Remedial Alternatives Analysis & Remedial Action Work Plan

300 Commerce Drive
Town of Henrietta
Rochester, NY 14623

BCP ID No. C828158

Prepared for:

Yaro Enterprises, Inc.
225 Rosemont Drive
Rochester, NY 14617

October 2022
Revised April 2023

Prepared By:

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Certification

Remedial Alternatives Analysis Report

I, Nancy Van Dussen, of Ravi Engineering & Land Surveying, P.C., certify that I am currently a New York State-registered professional engineer as defined in 6 NYCRR Part 375 and that this Alternatives Analysis 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."

Nancy S. VanDussen — 4-4-23

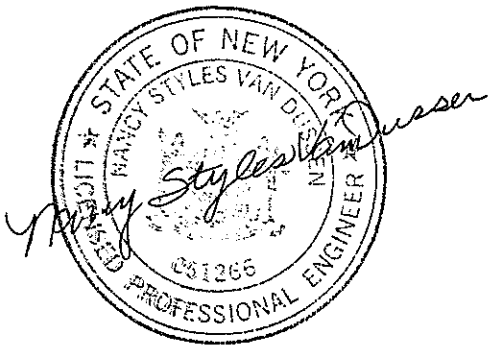
Signature — Date

Remedial Action Work Plan

I, Nancy Van Dussen, of Ravi Engineering & Land Surveying, P.C., certify that I am currently a New York State-registered professional engineer as defined in 6 NYCRR Part 375 and that this Remedial Action Work Plan was prepared in accordance with applicable statutes and regulations and in substantial conformance with the NYSDEC Division of Environmental Remediation (DER) Technical Guidance for Site Investigation and Remediation (DER-10).

Nancy S. VanDussen — 4-4-23

Signature — Date



List of Acronyms

Acronym	Definition
µg	Microgram
AAR	Alternatives Analysis Report
AOC	Area of Concern
B	Soil Boring
BCA	Brownfield Cleanup Agreement
BCP	Brownfield Cleanup Program
BGS	Below Ground Surface
CAMP	Community Air Monitoring Plan
CCD-C	Center City District & Design District Cascade-Canal
CCR	Construction Completion Report
CFR	Code of Federal Regulations
COC	Contaminant of Concern
CP	Commissioner Policy
CPP	Citizen Participation Plan
cVOC	Chlorinated Volatile Organic Compound
cy	Cubic yard
DER	Division of Environmental Remediation
DMM	Division of Materials Management
DUSR	Data Usability Summary Report
EC	Engineering Control
EE	Environmental Easement
EISB	Enhanced *In Situ* biodegradation
ERD	Enhanced reductive dichlorination
ESA	Environmental Site Assessment
ESC	Erosion and Sediment Controls
FER	Final Engineering Report
FOIL	Freedom of Information Law
ft.	Foot
G	Gram
GAC	Granular Activated Carbon
GPS	Global Positioning System
HASP	Health and Safety Plan
IC	Institutional Control
IRM	Interim Remedial Measure
IRM WP	Interim Remedial Measure Work Plan
ISCO	*In Situ* chemical oxidation
kg	Kilogram
L	Liter

lbs	Pound
LNAPL	Light Non-Aqueous Phase Liquid
M	Meter
MCDES	Monroe County Dept. of Environmental Services
MCPW	Monroe County Pure Waters
MDL	Method Detection Limit
mg	Milligram
MNA	Monitored natural attenuation
MS/MSD	Matrix Spike/Matrix Spike Duplicate
mV	Millivolt
MW	Monitoring Well
NYCRR	New York Codes, Rules and Regulations
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYSDOT	New York State Department of Transportation
OMH	Office of Mental Health
ORP	Oxidation reduction potential
OSHA	Occupational Safety and Health Administration
PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PCE	Perchloroethylene
PE	Professional Engineer
PID	Photoionization Detector
POGW	Protection of Groundwater
POTW	Publicly Owned Treatment Works
ppm	Parts per million
Ppb	Parts per billion
PVC	Polyvinyl Chloride
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance / Quality Control
RAA	Remedial Alternatives Analysis
RAO	Remedial Action Objective
RAWP	Remedial Action Work Plan
RE	Remedial Engineer
RI	Remedial Investigation
RIR	Remedial Investigation Report
RIWP	Remedial Investigation Work Plan
ROW	Right-of-way
RPSCOs	Remedial Program Soil Cleanup Objectives
RC	Restricted Commercial
RRCDC	Rochester Regional Community Design Center

SCGs	Standards, Criteria, and Guidelines
SCO	Soil Cleanup Objective
SMP	Site Management Plan
SPT	Standard Penetration Test
SRB	Sulfate-reducing bacteria
SSDS	Sub-Slab Depressurization System
SVI	Soil Vapor Instrusion
SVOC	Semi-Volatile Organic Compound
TIC	Tentatively Identified Compound
TCE	Trichloroethylene
TIC	Tentatively Identified Compound
TOGS	Technical and Operational Guidance Series
TP	Test Pit
TSDF	Treatment/Storage/Disposal facility
UIC	Underground injection control
USEPA	United States Environmental Protection Agency
USGS	United States Geologic Survey
UST	Underground Storage Tank
UU	Unrestricted Use
VOC	Volatile Organic Compound

Executive Summary

This Remedial Alternatives Analysis (RAA) was prepared by Ravi Engineering and Land Surveying PC (RE&LS) for the property located at 300 Commerce Drive in the Town of Henrietta, Monroe County, New York (the "Site"). The RAA was prepared in accordance with the New York State Department of Environmental Conservation (NYSDEC) Remedial Investigation Work Plan for the Site. It incorporates information generated during the Labella Associates, D.P.C. (Labella) Remedial Investigation Report (RIR) and also information generated by Terracon Consultants-NY, Inc. (Terracon) resulting from a Soil Vapor Extraction (SVE)/Dual Phase Extraction (DPE) Pilot Test conducted in October 2020.

Yaro Enterprises, Inc. (Yaro) envisions the future use of the Site to be for continued commercial use.

This RAA identifies one or more remedial alternatives and evaluates the effectiveness of each alternative with respect to the remedy selection evaluation criteria as presented in 6 NYCRR Part 375 and DER-10. Remedies in the BCP are selected from four cleanup tracks:

- **Track 1** cleanups need to meet the requirements as presented in 6 NYCRR Part 375-3.8(e)(1).

- **Track 2** cleanups need to meet the requirements as presented in 6 NYCRR Part 375-3.8(e)(2).

- **Track 3** - cleanups need to meet the requirements as presented in 6 NYCRR Part 375-3.8(e)(3).

- **Track 4**- cleanups need to meet the requirements as presented in 6 NYCRR Part 375-3.8(e)(4).

The RI identified several areas of soil and groundwater with environmental impacts. Labella identified the contaminants of concern (COCs) to be chlorinated volatile organic compounds (cVOCs).

Analytical laboratory results for soil and groundwater were compared to Soil Cleanup Objectives (SCOs) referenced in the New York State Department of Environmental Conservation (NYSDEC) document titled "*6 NYCRR Part 375, Environmental Remediation Programs*" dated December 14, 2006. The data were compared to Unrestricted SCOs, Restricted Commercial Use SCOs, and Protection of Groundwater SCOs for cVOCs.

The Site is a 2.689-acre parcel (Tax ID#161.10-1-18) and is improved with an approximately 18,700 square-foot, two-story, brick faced, slab-on-grade building that was constructed in 1967 with a 1990 addition. The Site is connected to the public water and sewer systems.

The Site is a commercial/light industrial facility that is occupied by *Lavolab, Inc*. It was previously utilized by a tenant operating a commercial printing operation (*Excelsus Solutions, LLC*). The Site is zoned for industrial use. It is surrounded by *Consolidated Freightways* (Trucking Company) to the north/northeast; railroad tracks to the north, west, and southwest; *Miller Metal* fabricating and numerous commercial/industrial properties to the south; and, an auto parts store to the east.

The Site was undeveloped prior to construction of the current Site building in 1967. Rochester Street Directories listed the following businesses as present at 300 Commerce Drive:

- *F&H Products Corporation* occupied the property from 1968 until 1981.
- *Con Tech Corporation* and *Rensselear Components* were located at the Site in 1987.
- In 1997 and 1992 the Site was occupied by *Forester Company*; and *Teamwork Solutions*, Inc.
- In 2002 *Forester Control, Inc.* and *Motion Industries* were listed at the Site.
- In 2003 *My Brands Inc.* and *Motion Industries* occupied the Site.
- *Excelsus Solutions, LLC* (Commercial Printers) occupied the Site in 2007.

As identified in Labella's Phase I Environmental Site Assessment (ESA), cutting oils were formerly utilized at the Site, and oil-saturated metal shavings were reportedly stored outdoors. The use of cutting oils and the presence of metal shavings indicates that a machining facility may have been operated at the Site. The cutting oils are presumed to be the source of the cVOCs detected in soil and groundwater underlying the concrete slab north of the loading dock on the west side of the building.

Adjacent properties have included an auto service/repair station, machine shop, tank manufacturer and coatings manufacturer at 315 Commerce Drive from 1992 to 2007. The property located at 305 Commerce Drive was historically utilized as a machine shop and screen printing company from 1987 to 2007. The parcel located at 15 Transport Drive, adjacent to the north of the Site, was historically utilized as *Consolidated Freightways* from 1975 to 2002.

TCE Impacted Areas (Soil)

Trichloroethylene (TCE) is the predominant contaminant detected in soil and groundwater at the site. The area of TCE and related breakdown compounds in soil and groundwater as indicated in Labella's RIR is illustrated on Figures 2 and 4.

The TCE source for Area A coincides with where oil-saturated metal shavings containing the compound were reportedly stored on the concrete slab north of the loading dock on the west side of the building.

Groundwater Impacts

TCE-impacted groundwater has been documented at concentrations as high as 55,100 ug/l in 2017 beneath the loading dock to the west side of the building, down from

167,000 ug/l detected in 2008.

Soil Vapor Intrusion

Based on preliminary data generated through the pre-BCP investigation and 2009-2012 RI work, installation of a sub-slab depressurization system (SSDS) was completed via an Interim Remedial Measure (IRM) to mitigate potential soil vapor intrusion impacts to indoor air quality. The SSDS was installed by Labella in 2017 in accordance with the NYSDEC-approved IRM Work Plan dated March 2016.

The TCE plume is beneath the west side of the building near the loading dock.

Groundwater at the Site generally flows to the north/northwest.

Potentially Exposed Population and Exposure Routes

The Site is comprised of green space to the north, west, and south with the building and associated parking lot covering the remainder of the Site area. Environmental impacts are in subsurface soils and groundwater covered by the building and parking lot.

Groundwater is not used as a source of potable or non-potable water at the Site or in the Site area. Under these conditions, no complete exposure pathways are identified on the Site; thus, it is unlikely that the general public has a potential to be exposed to Site contaminants. However, if corrective actions are not implemented, the following complete exposure pathways for receptor populations may exist during or after Site development:

- Construction workers and the surrounding community may have the potential to be exposed to Site contaminants via inhalation, direct dermal contact and ingestion of site contaminants during activities that involve disturbance of contaminated media (soil, fill or groundwater).

Evaluation and Selection of Recommended Remedial Alternative

Remedial goals, objectives, and consideration factors were developed in order to prepare the remedial alternatives. Evaluation criteria were then developed in order to evaluate and compare the remedial alternatives. The alternatives, presented below, are directed at addressing Site contamination in soil and groundwater, and these alternatives are presented below. The alternatives consider that the Site will be used for Commercial purposes.

1. <u>No Action:</u>

A no action alternative is a NYSDEC Brownfield Cleanup Program (BCP) procedural requirement, and provides a baseline to evaluate other alternatives. Under this alternative, remedial and monitoring activities as well as placement of institutional controls or engineering controls at the Site are not implemented.

Environmental conditions at the Site would essentially remain as they are, and future use of the Site would not be limited.

2. In-Situ Groundwater Remediation; Institutional Controls; Engineering Controls; and Groundwater Monitoring:

Remediation would consist of in-situ groundwater remediation to assist in remediation of residual volatile organic compound (VOC) groundwater contamination above cleanup criteria in the overburden. The remaining contaminants in soil and groundwater would be addressed via institutional controls and engineering controls (e.g., soil vapor mitigation system, cover system). A groundwater monitoring program would be implemented to evaluate the effectiveness of the remedy. This alternative is considered a Track 4 cleanup to allow for commercial use of the Site.

The Site will have an Environmental Easement, groundwater use restrictions, and a Site Management Plan as institutional controls. The SSDS and a site-wide cover system will be the engineering controls for the Site at this time.

