil Disposal facility is 100 miles from site 10 gallons for Geoprobe for 1 day to perform 4 in-situ injection points to 20' for isco chemical amendment	40 gallons of fuel/897.6 pounds of CO2 10 gallons of fuel/224.4 pounds of CO2	1 geoprobe - 10 gallons of fuel per day (used for 1 day), 224.4 pounds of CO2	Na	1 onsite visits per year for sampling 111 miles one way, 15 miles per gallon, 14.8 Gallons of fuel per year	74 gallons of fuel, 1,660 pounds of CO2, 332 pounds of CO2 (per year)	NA	124 gallons of fuel	2,782 pounds of CO2	4	Similar to Alternative 3, this Alternative reduces the duration for long-term monitoring of groundwater, as active treatment of groundwater is included. Though this Alternative scores similarly to Alternative 3, costs for this Alternative are higher than Alternative 3, with little added benefit.
5 Air Sparge, Soil Vapor Extraction Engineering and Institutional Controls Site Management Plan	Soil vapor extraction (SVE) can be used to actively reduce sorbed contaminant mass in the overburden. Air sparging will directly treat the dissolve phase CVOC overburden groundwater plume. Vertical SVE wells have the greatest potential to reach the targeted zone for treatment and can be installing within the onsite warehouse in the soil source area. SVE can be used as an engineering control, as well as monitoring of soil vapor and groundwater conditions through an SMP. Periodic groundwater monitoring will be used to confirm the reduction of the CVOC groundwater concentrations through MNA after the remedial activities are complete. Costs assume a pilot test and design costs for the air sparge and SVE systems. Costs assume monthly O&M after an initial startup period (includes system testing for carbon breakthrough). Costs assume annual groundwater monitoring for MNA parameters (4 locations) for a period of 5 years. Assumes the SVE and air sparge systems will operate for a period of no longer than 3 years.	YES	YES	10 yards	1 truck -> 5 miles per gallon of fuel 1 truck up to 10 yards of soil 1 trucks to remove soil 25 gallons of fuel to run excavator for one half day Disposal facility is 100 miles from site 1 Trucks to bring fill to restore site (10 mile pound trip) 40 gallons of fuel for soil removal 17.5 gallons for excavator to remove source area and outdoor excavation 17.5 gallons of excavator to place fill 2 gallons to bring clean fill	67 gallons of fuel, 1,500 pounds of CO2	Na	Estimated electricity usage for SVE - 800 kWh per month, 9,600 kWh per year	12 onsite visits per year for operation and maintenance of system 111 miles one way, 15 miles per gallon	177.6 gallons of fuel per year, 3,978 pounds of CO2 per year 9,600 kWh per year	3,978 pounds of CO2 per year over 3 years, annual visits for sampling for 2 years after system is shut off (14.8 gallons of fuel/ 332 pounds of CO2 per year) 9,800 kWh per year over 3 years, 29,400 kWh	12,598 pounds of CO2 9,800 kWh per year over 3 years, 29,400 kWh	29,400 kWh for the SVE (3 years) 12,598 pounds CO2 (3,978 pounds per year for monthly site visits+ 2 annual groundwater sampling visits)+ 1,500 pounds of CO2 for the excavation 14,098 pounds of CO2 over lifetime of remedy	1	This Alternative is protective of receptors by treating the CVOC groundwater plume downgradient of the Site. The cost of this alternative is higher due to additional infrastructure needed.

Scoring above was evaluated on a scale of 1 to 5, where 1 = high CO2 Use while meeting criteria, and 5 = low CO2 use while meeting a criteria.

NA = Not Applicable. This Alternative was not evaluated on the balancing criteria because the threshold criteria were not met.