3. Impacted Removals; Institutional Controls; Engineering Controls; and Groundwater Monitoring:

- Remediation would consist of the removal and off-site disposal of the area of highest impacted soil above soil cleanup criteria for the Site.

- Regenesis products (discussed in Section 2.7) will be added to the excavation to treat residual groundwater contamination prior to backfill.

- This includes removal of contaminated soil in the TCE source area beneath the concrete slab north of the loading dock on the west side of the building.

- The remaining contaminants in soil and groundwater would be addressed via institutional controls (e.g., Environmental Easement and Site Management Plan) and engineering controls (e.g., soil vapor mitigation system, Site cover system).

A groundwater monitoring program would be implemented to evaluate the effectiveness of the remedy. This alternative is considered a Track 4 cleanup to allow for commercial use of the Site.

The Site will have an Environmental Easement, groundwater use restrictions, Site use restrictions, and a Site Management Plan as institutional controls. The SSDS and a site-wide cover system will be the engineering controls for the Site at this time.

4. Full Removal of Impacted Fill Material, Soil, Groundwater Remediation; and Groundwater Monitoring:

Excavation and off-site disposal would be implemented to completely remediate impacted soils that exceed NYSDEC Track 1 SCOs and allows for unrestricted use of the Site. Contaminated groundwater that exceeds TOGS 1.1.1 Groundwater Standards in overburden and also bedrock that are not affected by the excavation dewatering would be addressed by in-situ remediation in accordance with 6 NYCRR Part 375-3.8(e)(1)(iv). Groundwater monitoring would be implemented to evaluate the effectiveness of the remedy. This alternative is considered a Track 1 cleanup to allow for Unrestricted Use of the Site.

The proposed recommended remedial alternative is based on the results of the Remedial Investigation (RI) and the evaluation of alternatives presented herein. An evaluation of the four (4) remedial alternatives was performed.

Recommended Alternative

Implementation of Alternative #3 (Impacted Removals; Institutional Controls; Engineering Controls; and Groundwater Monitoring) is recommended for the Site. Alternative #3 would achieve the remediation goals for the Site by:

- Source removal of contaminated soil/fill;
- Controlling exposure to residual contamination through the use of institutional controls and engineering controls;
- Creating conditions by source removal that restore groundwater quality to the extent practicable; and
- Monitoring of groundwater to evaluate the effectiveness of the remedy.

Alternative #3 satisfies the threshold criteria and provides the best balance with the primary balancing criteria identified in Section 3.5. Alternative #3 is an acceptable alternative, can be implemented easily in relation to future use of the Site, and costs less than Alternative #4.

The proposed remedy for the Site is source removal of the TCE-impacted soils in exceedance of the Protection of Groundwater SCOs and groundwater in exceedance of the TOGS 1.1.1 Groundwater Statndard.

1.0 INTRODUCTION and BACKGROUND

RE&LS has prepared this RAA Report for Yaro for submission to the NYSDEC Region 8 Division of Environmental Remediation in accordance with the Brownfield Cleanup Program (Title 6 NYCRR Part 375, and DER-10 "Technical Guidance for Site Investigation and Remediation."

Yaro used private funds to characterize and assess environmental conditions at the Site. Labella was contracted by Yaro to complete the RI. The details of their work are discussed in their RIR.

1.1 Site Location and Description

The Site is a 2.689-acre parcel (Tax ID#161.10-1-18) and is improved with an approximately 18,700 square-foot, two-story, brick faced, slab-on-grade building that was constructed in 1967 with a 1990 addition. The Site is connected to the public water and sewer systems.

The Site is a commercial/light industrial facility that was previously utilized by a tenant operating a commercial printing operation (*Excelsus Solutions, LLC*). The Site is zoned for industrial use. It is surrounded by *Consolidated Freightways* (Trucking Company) to the north/northeast; railroad tracks to the north, west, and southwest; *Miller Metal* fabricating and numerous commercial/industrial properties to the south; and, an auto parts store to the east.

1.2 Site History

The Site was undeveloped prior to construction of the current Site building in 1967. Rochester Suburban Street Directories listed the following business as present at 300 Commerce Drive:

- *F&H Products Corporation* occupied the property from 1968 until 1981.
- *Con Tech Corporation* and *Rensselear Components* were located at the Site in 1987.
- In 1997 and 1992 the Site was occupied by *Forester Company*; and *Teamwork Solutions, Inc.*
- In 2002 *Forester Control, Inc.* and *Motion Industries* were listed at the Site.
- In 2003 *My Brands, Inc.* and *Motion Industries* occupied the Site.
- The directory lists *Excelsus Solutions, LLC* (Commercial Printers) as Present on-Site in 2007.

As identified in Labella's Phase I ESA, cutting oils were formerly utilized at the Site and oil-saturated metal shavings were reportedly stored outdoors. The use of cutting oils and the presence of metal shavings suggests that a machining facility may have been operated on the Site.
Adjacent properties have included an auto service/repair station, machine shop, and coatings manufacturer at 315 Commerce Drive from at least 1992 to at least 2007. The property located at 305 Commerce Drive was historically utilized as a machine shop and screen printing company from at least 1987 to at least 2007. The parcel located at 15 Transport Drive, located adjacent to the north of the Site, was historically utilized as a Consolidated Freightways from approximately 1975 to 2002.

1.3 Site Environmental Concerns and Impacts

RE&LS has reviewed currently available documentation relative to the environmental history of the Site as documented by Labella. Section 1.3 of the Labella RIR (Appendix 4) provides a comprehensive discussion of previous assessment, investigation, and remedial efforts.

1.4 Remedial Investigation

Based on the cumulative results of the pre-BCP and Labella RI investigations, the nature and extent of contamination at the Site has been defined and two (2) areas of concern (AOCs) have been identified. These AOCs are summarized below.

AOC 1 Chlorinated Volatile Organic Compounds in Soils and Groundwater

Soil and groundwater exhibiting cVOC contamination including TCE, Tetrachloroethene (PCE) and associated breakdown products at concentrations above NYSDEC Part 375 Soil Cleanup Objectives (SCOs) and Part 703 Groundwater Standards. As shown on Figures 2 and 3, "worst-case" impacts were identified beneath a concrete pad in the central portion of the Site, on which cutting-oil saturated metal shavings were historically stored prior to disposal. The cVOC-laden oil apparently migrated through the concrete slab and into the underlying soil and groundwater.

These "worst-case" impacts identified by Labella are present in soil in an approximately 100-square foot area to depths of approximately 8-ft. below ground surface (BGS) beneath the concrete pad north of the loading dock on the west side of the building. Labella identified total cVOC concentrations in soil in this area to be as high as 58,510 ug/kg.

Lower-level cVOC impacts also appear to be present in the following isolated areas:

- In the vicinity of the stormwater vault located to the east of the Site building, into which effluent from a catch basin in the loading dock on the western side of the Site building discharges. A water sample collected from the catch basin in January 2018 identified a total VOC concentration of 2,554.00 ug/L. Remedial activities will include the removal of the water and sediments in the vault.

  Yaro is also proposing to replace the catch basin during the proposed remedial excavation activities.

  Yaro will replace and install a new catch basin with a sealed bottom to prevent groundwater infiltration; it will be designed to capture rainwater only. No potentially contaminated groundwater will be collected in the future, and no contaminated water will be discharged to the stormwater vault in the future. The new catch basin will be piped to discharge to the drainage swale east of the building. No treatment will be required.

- Along the northern portion of the Site building. The most recent total cVOC concentrations identified by Labella in nearby wells GP-11-05/MW-07 and RI-SB/MW-01 were 457.2 ug/L and 81.04 ug/L, respectively. The source of cVOC impacts in this area is unknown, but based on the location of these impacts behind the building, could be due to historical improper waste storage. This area also appears limited and isolated to the area just north of the Site building.

- Based on Labella's Figure 7, "Conceptual Model, Total CVOCs in Shallow Groundwater," a second, small component of the TCE plume is located at the northeast corner of the building. We propose to treat this portion of the plume in-situ with the Regenesis 3DME and S-MZVI products described above. Yaro will dig a pit approximately ten (10) feet north and five (5) feet west of the northeast corner of the building. The pit will be dug until saturated conditions are encountered. Saturated soils will de churned up and disturbed by the excavator, at which point one drum of 3DME and one drum S-MZVI will be dumped into the pit. Further mixing will assure distribution of the Regenesis product in the saturated soils. Excavated soils will then be returned into the pit as backfill.

- Trends in VOC and breakdown product concentrations indicate substantial natural degradation is occurring at the Site. Groundwater parameters collected by Labella as part of low flow sampling activities provide indicators for the type of subsurface environment that exists within the saturated zone. One of the parameters recorded during sampling was oxidation reduction potential (ORP) which indicates if there is a reducing or oxidizing environment.

    - Negative ORP measurements collected by Labella during overburden groundwater sampling indicate that the saturated zone at the Site is a reducing environment.

    - Labella also measured dissolved oxygen (DO) in groundwater. DO can indicate whether conditions in the saturated zone are aerobic or anaerobic. DO measurements were generally between 0 to 0.80 mg/L. Levels of DO below 1 mg/L typically indicate an anaerobic environment. Reducing, anaerobic conditions are typically favorable for the breakdown of cVOCs via reductive dechlorination processes, and can explain the high levels of degradation identified in the groundwater data.

AOC 2: Miscellaneous Areas of Soil/Sediment Impacts

Soil and sediment sampling has identified the following sub-AOCs in which one (1) or more targeted compounds were identified above appropriate Standards, Criteria and Guidelines (SCGs):

AOC 2A: Polyaromatic hydrocarbons (PAHs) in Shallow Soil in Labella GP-09-01 – Benzo(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene and dibenzo(a,h)anthracene were identified at concentrations above Restricted Commercial SCOs in a soil sample collected from 0 to 2 –ft. BGS in boring GP-09-01. Several other PAHs and pesticides were identified above Unrestricted Use SCOs in this sample. A soil sample collected from a depth of 4-ft to 6-ft. BGS in the same boring and other borings in close proximity to GP-09-01 did not identify any targeted compounds above Restricted Commercial SCOs, indicating that the impacts are surficial in nature around GP-09-01.

These impacts appear to be present in an approximately 10-foot by 10-foot (100-sq. ft.) area to depths of approximately 3-ft BGS. A metal support structure is present in this location; it was the former mounting structure for an exterior vacuum system utilized by a previous tenant. Historic surficial release(s) from this vacuum system appear to have been the source of these shallow impacts.

Under a Track 4 cleanup, the Site will be required to have a site-wide cover system (where applicable). A site-wide existing cover evaluation will be required in compliance with DER-10 to determine the extent of cover that will be required to obtain compliance with Restricted Commercial Use SCOs.

AOC 2B: Residual Material in Stormwater Vault – A stormwater vault is located on the east side of the building; the concrete bottom of the vault is approximately three feet BGS. Stormwater from the building roof, at least one (1) parking lot drain, and a catch basin located in the loading dock appear to drain to this vault.

Yaro will replace and install a new catch basin with a sealed bottom to prevent groundwater infiltration; it will be designed to capture rainwater only. In the future, no potentially contaminated groundwater will be collected, and no contaminated water will be discharged to the stormwater vault.

Analysis of a sample from the vault collected by Labella identified concentrations of several pesticides and zinc above Unrestricted Use SCOs, but below the Restricted Commercial SCOs. In addition, copper was identified at a concentration of 420,000 ug/kg in this sample, which is above the Unrestricted Use SCO (50,000 ug/kg) and Commercial Use SCO (270,000 ug/kg) for this compound.

The effluent pipe in the vault discharges to the off-site ditch to the east, as depicted on Figure 4.

Based on the lack of elevated concentrations of copper in other areas of the Site; the tendency for compounds like copper to adhere to the soil matrix and not leach in groundwater; and, the generally confined nature of this structure, these impacts appear to be limited to the material within the stormwater vault.

Additional sediment sampling will be conducted prior to any remedial determinations regarding drainage ditch sediments.

AOC 2C: PAHs Southeast of Site Building – Analysis of a sample collected from an area to the southeast of the Site building identified the presence of three (3) PAHs at concentrations above Unrestricted Use SCOs. Concentrations were not identified above Restricted Commercial Use SCOs. Evidence of impairment (elevated PID readings, suspect odors or staining) was not noted in this soil boring. However, trace volumes of asphalt were observed in the boring. The PAHs identified in this sample are commonly found in asphalt and this could account for the elevated concentrations identified in sample GP-09-11. As PAHs are not the contaminants of concern (COC), and they are not in exceedance of the Restricted Commercial Use SCOs, no further action is proposed for AOC-2C.

1.5 Proposed Future Use of Site and Adjoining Properties

The Site and adjoining properties are proposed for continued restricted commercial usage.