Overall Protectiveness of Public Health and the Environment - This criterion is an overall evaluation of each alternative's ability to protect public health and the environment.
Compliance with SCGs - Compliance with SCGs addresses whether a remedy will meet environmental laws, regulations, and other standards and criteria.
Long-Term Effectiveness and Permanence - This criterion evaluates the long-term effectiveness of the remedial alternatives after implementation. If wastes or treated residuals remain onsite after the selected remedy has been implemented, the following items are evaluated: 1) the magnitude of the remaining risks, 2) the
Reduction of Toxicity, Mobility, and Volume through Treatment - For this criterion, preference is given to alternatives that permanently and significantly reduce the toxicity, mobility and volume of the contamination at the Site.
Short-Term Impact and Effectiveness - This criterion evaluates potential short-term impacts on the community, workers, and the environment during remedial construction. The length of time needed to achieve RAOs is also estimated and compared against the other alternatives.

Implementability - This criterion evaluates the technical and administrative feasibility to implement each remedial alternative. Technical feasibility includes difficulties associated with the implementation of the remedy and the ability to monitor its effectiveness. Administrative feasibility includes the availability of the necessary personnel and materials along with potential difficulties in obtaining specific operating approvals, access for construction, institutional controls, etc.

Cost Effectiveness - Capital costs and annual operation, maintenance, and monitoring costs are estimated for each remedial alternative and compared on a present worth basis. In addition, a long-term evaluation of costs is evaluated to weigh the cost/benefit ratio of applying a more active remedy versus a passive remedy over time, particularly if all other factors are equal to discern a preferred remedy for selection.

Land Use – This criterion evaluates each remedial alternative with respect to the current, intended, and reasonably anticipated future land use.

Community Acceptance - Community concerns regarding selection of a remedial alternative will be considered.

Green Remediation - Considers all environmental effects of the remedy implementation, evaluates the size of the environmental footprint.

Table 8 - Comparative Summary of Alternatives
251 Walsh Road Site, 251 Walsh Avenue, New Windsor New York
HRP# DEC1018.P3

Alternative	Remedy Description	Threshold Criteria: Overall Protectiveness of Public Health and the Environment	Threshold Criteria: Compliance with the SCGs	Balancing Criteria: Long-Term Effectiveness and Permanence	Reduction of Toxicity, Mobility, and Volume Through Treatment	Short-Term Impact and Effectiveness	Implementability	Cost Effectiveness	Land Use	Community Acceptance	Green Remediation	TOTAL SCORE	Comments
1 No Action	This alternative would leave the Site in its present condition and would not provide any additional protection to human health or the environment. The No Action alternative would not involve any surface soil, subsurface soil, groundwater, or soil vapor remedial activity. In addition, the No Action alternative would not place any institutional or engineering controls on the Site property	NO	NO	NA	NA	NA	NA	NA $10,000	NA	NA	NA	NA	Though the least expensive and most readily implementable option, this Alternative does not meet SCGs.
2 Continued onsite monitoring of natural attenuation (MNA) Institutional controls	Monitored natural attenuation can be used to track the degradation of groundwater impacts at the Site to the point at which the Site becomes compliant with SCGs and can be closed. There is a lack of evidence of offsite contamination related to the Site, surrounding properties utilize City provided water and the implementation of institutional controls (e.g., land use restrictions) will decrease the likelihood of human exposure. This alternative would not seek to actively remove or treat the VOC contaminated media onsite but would disrupt the current or future exposure pathways through the imposition of Institutional Controls (ICs). ICs would be required to prevent future exposure pathways from developing by controlling exposure during potential future construction and limiting the use of groundwater. An Environmental Easement would be recorded to provide an enforceable legal instrument to ensure ICs are met.	YES	YES	4	1	5	5	5 $50,435	4	2	5	31	This Alternative monitors parameters associated with the natural attenuation that is occurring on site.
3 In Situ Passive Groundwater Treatment	This alternative includes the emplacement of a passive treatment material such as ORC sock which would increase the rate of attenuation of the contaminate plume on site, thereby reducing potential transport of contaminants to the vapor-phases. This alternative would utilize the pre-existing wells and/or installation of dedicated treatment wells on site and work to speed up the attenuation of the CVOCs through the increase oxygen availability in the subsurface.	YES	YES	4	3	4	4	3 $205,350	4	3	3	28	This Alternative retains the monitoring from Alternative 2 and includes the addition of ORC socks or similar passive groundwater treatment.
4 In Situ Groundwater Treatment Carbon or similar in-situ subsurface injection	This alternative introduces activated carbon or similar in-situ subsurface injection into the system which acts to absorb the impacted groundwater and the addition of a catalyst to increase the breakdown of the contaminates of concern. Costs assume injection in up to 4 temporary wells. Costs assume 1 injection event. Assumes an in-situ application of activated carbon or similar treatment as a one time injection in the area of the down gradient groundwater plume (4 temporary injection wells). Assumes treatment objectives can be reached in 5 years. Costs assume annual groundwater monitoring for monitored natural attenuation parameters (VOCs, iron, manganese, sulfate, nitrate, field parameters) (4 locations) for a period of 3 years during treatment and annually for a period of 2 years following.	YES	YES	4	4	4	3	4 $198,100	4	2	2	27	This Alternative retains the monitoring from Alternative 2 and includes the addition of in situ injections.
5 Air Sparge, Soil Vapor Extraction Engineering and Institutional Controls Site Management Plan	Soil vapor extraction (SVE) can be used to actively reduce sorbed contaminant mass in the overburden. Air sparging will directly treat the dissolve phase CVOC overburden groundwater plume. Vertical SVE wells have the greatest potential to reach the targeted zone for treatment and can be installing within the onsite warehouse in the soil source area. SVE can be used as an engineering control, as well as monitoring of soil vapor and groundwater conditions through an SMP. Periodic groundwater monitoring will be used to confirm the reduction of the CVOC groundwater concentrations through MNA after the remedial activities are complete. Costs assume a pilot test and design costs for the air sparge and SVE systems. Costs assume monthly O&M after an initial startup period (includes system testing for carbon breakthrough). Costs assume annual groundwater monitoring for MNA parameters (4 locations) for a period of 5 years. Assumes the SVE and air sparge systems will operate for a period of no longer than 3 years.	YES	YES	4	5	2	2	1 $979,800	4	1	1	20	This Alternative retains the monitoring from Alternative 2 and includes the addition of an air sparge and soil vapor extraction system.