1.6 RAA Objective

The objective of the RAA is to identify, evaluate, and select a remedy to address identified contamination at the site.

2.0 REMEDIAL GOALS, OBJECTIVES, CONSIDERATION FACTORS, & EVALUATION CRITERIA

The general remedial goal for sites in the NYS Brownfield Cleanup Program is to eliminate or mitigate significant threats to the public and the environment posed by the Site contaminants through the proper application of scientific and engineering principles.

Remedial goals, objectives and other factors to consider are provided in this section of the RAA.

2.1 Cleanup Goals

Standards, Criteria and Guidance (SCG) values to allow for Restricted Commercial use are considered in this RAA. The SCGs assist in defining the extent of contamination requiring remediation, and also are used to evaluate the effectiveness of the remedy. The SCGs for soil, groundwater and soil vapor intrusion to be used for this project are provided below.

- Analytical laboratory results for groundwater will be compared to groundwater standards and guidance values referenced in the NYSDEC document titled "*Division of Technical and Operational Guidance Series, Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations*" (TOGS 1..1.1) dated June 1998 as amended by April 2000 and June 2004 Addendums.

- Analytical laboratory results for soil and fill will be compared to SCOs referenced in the NYSDEC document titled "*6 NYCRR Part 375, Environmental*

Remediation Programs" dated December 14, 2006. Specific SCOs to be considered will include Track 4 Restricted Commercial SCOs and Protection of Groundwater SCOs.

2.2 Remedial Action Objectives

Remedial Action Objectives (RAOs) are medium-specific objectives for the protection of human health and the environment. RAOs for this project are as follows:

2.2.1 Soil

RAOs for Public Health Protection

- Prevent ingestion/direct contact with contaminated soil.
- Prevent inhalation exposure to contaminants volatizing from soil.

RAOs for Environmental Protection

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

2.2.2 Soil Vapor

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

2.2.3 Groundwater

- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.
- Remove the source of ground or surface water contamination.
- Prevent the discharge of contaminants to surface water and sediment.

2.2.4 Sediments

RAOs for Public Health Protection

- Prevent direct contact with contaminated sediments.
- Prevent surface water contamination which may result in fish advisories.

RAOs for Environmental Protection

- Prevent releases of contaminant(s) from sediments that would result in

surface water levels in excess of ambient water quality criteria.

- Prevent impacts to biota from ingestion/direct contact with sediments causing toxicity or impacts from bioaccumulation through the marine or aquatic food chain.

- Restore sediments to pre-release /background conditions to the extent feasible.

2.3 Soil & Groundwater Cleanup Objectives and BCP Cleanup Track

2.3.1 Soil & Groundwater Cleanup Objectives

This section describes the SCGs used for comparison of COC concentration results for sampled/analyzed media at the Site.

The applicable SCGs used for evaluation of the Site investigation results include water quality standards and guidance values published by the NYSDEC Division of Water and SCOs published by the NYSDEC Division of Environmental Remediation.

The SCGs were provided by:

- *Commissioner Policy CP-51: Soil Cleanup Guidance*, NYSDEC, October 21, 2010;
- *Technical and Operational Guidance Series (TOGS) 1.1.1, Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations,* NYSDEC, October 1993, Reissued June 1998 (with addenda dated April 2000 and June 2004);
- 6 NYCRR Part 375-6 SCOs, NYSDEC, Division of Environmental Remediation, December 14, 2006; and
- *Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York*, NYSDOH, Bureau of Environmental Exposure Investigation, October 2006.

This AAR/RAWP concludes that a Track 4 remedial program is most appropriate for the Site. The AAR/RAWP also includes evaluation of remedial alternatives that may be capable of meeting the requirements of Track 1.

The intent to employ a Track 4 cleanup is based on the assumption that a Track 1 remediation is not possible due to the intent to reuse on-Site buildings under which some contamination will remain present. Therefore, the proposed Track 4 Remedial Action to be performed, which is described in this work plan, is intended to reduce on-Site soil and groundwater contamination, prevent off-Site contaminant migration, and protect human health of the occupants of, and visitors to, the Site via vapor mitigation systems.

2.3.2 Other Factors for Consideration

The following additional considerations were evaluated during the development of remedial alternatives:

- Eliminate or mitigate threats to public health and the environment.
- Address source areas of contamination using the following hierarchy in order of preference:

    - Removal and/or treatment;
    - Containment;
    - Elimination of exposure; and
    - Treatment of source at point of exposure.

Protect groundwater considering the following:

- Source removal, treatment or control;
- Restoration of groundwater quality to meet applicable SCGs to the extent practicable; and
- Plume containment/stabilization.

Prevent soil vapor intrusion into structures:

- Implement a monitoring plan to evaluate the potential for exposure relative
- to soil vapor intrusion; and
- Implement engineering controls to address soil vapor intrusion (e.g., sub-slab depressurization system, etc.).

2.4 Contaminants of Concern

Labella identified the COCs to be cVOCs.

2.5 Development of Remediation Criteria

In order to evaluate the effectiveness of remedial alternatives for this Site, the following general and Site-specific remediation criteria (i.e., threshold criteria) were developed in accordance with the provisions set forth in DER-10. The first two (2) evaluation criteria listed below are threshold criteria and must be satisfied in order for an alternative to be considered for selection. The subsequent evaluation criteria are primary balancing criteria which are used to compare the positive and negative aspects of each remedial alternative that first meets the threshold criteria:

- <u>Protection of Human Health and the Environment:</u>

    This criterion is an evaluation of the remedy's ability to protect public health and the environment, and assesses how risks posed through each existing or potential pathway of exposure are eliminated, reduced or

controlled through removal, treatment, engineering controls or institutional controls. The remedy's ability to achieve each of the RAOs is evaluated.

- Compliance with Standards, Criteria and Guidance Values:

  Compliance with SCG values address whether or not a remedy will meet applicable environmental laws, regulations, standards, and guidance.

- Long-Term Effectiveness and Permanence:

  This criterion evaluates the long- term effectiveness of the remedy after implementation. If wastes or treated residuals remain on-site after the selected remedy has been implemented, the following items are evaluated:

  - Whether residual contamination will pose significant threats, exposure pathways, or risks to the community and environment;
  - The adequacy of the engineering and institutional controls intended to limit the risk;
  - The reliability of these controls; and,
  - The ability of the remedy to continue to meet RAOs in the future.

- Reduction of Toxicity, Mobility and Volume:

  The remedy's ability to reduce the toxicity, mobility or volume of site contamination is evaluated. Preference is given to remedies that permanently and significantly reduce the toxicity, mobility or volume of the wastes at the Site.

- Short-Term Impacts and Effectiveness:

  The potential short-term adverse impacts and risks of the remedy upon the community, the workers and the environment during its construction and/or its implementation are evaluated. This includes identification of short-term adverse impacts and health risks, the effectiveness of any engineering controls, and the length of time needed to achieve the remedial objectives.

- Implementability:

  The technical and administrative feasibility of implementing the remedy is evaluated. Technical feasibility includes the difficulties associated with the construction and the ability to monitor the effectiveness of the remedy. Administrative feasibility includes the availability of the necessary personnel and material, the evaluation of potential difficulties in obtaining specific operating approvals, access for construction, etc.

- Land Use:

  This criterion is intended to evaluate the remedial alternatives in relation to the

planned future use of the Site.

- Cost-effectiveness:

  Capital, operation, maintenance and monitoring costs are estimated for the remedy and presented on a present worth basis.

- Community Acceptance.

  This criterion is intended to select a remedial alternative that is acceptable to the community. The public's comments, concerns and overall perception of the remedy are later addressed through the Citizen Participation Plan (CPP) that was developed under the NYSDEC approved Work Plan. The CPP provides a mechanism for the public to review and comment on project documents as the project progresses. As such, community acceptance is not discussed in this report.

2.6 General Response Actions

Estimates of the areas and volumes of contaminated media to be addressed were identified in the RI. These estimated areas and volumes are summarized below.

TCE Impacted Areas (Soil)

TCE is the predominant contaminant detected in soil and groundwater at the site, identified as AOC 1. The TCE impacts in soil are present around the loading dock on the west side of the building. Labella's SB-1, SB-2, SB-8, and GP-9 exhibited TCE levels in soils in exceedance of the Part 375 SCO for Protection of Groundwater.

Although Labella estimated that approximately 150 cubic yards, or 240 tons of grossly impacted soils are present, a Pre-Design Investigation (PDI) is proposed in this area to delineate the extent of TCE-impacted soils that will need to be addressed.

Groundwater Impacts

Shallow groundwater around the loading dock is grossly impacted by TCE. In 2008, Labella detected 30,500 µ/L of TCE in groundwater beneath the concrete slab north of the loading dock.

Response Actions

General response actions to address the identified contamination in soil or fill can include one (1) or more of the following:

- Treatment,
- Containment,
- Excavation/Extraction/Disposal,
- Ventilation,

- Environmental engineering controls, and
- Institutional controls.

The response actions are evaluated for application in addressing soil or fill contamination that exceeds applicable NYSDEC SCOs.

General response actions to address the identified contamination in groundwater can include one (1) or more of the following:

- Treatment,
- Containment,
- Extraction,
- Disposal,
- Environmental engineering controls,
- Institutional controls, and
- Monitored natural attenuation.

The response actions are primarily evaluated for application in addressing groundwater contamination that exceeds NYSDEC TOGS 1.1.1 Groundwater Standards or Guidance Values.

2.7 Development of Alternatives

The alternatives considered for this Site are directed at addressing contamination in soil, fill and groundwater, and these alternatives are presented below. The Site is zoned for industrial use and will be used as commercial property.

1. No Action:

A no action alternative is a NYSDEC BCP procedural requirement and provides a baseline to evaluate other alternatives. Under this alternative, remedial and monitoring activities as well as placement of institutional controls or engineering controls at the Site are not implemented. Environmental conditions at the Site would essentially remain as they are, and future use of the Site would not be limited.

2. In-Situ Soil & Groundwater Treatment; Institutional Controls; Engineering Controls; and Groundwater Monitoring:

The following in-situ methodologies were evaluated:

Method, Technology or Approach	Description & Limitations
a. Dual-Phase or Multi-Phase Extraction/Treatment	Dual phase extraction system (DPES) extract and treat vapor and aqueous streams; The process can require long time periods for completion; Such a system would require equipment and piping in interior wells, would be energy-intensive and would have high capital and operating costs.
b. In-situ cVOC Treatment with Regenesis 3DME and S-MicroZVI products	Geoprobe injections of two products provided by Regenesis to promulgate the reduction of cVOCs in situ. After the injections, no additional piping or energy supply will be required. This method would be prefereable to those discussed above.

The above technologies are acceptable methods of in-situ treatment in the industry, and they were considered. However, Terracon performed a limited Soil Vapor Extraction (SVE)/Dual Phase Extraction (DPE) Pilot Test to determine the feasibility of utilizing SVE/DPE on October 29, 2020 (Appendix 6). Terracon concluded that, based on the results of our subsurface investigation and subsequent vacuum pilot testing, it appears that this site may not be suitable for the use of dual phase extraction of vapor and liquids as a remediation method.

DPES Analysis

Terracon concluded that, based on the results of our subsurface investigation and subsequent vacuum pilot testing, it appears that this site may not be situated for the use of dual phase extraction of vapor and liquids as a remediation method.

Terracon stated that the overlying fills consisting of silty sand, and the underlying native silts and clays will not allow sufficient penetration of vacuum to be an economically viable option to extract both vapor and groundwater at the site. It is Terracon's opinion that alternative options for remediation should be considered.

In-Situ Analysis

To treat the cVOC groundwater plume in place, we considered utilizing a Geoprobe injection of two *Regenesis* products, 3D-Microemulsion (3DME) and colloidal sulfidated micro zero-valent iron (S-MicroZVI). As stated in the *Regenesis* the Project Goals are to 1) reduce dissolved cVOC concentrations, and 2) reduce source area mass.

The *Regenesis* approach combines both biological enhanced reductive dechlorination (ERD) and abiotic in-situ chemical reduction (ISCR) degradation pathways for rapid reduction of cVOCs. The self-distributing features of 3DME allows for sufficient

coverage and will provide a source of iron, creating conditions for abiotic reduction via the formation of iron sulfides, oxides, and hydroxides. This will foster rapid abiotic reduction of cVOCs while reducing the potential for daughter product formation.

As indicated in the *Regenesis* specifications, they propose an injection strategy for 1) an approximately 9,000 ft.^{3} "hotspot" and 2) the approximately 216,000 ft.^{3} "shallow plume area."