Scoring above was evaluated on a scale of 1 to 5, where 1 = Lowest likelihood of meeting a criteria, and 5 = Highest likelihood of meeting a criteria.

NA = Not Applicable. This Alternative was not evaluated on the balancing criteria because the threshold criteria were not met.

Overall Protectiveness of Public Health and the Environment - This criterion is an overall evaluation of each alternative's ability to protect public health and the environment.
Compliance with SCGs - Compliance with SCGs addresses whether a remedy will meet environmental laws, regulations, and other standards and criteria.
Long-Term Effectiveness and Permanence - This criterion evaluates the long-term effectiveness of the remedial alternatives after implementation. If wastes or treated residuals remain onsite after the selected remedy has been implemented, the following items are evaluated: 1) the magnitude
Reduction of Toxicity, Mobility, and Volume through Treatment - For this criterion, preference is given to alternatives that permanently and significantly reduce the toxicity, mobility and volume of the contamination at the Site.
Short-Term Impact and Effectiveness - This criterion evaluates potential short-term impacts on the community, workers, and the environment during remedial construction. The length of time needed to achieve RAOs is also estimated and compared against the other alternatives.
Implementability - This criterion evaluates the technical and administrative feasibility to implement each remedial alternative. Technical feasibility includes difficulties associated with the implementation of the remedy and the ability to monitor its effectiveness. Administrative feasibility includes
Cost Effectiveness - Capital costs and annual operation, maintenance, and monitoring costs are estimated for each remedial alternative and compared on a present worth basis. In addition, a long-term evaluation of costs is evaluated to weigh the cost/benefit ratio of applying a more active
Land Use – This criterion evaluates each remedial alternative with respect to the current, intended, and reasonably anticipated future land use.
Community Acceptance - Community concerns regarding selection of a remedial alternative will be considered.
Green Remediation - Considers all environmental effects of the remedy implementation, evaluates the size of the environmental footprint.