3. Impacted Soil & Groundwater Removal; Institutional Controls; Engineering Controls; and Groundwater Monitoring:

This option to address AOC 1 will consist of soil and groundwater removal from the TCE "source area" around the loading dock on the west side of the building where soils exceed the Protection of Groundwater Standard for TCE. This Alternative includes removal of contaminated soil and shallow groundwater in the TCE source area beneath the concrete slab north of the loading dock, beneath the building slab, and beneath the asphalt loading dock driveway. It is anticipated that some TCE contaminated soil and groundwater would remain in place subsequent to the implementation of the remedy.

During the September 2020 Pilot Test, TCE-contaminated soils were removed and drummed during the drilling procedure. To arrange for disposal of the drummed soil, RE&LS submitted the soil characterization data to NYSDEC and requested a "contained-in" determination. In their 8/31/21 letter NYSDEC stated "concentrations detected for individual VOCs, SVOCs, metals, pesticides and PCBs were all significantly less than their current "contained-in" soil action levels, and Land Disposal Restriction concentrations. The drum "does not have to be managed as a hazardous waste" and may be disposed of at a Part 360 permitted facility that is able to accept the material as non-hazardous waste. The drummed Pilot Test soils were disposed of as Non-hazardous waste at Waste Management's Chaffee Landfill; the waste manifest is attached to the Terracon Pilot Test Report (Appendix 5). It is anticipated that the source area soils will be disposed of in a similar fashion (Appendix 1).

Contaminated soils that are excavated from beneath the slab will be containerized in a plastic-lined (and covered) dumpster provided by Waste Management for disposal characterization. To characterize the soils, Waste Management will require:

- Total VOCs
- Total SVOC
- RCRA Metals
- Pesticides
- Herbicides
- Polychlorinated Biphenyls (PCBs)
- Ignitibility
- Corrosivity
- Reactivity

Based on these results, it is anticipated that the soils will be appropriate for a NYSDEC

"contained-in" determination for off-site disposal at a Waste Management non-hazardous waste landfill (Mill Seat or High Acres). If the soil does not meet the contained-in soil action levels and Land Disposal Restrictions (LDRs) then it will require off-site disposal at a hazardous waste landfill for treatment.

Groundwater collected while dewatering the excavation will be collected in a 330 gallon intermediate bulk container (IBC) Tote. Upon completion, it will be characterized for disposal at a wastewater treatment plant (WWTP).

Remaining contaminants in soil, and groundwater will be addressed via institutional controls (e.g., Environmental Easement and Site Management Plan) and engineering controls (e.g., soil vapor mitigation system, cover system). A groundwater monitoring program will be implemented to evaluate the effectiveness of the remedy. This alternative is considered a Track 4 cleanup to allow for commercial use of the Site.

Concurrently with AOC 1 remediation, Yaro contractors will remediate AOC 2A by excavating an approximately 10-foot by 10-foot (100-sq. ft.) area to depths of approximately 3-ft BGS northeast of the building. These soils will be sampled and pre-approved for direct loading and hauling to either Waste Management of NY Mill Seat or High Acres Landfill.

Yaro contractors will remediate AOC 2B by vacuuming the contents of the stormwater vault and associated piping into a plastic, 50-gallon plastic drum. These materials will be sampled and characterized for disposal in compliance with all applicable regulations.

3.1 Groundwater

To treat residual groundwater contamination after contaminated soil removal, we propose to utilize *Regenesis* 3DME and S-MicroZVI, as described in Section 2.7. After soil removal, one 55-gallon drum of each will be introduced to the pit prior to backfilling.

3.2 Sediments

Additional sediment sampling will be conducted prior to any remedial determinations regarding drainage ditch sediments. As discussed in Section 8.7 and indicated on Figure 5, we propose to collect three (3) sediment samples from the drainage ditch for copper analysis concurrently with the other activities proposed herein.

Copper concentrations will be compared to the Protection of Ecological Resources SCOs; based on these results, drainage ditch soils may require removal to obtain SCO compliance.

4. Full Removal of Impacted Soil and Groundwater Remediation; and Groundwater Monitoring:

Excavation and off-site disposal would be implemented to completely remediate soil contamination that exceeds NYSDEC Unrestricted Usage SCOs. As indicated on Figure 4, soils in exceedance of these SCOs would require removal from beneath a large portion of the building slab.

- Soil removal to achieve Track 1 objectives would require demolition of the building.
- All sub-slab soils in exceedance of Unrestricted SCOs would require removal.
- Drainage ditch sediment removal may be required to meet the Protection of Ecological Resources SCOs.
- Groundwater treatment will be required to obtain compliance with TOGS 1.1.1 Groundwater Standards.

This alternative is considered a Track 1 cleanup to allow for Unrestricted Use of the Site.

3.0 DETAILED EVALUATION OF ALTERNATIVES

The selected alternatives for addressing Site contamination are further evaluated in this section. These alternatives are evaluated relative to the criteria presented in Section 3.0, including the future Commercial Use of the Site.

3.1 Individual Evaluation of Alternatives

Each of the alternatives identified in Section 3.7 are further evaluated in detail in this section of the report. Remedial Alternatives #2 and #3 will include the development and implementation of a Remedial Work Plan and a Health and Safety Plan (HASP).

Alternative #1 - No Action

Under Alternative #1, environmental conditions at the Site would remain unaltered. Alternative #1 is not considered an option as it does not protect human health and the environment, it does not comply with SCGs, it does not reduce toxicity, mobility or volume of contaminants, it would likely not gain community acceptance, it would force the need for engineering and institutional controls and it would be a barrier to Site re-development. Accordingly, this alternative is not considered further.

Alternative #2a – Dual Phase Extraction System (DPES):

Terracon Consultants-NY, Inc. (Terracon) performed a limited Soil Vapor Extraction (SVE)/Dual Phase Extraction (DPE) Pilot Test to determine the feasibility of utilizing

SVE/DPE on October 29, 2020 (Appendix 6). Terracon concluded that, based on the results of our subsurface investigation and subsequent vacuum pilot testing, it appears that this site may not be situated for the use of dual phase extraction of vapor and liquids as a remediation method.

Terracon stated that the overlying fills consisting of silty sand, and the underlying native silts and clays will not allow sufficient penetration of vacuum to be an economically viable option to extract both vapor and groundwater at the site. It is Terracon's opinion that alternative options for remediation should be considered.

Based on these Pilot Test results the DPES was not evaluated as a remedial option.

Alternative #2b - In-Situ Soil & Groundwater Treatment; Institutional Controls; Engineering Controls; and Groundwater Monitoring:

Assessment

Protection of Human Health and the Environment

This alternative would be protective of human health and the environment. Risks associated with potential human health exposure pathways would be eliminated, reduced or controlled. RAOs for public health protection and environmental protection would be adequately addressed by this alternative.

Compliance with SCG Values

Alternative #2b provides monitoring to evaluate compliance with chemical-specific SCG values. However, as discussed below, our September 2020 Pilot Test data indicated that in-situ methodologies will either be ineffective of take longer than acceptable to obtain compliance with the SCOs.

Long-Term Effectiveness and Permanence

Long-term effectiveness and permanence would be adequately monitored. Potential exposure pathways identified as part of this project would be mitigated.

Reduction of Toxicity, Mobility and Volume

This alternative would aggressively address the toxicity, mobility and volume of the TCE-contaminated soils and groundwater plume.

Implementability

Regardless of the effectiveness of in-situ treatment systems to address both vadose zone and groundwater contamination, it will not be an effective solution at the Site. The September 2020 Pilot Test data indicated that in-situ methodologies

will be either ineffective or take an longer than acceptable time to achieve compliance with the SCOs. The subsurface conditions are not conducive to vapor extraction or chemical dispersion.

While this alternative scores high, due to the subsurface conditions indicated by the Pilot Test, it is not considered practical because it would be difficult to achieve compliance with SCOs in an acceptable timeframe. Thus, Alternative #2 was not considered any further.

Land Use

In-situ groundwater treatment will have no impact on the continued commercial use of the Site building.

Cost-effectiveness

- Regenesis provided an estimate of $225,000 to provide their recommended volumes of 3DME and S-MicroZVI.
- An estimated $25,000 will be incurred for the Geoprobe injections of the Regenesis product.
- An estimated $10,000 will be incurred for RE&LS consulting fees.
- An estimated $5,000 will be incurred to remediate AOC 2A and 2B.

An estimated fee of $265,000 will be incurred to implement **Alternative #2b.**

Annual Fees

Annual fees of approximately $10,000 will be incurred for:

- Maintenance and operation of the SSDS;
- Vapor sampling and groundwater sampling in conformance with the Site Management Plan;
- Periodic Review Report (PRR).

Community Acceptance

As the Site is located in a Commercial neighborhood, and no off-site migration is documented, it is anticipated that this remedial alternative will be acceptable to the community.

Alternative #3 - Impacted Soil & Groundwater Removal; Institutional Controls; Engineering Controls; and Groundwater Monitoring:

Alternative #3 – Assessment

Protection of Human Health and the Environment

This alternative would be protective of human health and the environment. Risks associated with potential human health exposure pathways would be eliminated, reduced or controlled. RAOs for public health protection and environmental protection would be adequately addressed by this alternative.

Compliance with SCG Values

Alternative #3 provides monitoring to evaluate compliance with chemical-specific SCG values. As source area removal is proposed, Alternative #3 will be an effective methodology to obtain compliance with SCG Values.

Long-Term Effectiveness and Permanence

Long-term effectiveness and permanence would be adequately monitored. Potential exposure pathways identified as part of this project would be mitigated.

Reduction of Toxicity, Mobility and Volume

Source removal will aggressively address the toxicity, mobility and volume of the TCE-contaminated soils and groundwater plume.

Implementability

Yaro has extensive contracting experience, and their operators are OSHA 40-Hour HAZWOPER certified. Yaro's workers will have current OSHA 8-Hour HAZWOPER refreshers, as required.

To ensure the structural integrity of the building, Yaro will saw cut the slab prior to excavation, remove the effected portion of the slab with a fork lift, and use aluminum panel shield trench protection for the vertical shores of the excavation.

As Site owners, they will be capable of performing whatever degree of excavation and source removal are required to obtain the Certificate of Completion (COC).

Land Use

As the Site will be restored after source removal, this will have no impact on the future commercial use of the building.

Cost-effectiveness

- Labella estimated that approximately 200 tons of contaminated soils comprise the "hotspot" that should be removed. The volume will be more precisely

defined by our PDI. As such, we are conservatively estimating that 400 tons of soil will require removal to obtain compliance with the SCOs. A NYSDEC "contained-in" determination will be required, but it is our assumption that the soils will be disposed of as "non-hazardous" waste at either Waste Management Mill Seat or High Acres Landfill. Yaro estimates that it will cost $75 per ton to excavate and dispose of the soils. An estimated fee of $30,000 will be incurred for "hotspot" soil removal.

- Yaro estimates that it will cost $20,000 to:

  - backfill and compact excavations with two-inch crusher run gravel from the Dolomite mine in Avon, NY,

  - restore the concrete floor,

  - and restore the exterior slab north of the loading dock upon completion.

- After the soil removal, we propose to add one drum of Regenesis 3DME and one drum of S-MicroZVI to treat residual groundwater contamination in place. The two drums will cost approximately $10,000.

- An estimated $10,000 will be incurred for RE&LS consulting fees.

- An estimated $5,000 will be incurred to remediate AOC 2A and 2B.

- An estimated $5,000 will be incurred for long-term groundwater monitoring.

An estimated fee of $80,000 will be incurred to implement **Alternative #3.**

Annual Fees

Annual fees of approximately $10,000 will be incurred for:

- Maintenance and operation of the SSDS;

- Vapor sampling and groundwater sampling in conformance with the Site Management Plan;

- Periodic Review Report (PRR).

- Long-term groundwater monitoring.

Community Acceptance

As source removal and in-situ groundwater treatment is proposed, it is anticipated that this remedial alternative will be acceptable to the community.

Institutional Controls

Upon completion of the proposed source removal, a NYSDEC Environmental Easement (EE) and Site Management Plan (SMP) will be prepared for the Site that will:

- Preclude groundwater usage at the Site;
- Provide guidance regarding potential environmental and exposure concerns relative to future Site use and activities.
- Require periodic inspection of and reporting on maintenance of ECs.

Alternative #4 - Full Removal of Impacted Fill Material, Soil, Groundwater Remediation; and Groundwater Monitoring:

Alternative #4 – Assessment

Excavation and off-site disposal would be implemented to completely remediate impacted soils (where accessible) that exceed NYSDEC Track 1 SCOs and allows for unrestricted use of the Site. Contaminated groundwater that exceeds Track 1 SCOs in overburden and also bedrock that are not affected by the excavation dewatering would be addressed by in-situ remediation. Groundwater monitoring would be implemented to evaluate the effectiveness of the remedy. This alternative is considered a Track 1 cleanup to allow for Unrestricted Use of the Site.

Protection of Human Health and the Environment

This alternative would be protective of human health and the environment.

Compliance with SCG Values

Alternative #4 will be an effective methodology to obtain compliance with SCG Values.

Long-Term Effectiveness and Permanence

Long-term effectiveness and permanence would be adequately monitored. Potential exposure pathways identified as part of this project would be mitigated.

Reduction of Toxicity, Mobility and Volume

Source removal will aggressively address the toxicity, mobility and volume of the TCE-contaminated soils and groundwater plume.

Implementability

Implementability of Alternative is problematic, as approximately 50% of the building slab (or greater) would require removal to obtain compliance with Unrestricted SCOs.

3.2 Comparative Analysis of Alternatives

As described above, Alternative #3 of source removal is selected.

Goals of this alternative include:

- Remediating the TCE contamination in soil to achieve compliance with Protection of Groundwater SCOs;
- Remediating the residual VOC contamination in groundwater to achieve standards and guidance values as defined in NYSDEC TOGS 1.1.1 to the extent practicable;
- Controlling exposure to residual contaminants that may be present in historic fill material and soil at the Site; and
- Preventing off-Site migration in groundwater.

Comparative Analysis of Alternatives

- Alternative #3 is the more cost effective of the remedial options evaluated.
- Alternative #3 satisfies the threshold criteria (protection of human health and the environment; and compliance SCG values) and provides the best balance of the primary balancing criteria described that are identified in Section 3.5. Alternative #1 does not satisfy the threshold criteria and is not considered viable alternative; thus is not further discussed in this comparison. Alternative #2 satisfies the threshold criteria, but, will take longer to achieve SCO compliance, and is not as cost-effective as Alternative #3.
- The long term effectiveness and permanence of Alternative #3 is adequate as a Track 4 cleanup with use restrictions. The adequacy and reliability of engineering controls and institutional controls will have the ability to continue to meet RAOs and keep residual contamination from posing significant threats, exposure pathways, or risks to the community or environment. The long term effectiveness and permanence of Alternative #3 is adequate as a Track 4 cleanup for Commercial use.
- Alternative #3 would have a greater reduction in toxicity, mobility and volume of contamination at the Site than Alternative #2.
- Implementation of a Health & Safety Plan (HASP) and Community Air Monitoring Plan (CAMP) while implementing Alternative #3 will protect Site workers and the nearby community from these short-term risks.
- Alternative #3 can easily be implemented at the Site. Due to subsurface conditions, alternative #2 would be difficult to implement.
- Alternative #2 and #3 would be acceptable for the planned future use of the Site.

In summary, Alternative #3 is a cost-effective alternative that is being recommended for implementation at the Site.

3.3 Qualitative Exposure Assessment

The following NYSDOH Qualitative Human Health Exposure Assessment (QEA) is prepared in conformance with Appendix 3B of DER-10.

The purpose of the QEA is to evaluate and document how people might be exposed to site-related contaminants, and to identify and characterize the potentially exposed populations(s) now, and under the reasonably anticipated future use of the site:

1. Contaminant source(s)

   As identified in Labella's Phase I ESA, cutting oils were formerly utilized at the Site, and oil-saturated metal shavings were reportedly stored outdoors. The use of cutting oils and the presence of metal shavings indicates that a machining facility may have been operated at the Site. The cutting oils are presumed to be

the source of the cVOCs detected in soil and groundwater underlying the concrete slab north of the loading dock on the west side of the building.

2. Contaminant release and transport mechanisms

   The contaminants are present in the cVOC groundwater plume beneath the loading dock and concrete slab at the southwest corner of the building, with an associated soil vapor phase in the unsaturated zone. Transport is by groundwater flow and vapor migration.

3. Potential exposure point(s)

   As the building is equipped with a SSDS for vapor mitigation, and Site groundwater is not used, no potential exposure points are identified.

   Potential exposure points will be by direct contact with remedial contractors or utility workers while excavating and removing contaminated soils and groundwater. Concerns will be minimized by adherence to the Health & Safety Plan (HASP).

   Potential exposure points will be by direct contact with utility workers.

4. Route(s) of exposure

   Potential routes of exposure include inhalation and dermal contact.

5. Receptor populations

   Remedial workers and utility workers are the potential receptor population.

4.0 REMEDIAL ACTION WORK PLAN

The Preferred Remedy achieves protection of public health and the environment for the intended use of the property. This section describes the preparation of necessary governing documents, general remedial construction information, Site preparation, and reporting procedures.

The remedial work will be performed in conformance with the following documents:

- The Site-Specific Health and Safety Plan (HASP), which describes health and safety protocols to be followed during remedial activities is included as Appendix 2.
- The Quality Assurance Project Plan (QAPP), which describes sampling and analytical methods for sampling, is included as Appendix 3.
- The Community Air Monitoring Plan (CAMP), which describes protocols for air monitoring to protect the surrounding community, is included as Appendix 4.

4.1 Remedial Engineer

The Remedial Engineer is required by the State of New York to be a Professional Engineer, registered in New York. The Remedial Engineer for this project is Nancy Van Dussen, PE, of RE&LS and her designated representatives.

The Remedial Engineer will have primary direct responsibility for implementation of the remedial program for the Site and will certify in the FER that the remedial activities were observed by environmental professionals under her supervision.

4.2 Worker Training and Monitoring

Site workers involved with the handling of contaminated materials will have up-to-date OSHA HAZWOPER certification and medical monitoring.

All Site workers will have a current 8-hour HAZWOPER refresher certification. Certificates will be made available to the Department prior to the start of any field work activities.

4.3 Remediation Goals

The remedy is selected pursuant to the remedy selection criteria set forth in DER-10, Technical Guidance for Site Investigation and Remediation and 6 NYCRR Part 375. The selected remedy is a Track 4 remedy: Restricted use with site-specific soil cleanup objectives. Under this Track 4 cleanup alternative, the Site will be designated for restricted Commercial use. Source area soils will be removed and disposed of in a permitted solid waste landfill.

- The data indicate an estimated 200 tons of contaminated soil will be removed from beneath the concrete slab north of the loading dock on the west side of the building. As indicated on Figure 4, an area of approximately 20 feet by 20, both inside and outside of the building will be excavated down to an approximate depth of eight feet BGS to achieve "hotspot removal." Yaro workers will first jackhammer and remove the concrete slab to allow access to sub-slab soil removal. It is estimated that approximately 200 tons of contaminated soil will be removed.

- The actual volume of soil proposed for removal will be further defined by our PDI; it is anticipated to fall within the range of 200 to 500 tons.

After hotspot removal, Institutional controls (e.g., deed restrictions, NYSDEC Environmental Easement, etc.) and a SMP including a Health & Safety Plan (HASP) will be implemented to protect against exposure and also would control Site use.

4.4 Remedial Action

4.4.1 Introduction and Purpose

Labella estimated 200 tons of Site soils are impacted with TCE in excess of regulatory standards that could present an exposure risk to human health and the environment. RE&LS proposes to conduct a Pre-Design Investigation (PDI) to more accurately determine the volume of soils to be removed (see Section 4.4.5).

The RAA recommended that a Remedial Action (RA) be conducted to address potential exposure risk. The remedial actions recommended include impacted soil removal from beneath the concrete slab north of the loading dock, beneath the building slab, and beneath the asphalt loading dock driveway. The RA is intended to address the exposure risks related to TCE impacts in soil and potential further impacts to groundwater, and to reduce exposure to Site contaminants.

The RA work will be conducted with oversight by RE&LS personnel in accordance with 6 NYCRR Part 375 and DER-10. There will always be a qualified environmental professional, NYS-licensed P.E., or a direct-report to the NYS-licensed P.E. on Site during remedy implementation.

In addition, the generic CAMP requirements will be supplemented with the Special CAMP requirements (Appendix 7).

4.4.2 Protection of Groundwater Standard

As described in the RAA, TCE was detected in soil and groundwater beneath the concrete slab north of the loading dock.

4.4.3 Site Preparation

The necessary permits from the Town of Henrietta will be obtained prior to the start of the remedial action and submitted to NYSDEC, if applicable.

4.4.3.1 Community Air Monitoring Plan (CAMP)

Generic CAMP monitoring will be performed, including dust/particulate monitoring during all intrusive remedial activities.

- Any monitoring results that exceed the action levels set by the CAMP will be reported to NYSDEC by text or phone call within two hours.

In addition to the generic CAMP, the Special CAMP will be implemented for all ground intrusive activities.

4.4.4 Soil Excavation and Groundwater Extraction

Based on soil data generated while a Pilot Test was conducted in September 2020 to determine the efficacy of a dual phase extraction system (DPES), it is anticipated that the soils will be disposed of as “non hazardous,” as determined by TAGM 3028 - "Contained In" Criteria for Environmental Media: Soil Action Levels (August 1997).

Sub-slab, interior soils will be loaded into a roll-off dumpster by the loading dock (Figure 4). After the interior, sub-slab work is completed, the dumpster will be re-located so that soils beneath the loading dock driveway can be excavated. This work will be conducted concurrently with Yaro’s project to replace the catch basin in this area.

As discussed below, a new “Contained-In” determination will be required prior to disposal of the excavated soils.

While the soils are being excavated, all fluids collected in the excavation will be pumped to a 150-gallon, skid-mounted tank(s). Upon completion, the evacuated water will be characterized for either 1) sewer discharge, or 2) wastewater treatment plant (WWTP) disposal.

Fluid discharge permits will be submitted to NYSDEC prior to any discharge activities.

4.4.4.1 Waste Characterization

When the excavation is complete, the dumpster soils will be characterized for disposal. Per Waste Management of New York, the following analyses will be required:

- RCRA Metals by USEPA Methods 7060, 7740, etc.
- Total Volatile Organic Compounds (VOCs) by Method 8260
- Total Semivolatile Organic Compounds (SVOCs) by Method 8270
- Pesticides by Method 8081
- Herbicides by Method 8151
- Polychlorinated biphenyls (PCBs) by Method 8082
- Ignitability/Flash by Method 1030
- Corrosivity/pH by Method 9045
- Reactive Sulfide by SW 846 Method 7.3.4.1
- Reactive Cyanide by SW 846 Method 7.3.4.2
- Percent Total Sulfur by SW 846 Methods D4239, 5050/9056
- Free Liquids/Paint Filter

As the soils will be excavated to the point that compliance with the Protection of Groundwater Standard SCO is achieved, it is not anticipated that these soils will

have hazardous waste characteristics.

A NYSDEC "Contained in Determination" will be required to determine whether or not disposal as hazardous waste will be required.

4.4.5 Pre-Design Investigation (PDI)

To refine the limits of soil removal that will be required beneath the slab inside the building, we propose to conduct a PDI by Geoprobe as indicated on Figure 4. Soil borings will be field screened and head space screening will be conducted with a photoionization detector (PID)

Soil Samples will be collected from varying depths and submitted to Paradigm Environmental Services (Paradigm) for Target Compound List (TCL) VOC analysis by USEPA Method 8260. These results will be used for planning only, ASP Category B deliverables will not be requested.

As indicated on Figure 4, a Geoprobe grid will be sampled to more precisely delineate the extent of soil removal that will be required to address AOC 1. Approximately 12 Geoprobe points will be installed to depths of 16 feet BGS, or to depths of Geoprobe refusal, whichever is first encountered.

Soil samples from 0 to 4 feet BGS, 4 feet to 8 feet, 8 feet to 12 feet, and from 12 feet to 16 feet BGS will be collected from each borehole and submitted for laboratory analysis for TCL VOCs. These data will delineate the amount of soils requiring removal from AOC-1 to obtain compliance with the Part 375 Protection of Groundwater SCOs.

If these data to not indicate compliance with the Protection of Groundwater SCOs, then additional investigation will be performed until the extent of contamination is determined.

The PDI will be conducted in a similar fashion on the concrete slab north of the loading dock on the building exterior to determine the extent of exterior contamination that will require removal to the north, south, and west.

The HASP, generic CAMP and Special CAMP will be implemented during all ground intrusive activities.

To protect worker safety, and to mitigate concerns relative to TCE vapors in the building all remedial activities, we propose to 1) open the loading dock doors prior to conducting the sub-slab excavation, and 2) utilize an industrial fan blowing across the excavation. The vapors will be blown through the loading dock to dissipate outside.

The contractors performing the excavation and the RE&LS field technicians will locate themselves on the upwind side of the fan throughout the excavation.

4.4.5.1 Remedial Design

Based on the PDI data, RE&LS will prepare drawings indicating the precise location of the proposed remedial excavation, the depths of the pit, and the anticipated volume of soils to be removed. A draft Remedial Design Report (RDR) will be submitted to NYSDEC for review and approval before the start of remedial activities. The RDR will be in accordance with DER-10 Section 5.2 and will include an engineering structural evaluation and all safety precautions to prevent impacts to the building's integrity.

4.4.6 Soil Excavation

Based on the PDI, RE&LS will mark out the area proposed for excavation to address AOC-1. Prior to slab removal, Yaro will jackhammer and remove the concrete in the area determined by the PDI. Soils will be excavated down to the depth determined in the PDI. The soils will be directly loaded into a lined, roll-off dumpster staged on the loading dock driveway. The soils will first be removed from beneath the concrete pad and building slab.

To address concerns relative to the operation of combustion engines inside the building, we propose to 1) open the loading dock doors prior to conducting the work, and 2) utilize an industrial fan to direct the vapors towards the loading dock door. The vapors will be blown through the loading dock to dissipate outside.

During excavation, VOCs will be monitored with a PID, and a 4-gas meter will be utilized to measure the lower explosive limit (LEL), oxygen (O_2), carbon monoxide (CO), and hydrogen sulfide (H_2S).

To address odor concerns, Biosolve (or the equivalent) will be available to apply to the excavation, if necessary.

Yaro will employ aluminum panel shield trench protection to shore the vertical sides of the excavation.

When excavations of those portions of AOC 1 have been completed, the dumpster will be re-located so that the soils beneath the loading dock driveway can be excavated. Yaro is proposing to replace the stormwater catch basin on the loading dock driveway. This will be performed by Yaro personnel concurrently with the contaminated soil removal from this location.

The dumpsters will be covered during non-work hours. The interior excavation will be secured during non-work hours, as it will be locked inside the building. The exterior excavation will be secured with snow fence during non-work hours.

The proposed excavation will not damage the building footers; the structural integrity of the building will be evaluated with an engineering structural evaluation in the RDR. As stated above, Yaro will employ aluminum panel shield trench

protection to shore the vertical sides of the excavation. All appropriate precautions will be taken to prevent impacts to the building's integrity.

The building tenant will be slightly impacted during remedial construction, as they will not be able to utilize the loading dock during construction. Loading and off-loading through alternate doors will be required while the remedial excavation is completed.

4.4.6.1 SSDS

The SSDS installed by Labella is comprised of three piping systems. The contractor retained by Labella to install the SSDS was Mitigation Technology (MT). The proposed remedial excavation will disrupt the piping at the south end of System 1. After the overlying concrete has been removed, the exposed System 1 piping will be cut away and temporarily capped. Unaffected portions of the system will remain in operation. Once soils are removed and replaced, a new suction cavity will be created and new piping will be installed to connect the affected area to the depressurization system. Once the piping is in place, a new section of concrete slab will be poured around the pipe and the system will be restored to normal operation.

After the SSDS is restored, MT will perform a pressure-field extension test to verify that a sub-slab vacuum is present throughout the affected area.

4.4.7 Off-Site Disposal of Contaminated Soils

RE&LS will coordinate the excavation and off-site disposal of soils. Soils will be field screened for evidence of contamination via visual characteristics, texture, odor and VOCs using a photo Ionization Detector (PID) and loaded directly into the lined dumpster for characterization.

All transporters of contaminated soils from the Site will have current permits and registrations with NYSDEC. All vehicles transporting waste will be properly placarded and covered in accordance with New York State Department of Transportation (DOT) regulations.

The following waste stream documentation will be kept for inclusion in the FER:

- Correspondence from the facility accepting the waste stream
- Waste profiles
- Waste characterization sampling and results
- Manifests
- Bills of Lading
- Weight tickets

For disposal purposes, the transporter will have a valid 6 NYCRR Part 364 waste transporter permit. A waste manifest and copy of the waste profile will accompany each shipment of material.

Off-site clean fill (subject to characterization, testing and approval by the NYSDEC) will be used to backfill the excavations. All imported soil and fill material will need NYSDEC approval prior to importation. Sampling of import material will be in accordance with DER-10 utilizing the current NYSDEC Import Request.

4.4.7.1 In-Situ Groundwater Treatment

To treat residual groundwater contamination, we propose to utilize two products provided by Regenesis; a 3-D Microemulsion (3DME) product and Sulfidated Zero-Valent Iron (S-MZVI) product will be introduced to the pit after soil excavation (Regenesis Specifications are included in Appendix 4).

- 3DME is a long term electron donor that will interact with groundwater and cover a larger area than originally emplaced.

- S-MZVI is a colloidal suspension of 2-4 micron diameter zero valent iron particles that have been coated with an iron sulfide layer. It will degrade PCE and TCE directly and creates reducing conditions for biodegradation of the daughter products.

In email communication with RE&LS, Regenesis stated that "Both products come as a liquid that can be applied directly to an open exaction (in the saturated zone), or diluted with water and injected through direct-push technology (DPT) or injection wells." Regenesis elaborated "any reagent that can be applied via direct push should also be applicable to excavation backfill (assuming they are applied to the saturated zone). The end result of both application styles is the same, perhaps even better for excavation backfill because distribution can be better controlled by mixing with excavation equipment."

Based on Labella's Figure 7, "Conceptual Model, Total cVOCs in Shallow Groundwater," a second, small component of the TCE plume is located at the northeast corner of the building. We propose to treat this portion of the plume in-situ with the Regenesis 3DME and S-MZVI products described above. Yaro will dig a pit approximately ten (10) feet north and five (5) feet west of the northeast corner of the building. The pit will be dug until saturated conditions are encountered. Saturated soils will de churned up and disturbed by the excavator, at which point one drum of 3DME and one drum S-MZVI will be dumped into the pit. Further mixing will assure distribution of the Regenesis product in the saturated soils. Excavated soils will then be returned into the pit as backfill.

4.4.8 Confirmatory Sampling and Laboratory Analysis

The methodology that will be used for collection, selection, and preservation of confirmatory samples will be performed in accordance with NYSDEC procedures and guidelines.

Soil samples will be collected directly from the excavator bucket at the direction of

RE&LS in the following manner. The samples will be collected from sidewalls and bottom of the pit.

1. Personnel performing soil collection and characterization will wear a clean pair of disposable latex gloves or equivalent.

2. Samples to be submitted for laboratory analysis will be collected and placed into pre-cleaned sample jars provided by the analytical laboratory, labeled and placed in a cooler in accordance with this work plan.

Confirmatory sampling will be performed to verify that remediation goals have been achieved. It is estimated that ten to 15 post excavation sidewall or bottom samples will be submitted for confirmatory analysis.

In conformance with DER-10:

- One confirmatory pit wall sample will be collected for every 30 linear feet of sidewall, and

- One pit bottom sample will be collected for every 900 square feet of pit bottom.

- The number of confirmatory samples will be contingent upon the size of the excavation and in accordance with DER-10.

- Confirmatory soil samples will be collected from the excavated sidewalls and pit bottom in accordance with NYSDEC DER-10 Chapter 5. Samples will be submitted to a New York State Department of Health (DOH) Environmental; Laboratory Approval Program (ELAP) certified lab for TCL VOC analysis. ASP Category B Deliverables; the results will be submitted for third party Data Usability Summary Report (DUSR) validation.

All analytical results intended for decision making such as limits of excavation, evaluating cleanup levels, and data validation will be based on Analytical Services Protocol Category B deliverable reporting standards. Independent data validation will be performed on all ASP Category B analytical results used for decision making purposes.

The excavation will remain open until the confirmatory results have been received. If the results do not meet the Protection of Groundwater SCOs, additional excavation will be performed until the SCOs are achieved. A snow fence or cones will be placed around the open excavation while laboratory results are pending.

4.4.9 Backfill

Yaro will import crusher run 2" (2-inch minus crushed limestone) from the Dolomite Avon, NY plant. Yaro will layer and tamp the crusher run; it contains fine-grained materials for compaction, and is suitable for use under building pads.

Imported fill soils to backfill the excavations will first be sampled in accordance with DER-10 Table 5.4(e)10:

Recommended Number of Soil Samples for Soil Imported To or Exported From a Site			
Contaminant	**VOCs**	**SVOCs, Inorganics & PCBs/Pesticides**	
Soil Quantity (cubic yards)	**Discrete Samples**	**Composite**	**Discrete Samples/Composite**
135 to 335 cys	4	2	3-5 discrete samples from different locations will comprise a composite sample for analysis

4.4.10 Restoration

After the contaminated soils are removed, the pit will be backfilled and compacted, and the concrete slab will be restored to grade.

4.4.11 Permits, Authorizations, Modifications

If modifications to the RAWP are necessary, they will be done in consultation with the NYSDEC project manager. Requests will be done in writing prior to approval and documented in the FER. Any requests for modifications to the approved RAWP will be identified in the progress report, along with the status of the requested modifications.

5.0 COMMUNITY & ENVIRONMENTAL REPSONSE PLAN (CERP)

This CERP outlines the measures that will be taken to safeguard the health and safety of site workers and the general public during the remedial action, and was prepared in accordance with DER-10 section 5.1(f)(4).

5.1 Community Air Monitoring Plan (CAMP)

Remedial work will be conducted in conformance with the New York State Department of Health (NYSDOH) CAMP Special Requirements (Appendix 4), and with Fugitive Dust and Particulate Monitoring requirements outlined in Appendix 1A and 1B of DER-10. The Special CAMP and fugitive dust monitoring will be implemented as follows:

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

5.1.1 Action Levels and Responses

VOC Monitoring, Response Levels, & Actions

VOCs will be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations will be measured at the start of each workday and periodically thereafter to establish background conditions. The monitoring work will be performed using equipment appropriate to measure the types of contaminants known or suspected to be present and will be calibrated daily. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

1. If total organic vapor levels exceed 5 parts per million (ppm) above background at the perimeter, work activities will be temporarily halted and monitoring continued. If levels decrease below 5 ppm above background, work activities will resume with continued monitoring.

2. If total organic vapor levels at the downwind perimeter persist at levels in excess of 5 ppm above background but less than 25 ppm, work activities will be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities will resume provided that the total organic vapor level at half the distance to the nearest potential receptor or residential/commercial structure is below 5 ppm.

3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

4. All 15-minute readings must be recorded and be available for State (DEC and DOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations will be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring will be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment will be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during work activities.

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust

suppression techniques will be employed. Work will continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work will be stopped and a re-evaluation of activities initiated. Work will resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m3 of the upwind level and in preventing visible dust migration.

3. All readings will be recorded and be available for State (DEC and DOH) personnel to review.

Vapor/Odor Management Plans

1. We propose to open the loading dock doors prior to conducting the sub-slab excavation, and utilize an industrial fan blowing across the excavation. The vapors will be blown through the loading dock to dissipate outside.

2. All workers and tenants will be instructed to place themselves upwind of the fans prior to digging.

3. Biosalve (or the equivalent) will be available and utilized if odors become problematic during the remedial process.

Noise and Vibration Mitigation

Yaro will saw cut the floor and remove the sections with a forklift prior to sub-slab excavation, eliminating the need for a vibration evaluation. Aluminum panel shield trench protection will be utilized for vertical shoring.

Erosion and Sediment Control

This CERP component is not applicable to this RAWP.

Waste Management Measures

See Section 4.4.4.1

Water Management & Treatment Measures

See Section 4.4.4

Traffic Control & Site Access

Site access is from Commerce Drive to the south; the parking lot south of the

building will be utilized for trucks waiting for loading. No truck parking or idling will be permitted on Commerce Drive. Queuing of trucks (if needed) will be performed onsite to minimize offsite disturbances.

Decontamination of Trucks and Equipment Leaving the Site

See Section 5.3

5.2 Site Access

Access to the remedial work area will be restricted with temporary construction fencing erected around the loading dock on the west side of the building to prevent unauthorized personnel from entering the area.

Cones will be placed around the work area, and building tenants will be denied access to the work area while the remedial activities are being performed.

5.3 Equipment Decontamination

Vehicles (excavators, drill rigs, etc.) and equipment that contact contaminated material will be decontaminated prior to leaving the Site. A truck decontamination (decon) pad will be constructed with polyethylene sheeting and will be large enough to accommodate the placement of equipment requiring decontamination. Water utilized for decontamination will be containerized.

The decontamination pad will be constructed in an area free of contamination.

- The decontamination pad will be lined with polyethylene sheeting with no seams within the pad to prevent leakage.
- The pad will be constructed on a level, paved surface to facilitate the removal of wastewater.
- Water will be pumped from the decontamination pad as needed to prevent overflows.

5.4 Off-Site Trucking Routes & Emergency Procedures

Heavy truck traffic is not anticipated due to the small quantity of contaminated soil proposed for excavation. No more than two disposal trucks will be required on any given day, therefore eliminating the need for truck staging and traffic controls.

Emergency routes and procedures details are outlined in the Site specific Health & Safety Plan (HASP) provided in Appendix 2.

RE&LS will ensure that no Site material is tracked off site and/or onto the public roadways. If any materials are tracked or discharged on the public roadways, they will be cleaned up and managed in accordance with all applicable local, State, and Federal

regulations.

5.5 Reporting Requirements

Analytical Laboratory

Paradigm Environmental Services, Inc. (Paradigm), a NYSDOH ELAP certified laboratory, will conduct all analytical laboratory testing.

Analytical Services Protocol

The laboratory will provide a NYSDEC ASP Category B Deliverables data package for all samples except the PDI samples.

Data Usability Summary Reports

Data Usability Summary Reports (DUSRs) will be prepared in accordance with NYSDEC DER-10 Section 2.0. The findings of the DUSR(s) will be incorporated in analytical laboratory tables provided in the FER.

Electronic Data Deliverables

All data generated (except for the PDI samples) will be submitted in an electronic data deliverable (EDD) that complies with the DEC Electronic Data Warehouse Standards (EDWS) or as otherwise directed by the NYSDEC Department of Environmental Remediation (DER) in accordance with DER-10 section 1.15.

6.0 SITE MANAGEMENT PLAN, INSTITUTIONAL, AND ENGINEERING CONTROLS

6.1 Institutional Control

An institutional control in the form of an Environmental Easement has been executed and recorded with the Monroe County Clerk which will:

- Require the remedial party or site owner to complete and submit to the NYSDEC a periodic certification of institutional and engineering controls in accordance with Part 375-1.8(h)(3);

- Allow the use and development of the controlled property for restricted Commercial use as defined by Part 375-1.8(g), although land use is subject to local zoning laws;

- Restrict the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYSDOH or County DOH; and

- Require compliance with the Department-approved Site Management Plan.

6.2 Engineering Controls

- The engineering control previously installed at the Site is the sub-slab depressurization system (SSDS) installed by LaBella in September 2019.

- Per DER-10, a soil cover is an engineering control required as an element of any remedy where contamination is present in the exposed surface soil above the appropriate use-based soil SCG. Exposed surface soil is the soil which will be present at the surface of a site which is not otherwise covered by the development at the site (e.g., buildings, pavement, etc.). Soil covers as part of a site remedy to address exposed surface soil will be in accordance with this subdivision.

  RE&LS will develop a Surficial Soil Sample Work Plan for NYSDEC approval to determine the extent, if any, of soil cover that will be required to achieve Track 4 SCOs.

6.2.1 Site Management Plan

A SMP will be developed for the Site, and will begin with the issuance of the Certificate of Completion. The purpose of the SMP is to ensure the safe reuse of the Site where contamination will remain in place by managing residual soil impacts remaining at the Site, mitigating and monitoring soil vapor and indoor air contaminants, and to monitor groundwater impacts and restrict groundwater usage at the Site. This document will be developed and submitted for regulatory approval with the FER.

The SMP will be generated in accordance with DER-10 utilizing the NYSDEC's current SMP template. It will include the following:

1. An Institutional Control in the form of an Environmental Easement has been executed and recorded with the Monroe County Clerk which will require the remedial party or site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8 (h)(3); Allow the use and development of the controlled property for restricted residential use, or commercial use or industrial use as defined by Part 375-1.8(g), although land use is subject to local zoning laws; Restrict the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYSDOH or County DOH; and require compliance with the Department approved Site Management Plan.

2. An Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination which exceeds Site SGCs.

3. A provision for removal or treatment of the source area located under the existing on-site building if and when the building is demolished

4. A provision that should a building foundation or building slab be removed in the future, a cover system consistent with that described in Section 6.2.6 of this report will be placed in areas where the upper two feet of exposed surface soil exceed the applicable SCOs.

5. A provision for evaluation of the potential for soil vapor intrusion for any new buildings developed on the site including provision for implementing actions recommended to address exposures related to soil vapor intrusion.

6. Provisions for the management and inspection of the identified engineering controls.

7. Provisions for maintaining site access controls and Department notification.

8. The steps necessary for the periodic reviews and certification of the institutional and/or engineering controls

9. A Monitoring Plan to assess the performance and effectiveness of the remedy. The plan includes, but may not be limited to:

    - Monitoring of soil, groundwater, sub-slab, and indoor air to assess the performance and effectiveness of the remedy.
    - A schedule of monitoring and frequency of submittals to the Department.
    - Monitoring for vapor intrusion for occupied existing or future buildings on the site, as may be required by the Institutional and Engineering Control Plan discussed above.

10. An Operation and Maintenance (O&M) Plan to address continued operation, maintenance, inspection, and reporting of mechanical or physical components of the active vapor mitigation systems. The plan includes, but is not limited to:

    - Procedures for operating and maintaining the systems; and
    - Compliance inspection of the systems to ensure proper O&M, as well as providing the data for any necessary reporting.

7.0 SCHEDULE AND REPORTING

7.1 Schedule

Implementation of the RAWP is scheduled to begin within 30 days of NYSDEC approval of this RAWP.

The approved remedial action schedule can only be modified by approval from the NYSDEC.

7.2 Periodic Reporting

Monthly progress reports will be submitted in accordance with the BCP agreement until the Certificate of Completion is issued.

7.3 Site Management Plan/Institutional Controls

To allow for the time needed to receive validated data, the Draft SMP and FER will be completed and submitted to the NYSDEC within 60 days of completion of remedial activities.

An Institutional Control in the form of an Environmental Easement has been executed and recorded with the Monroe County Clerk.

The SMP will be generated in accordance with DER-10 using the NYSDEC's current template.

7.4 Final Engineering Report

The FER will be completed in accordance with DER-10 Section 5.8 and will be generated using the NYSDEC's current FER template.

8.0 Emerging Contaminants

RE&LS proposes to conduct surficial soil sampling for emerging contaminants to determine if surficial soils require remediation. As a Track 4 cleanup is proposed for this commercial property, the top one foot of soil will be assessed for Part 375 VOCs, SVOCs, metals, PCBs, pesticides, cyanide, 1,4-dioxane, and Per- and Polyfluoroalkyl Substances (PFAS).

Of the 2.689-acre Site, approximately 1.0 acres is covered by the building and parking lot. Approximately 1.7 acres of lawn and/or wooded land will require sampling to determine PFAS sampling requirements.

In addition, the Protection of Groundwater Standards SCOs will be applied to contaminants detected in groundwater, and copper concentrations will be compared to the Protection of Ecological Resources SCO.

The number of samples will be collected in conformance with the August 2017 DER Soil Screening Guidance. Samples will be distributed as indicated on Figure 5.

8.1 Sampling Methodology

Each location will be sampled vertically in the following ranges below ground surface (bgs):

- Six grab samples will be collected for Part 375 VOC analysis from the two inches to six inches bgs interval.

- Three composite samples will be collected for Part 375 SVOCs, metals, pesticides, PCBs, cyanide, 1,4-dioxane analysis, and PFAS from two depths, 0 to 2 two inches and two inches to 12-inches BGS, for a total of six composite samples.

The composite samples will be comprised of five discreet subsamples each, and each of the subsamples will be spaced evenly through the area. Only samples that consist of visually similar material from similar depth and soil type will be composited. An equal number of composite subsamples will be collected from each of the two depth intervals.

8.1.1 Methodology – SVOCs, Pesticides, PCBs, Metals, and Cyanide

The following methodology will be used to collect samples in conformance with the current NYSDEC emerging contaminant guidance document, *Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS).*

- Samples will be collected from both the shallow and deep intervals using a steel shovel or trowel to dig an eight-inch diameter hole to one foot BGS in each of the subsample locations.

- The 0-2-inch interval will be collected first by placing the soil from that interval in a stainless steel bowl. The five subsamples will be mixed together with a pre-cleaned steel or stainless steel trowel or spoon and placed in the appropriate laboratory sample containers.

- The sampling equipment will then be decontaminated by first removing bulk material by hand or wire brush, washing with an Alconox solution, and rinsing with laboratory PFAS-free water.

- The two-inch to 12-inch interval samples will then be collected using a steel hand-auger and mixed and placed in sample containers in the same manner as the 0 to 2-inch interval described above.

- For the VOA grab samples, the hand auger will be used to collect a soil sample from the 2-inch to six-inch interval. The samples will be placed directly into laboratory jars.

- One duplicate sample, one matrix spike/matrix spike duplicate sample (MS/MSD), and one equipment blank will be collected. The equipment blank will be collected for PFAS analysis only.

8.1.2 Methodology – PFAS

The PFAS samples will be collected in conformance with the current NYSDEC emerging contaminant guidance document for perfluorooctanoic acid (PFOA), perfluorooctane sulfonic acid (PFOS), and 1, 4-Dioxane.

- The samples will be analyzed for PFAS using EPA Method 537.1.
- Samples will be collected in high density polyethylene (HDPE) containers with a chain-of-custody form provided by the laboratory.
- No sampling equipment components or sample containers will come into contact with aluminum foil, low density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials including sample bottle cap liners with a PTFE layer.
- A three-step decontamination procedure using a wire brush, Alconox detergent, and clean, PFAS-free water will be performed for sampling equipment.
- In areas where vegetative soil cover is in place, a trowel or shovel will be used to remove the turf so that it will be replaced at the conclusion of sampling.
- Surface soil samples (e.g. 0 to two inches below surface) will be collected using a steel or stainless steel spoon or trowel. The two- to 12-inch interval will be collected using a steel hand auger.
- When the sample is collected, it will be deposited into a stainless steel bowl for compositing prior to filling the sample containers.
- One field duplicate will be collected consisting of an additional sample at a given location.
- One matrix spike / matrix spike duplicate (MS/MSD) will be collected consisting of an additional two samples at a given location and identified on the Chain of Custody (COC).

8.2 Sampling Procedures

An equipment blank will be collected prior to sample collection. Field quality control samples are described in the next section of this report.

The samples will be placed in coolers and held on ice while the remainder of the sample is collected. The remainder of the field quality control samples will then be collected. The samples will be transported to the laboratory upon collection.

Sample containers, PFAS-free water, caps, coolers, labels, and a COC form will be provided by the laboratory. Sample containers of samples required to be fixed with a preservative will be prepared by the laboratory before each sampling event. An effort will be made to ensure that sampling equipment and sample containers will not come in contact with aluminum foil, low density polyethylene (LDPE), glass, or PTFE materials including bottle cap liners with a PTFE layer. These materials will be prohibited from the sample collection staging area. Handling of food and drink packaging materials, “plumbers thread seal tape”, waterproof field books, and permanent markers will be avoided before and during the sampling event.

8.3 Field Quality Control Samples

One equipment blank will be collected to monitor equipment cleanliness and decontamination procedures during field sampling.

One field duplicate sample will be collected to check on laboratory reproducibility, sampling technique, and sample variability. The duplicate sample will be coded so that the laboratory is not biased in performing the analyses.

One matrix spike/matrix spike duplicate (MS/MSD) sample will be collected to check on sample matrix effect and laboratory accuracy and precision.

8.4 PFAS Analysis

Samples will be analyzed for PFAS Target Analyte List (Table 1) by Modified EPA Method 537.1 in conformance with the current NYSDEC emerging contaminant guidance document, *Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS).*

Reporting limits for PFAS in soils are not to exceed 0.5 ug/kg. Samples will be analyzed by a laboratory holding ELAP certification for PFOA and PFOS in drinking water by EPA Method 537.1.

Table 1: PFAS Target Analyte List

Group	Chemical Name	Abbreviation	CAS Number
Perfluoroalkyl sulfonates	Perfluorobutanesulfonic acid Perfluorohexanesulfonic acid Perfluoroheptanesulfonic acid Perfluorooctanessulfonic acid Perfluorodecanesulfonic acid	PFBS PFHx PFHpS PFOS PFDS	375-73-5 S 355-46-4 375-92-8 1763-23-1 335-77
Perfluoroalkyl carboxylates	Perfluorobutanoic acid Perfluoropentanoic acid Perfluorohexanoic acid Perfluoroheptanoic acid Perfluorooctanoic acid Perfluorononanoic acid Perfluorodecanoic acid Perfluoroundecanoic acid Perfluorododecanoic acid Perfluorotridecanoic acid Perfluorotetradecanoic acid	PFBA PFPeA PFHxA PFHpA PFOA PFNA PFDA PFUA/PFUdA PFDoA PFTriA/PFTrDA PFTA/PFTeDA	375-22-4 2706-90-3 307-24-4 375-85-9 335-67-1 375-95-1 335-76-2 2058-94-8 307-55-1 72629-94-8 376-06-7
Fluorinated Telomer Sulfonates	6:2 Fluorotelomer sulfonate 8:2 Fluorotelomer sulfonate	6:2 FTS 8:2 FTS	27619-97-2 39108-34-4
Perfluorooctane sulfonamides	Perfluroroctanesulfonamide	FOSA	754-91-6
Perfluorooctane sulfonamidoacetic acids	N-methyl perfluorooctanesulfonamidoacetic acid N-ethyl perfluorooctanesulfonamidoacetic acid	N-MeFOSAA N-EtFOSAA	2355-31-9 2991-50-6

8.5 1,4-Dioxane Analysis

Samples will be analyzed for 1,4-dioxane by EPA Method 8270 using the NYSDEC current emerging contaminant guidance for PFAS and 1,4-dioxane. Reporting limits for 1,4-dioxane are not to exceed 0.1 mg/kg.

8.6 PFAS Reporting

Analytical results will be compared to Part 375 Commercial Use Soil Cleanup Objectives (SCO). The Commercial Use SCO of 440 parts per billion (ppb) for PFOS, and 500 ppb for PFOA, as indicated in the NYSDEC January 2021 PFAS guidance document *(Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances)*, will be used for these substances.

The laboratory will generate NYSDEC ASP Category B data deliverable packages. The data will be validated by Environmental Data Usability, (EDU), an independent data validator. A DUSR will be generated to confirm that the data meet the project specific criteria for data quality and data use. An EDD will be submitted electronically to the NYSDEC via the Environmental Information Management System (EIMS).

The EDD and a letter report presenting the sampling event details, an analytical summary table, the DUSR, and all supporting documentation, such as but not limited to soil sampling logs and laboratory data packages will be submitted to the Department within 30 days after receiving the validated data.

8.7 Drainage Ditch Samples

In an April 6, 2022 letter, NYSDEC stated that the "drainage ditch in which the stormwater discharges into ultimately discharges into a Class C stream…the copper concentrations should be compared to the Protection of Ecological Resources SCOs…Additional investigational activities will need to be conducted to determine the nature and extent of the contamination in the drainage ditch receiving the stormwater discharges."

To determine whether off-site migration in the drainage ditch is of concern, as indicated on Figure 7, we propose to collect three (3) sediment samples from the drainage ditch for copper analysis concurrently with the other activities proposed herein. Two of these will be collected from where the northern drainage ditch trends westwards towards the Class C stream; the western sample will be collected at the west end of the ditch where off-site migration will be evident, if present.

8.8 Off-Site Vapor Migration

To investigate potential concerns relative to off-site vapor migration, we propose to install soil vapor points around the Site perimeter by Geoprobe. Five soil vapor samples are proposed for VOC analysis around the perimeter of the Site to address BCP boundary requirements (Figure 6).

The vapor sampling will be conducted in accordance with the NYSDOH Soil Vapor Intrusion Guidance (October 2006):

Soil vapor probes will be installed in the following manner:

a) Samples will be installed using direct push technology by Geoprobe. Steel-screen vapor probes will be installed depths of four to eight bgs. The implants will be fitted with inert polyethylene tubing.

b) The boreholes will be backfilled with coarse sand to create a sample zone to collect vapors.

c) The vapor probes will be sealed above the sampling zone with a bentonite slurry to prevent outdoor air infiltration.

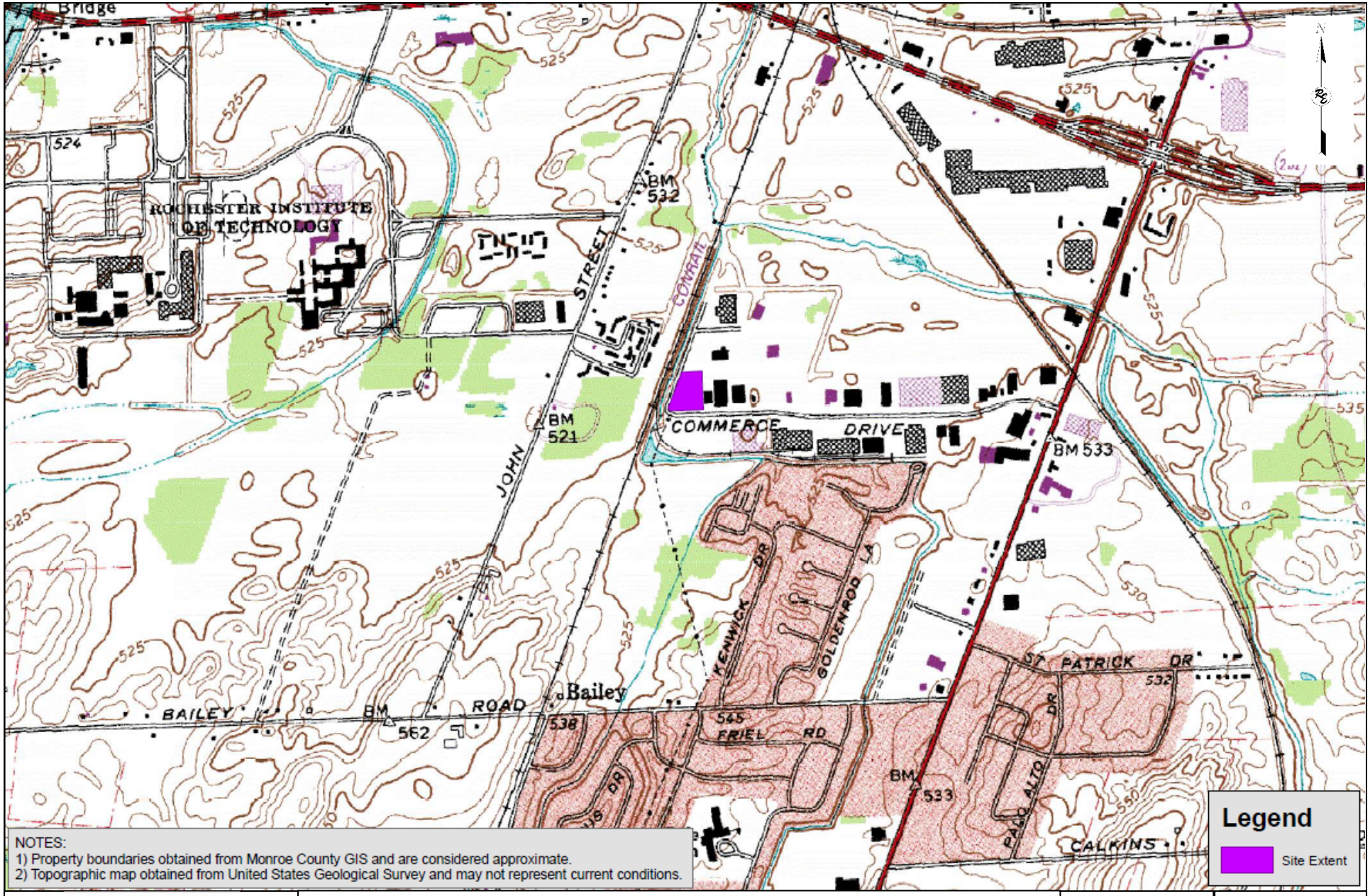
e) The inert tubing will be sealed to prevent outside air infiltration. The vapor samples will be collected a minimum of 24 hours after the holes are drilled to allow the gas beneath the surface to equilibrate. A minimum of one probe volume will be evacuated with a syringe prior to sample collection.

f) Vapor samples will be collected in 1-liter Summa Canisters equipped with pre-calibrated laboratory supplied flow regulators set for an approximate flow rate of 0.0028 Liter/minute. The regulators will be calibrated by the laboratory for a sampling time of 6 hours. Samples will be submitted to Centek Laboratories, LLC and analyzed for VOCs by EPA Method TO-15.

8.9 Groundwater Monitoring

RE&LS conducted a monitoring well inventory in June 2020. As indicated on Figure 8, three wells are in a suitable condition to be sampled. Concurrently with this remedial project, RE&LS will sample the wells and submit the groundwater samples for TCL VOC, TCL SVOC, TAL metals, 1,4-dioxane and PFAS analysis.

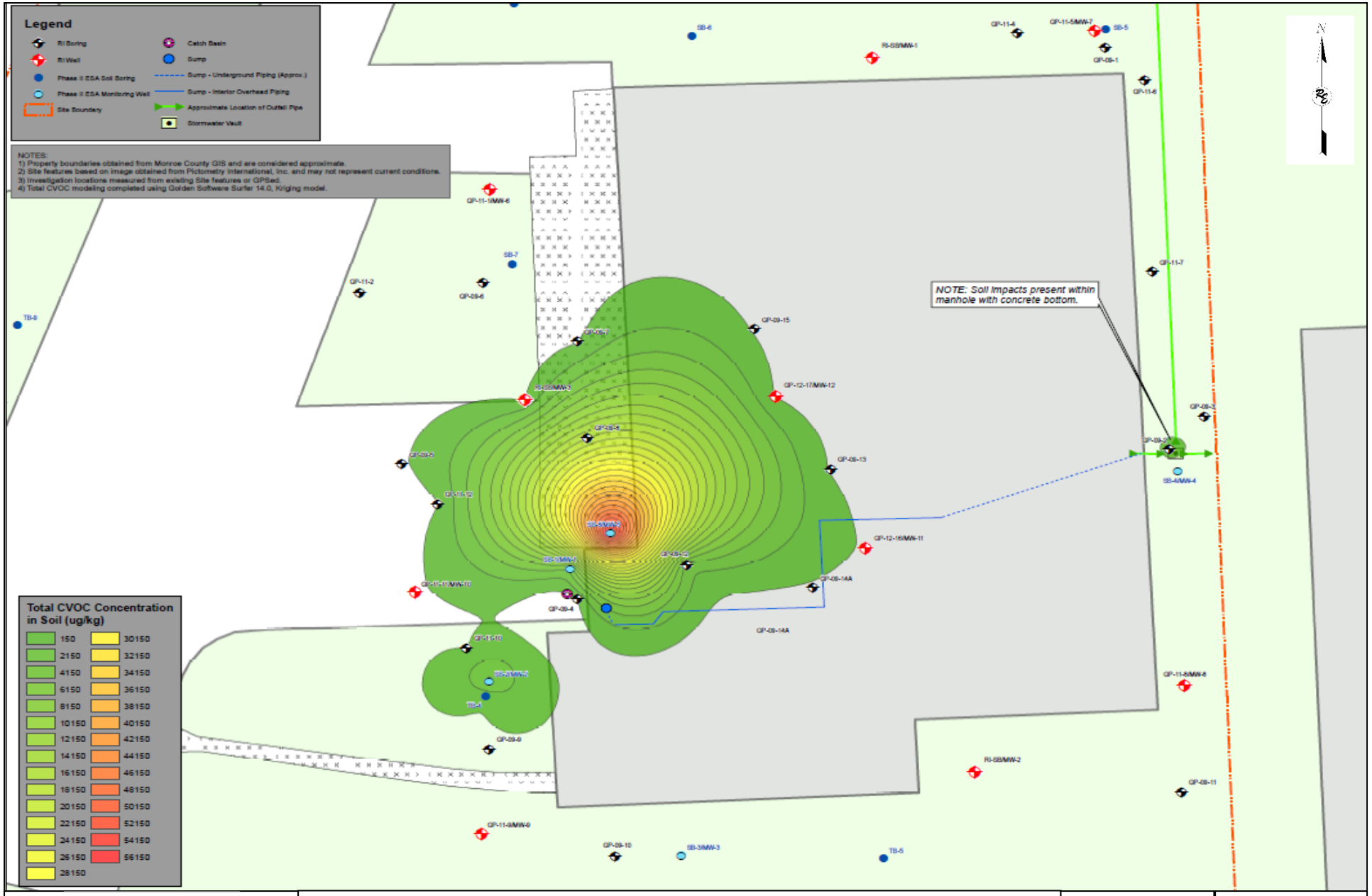
An evaluation of the groundwater monitoring well network will need to be conducted to determine if damaged monitoring wells at the Site need to be re-installed for performance monitoring and long-term groundwater monitoring.



RAVI ENGINEERING & LAND SURVEYING, P.C.
2110 S. CLINTON AVENUE, SUITE 1
ROCHESTER, NEW YORK 14618
TL: (585) 223-3660 FX (585) 697-1764

Site Location
300 Commerce Drive
Town of Henrietta, Rochester, New York 14623

PROJECT NO.	DATE:
45-19-005-B	June 2019
Scale: NTS	Figure No: 1



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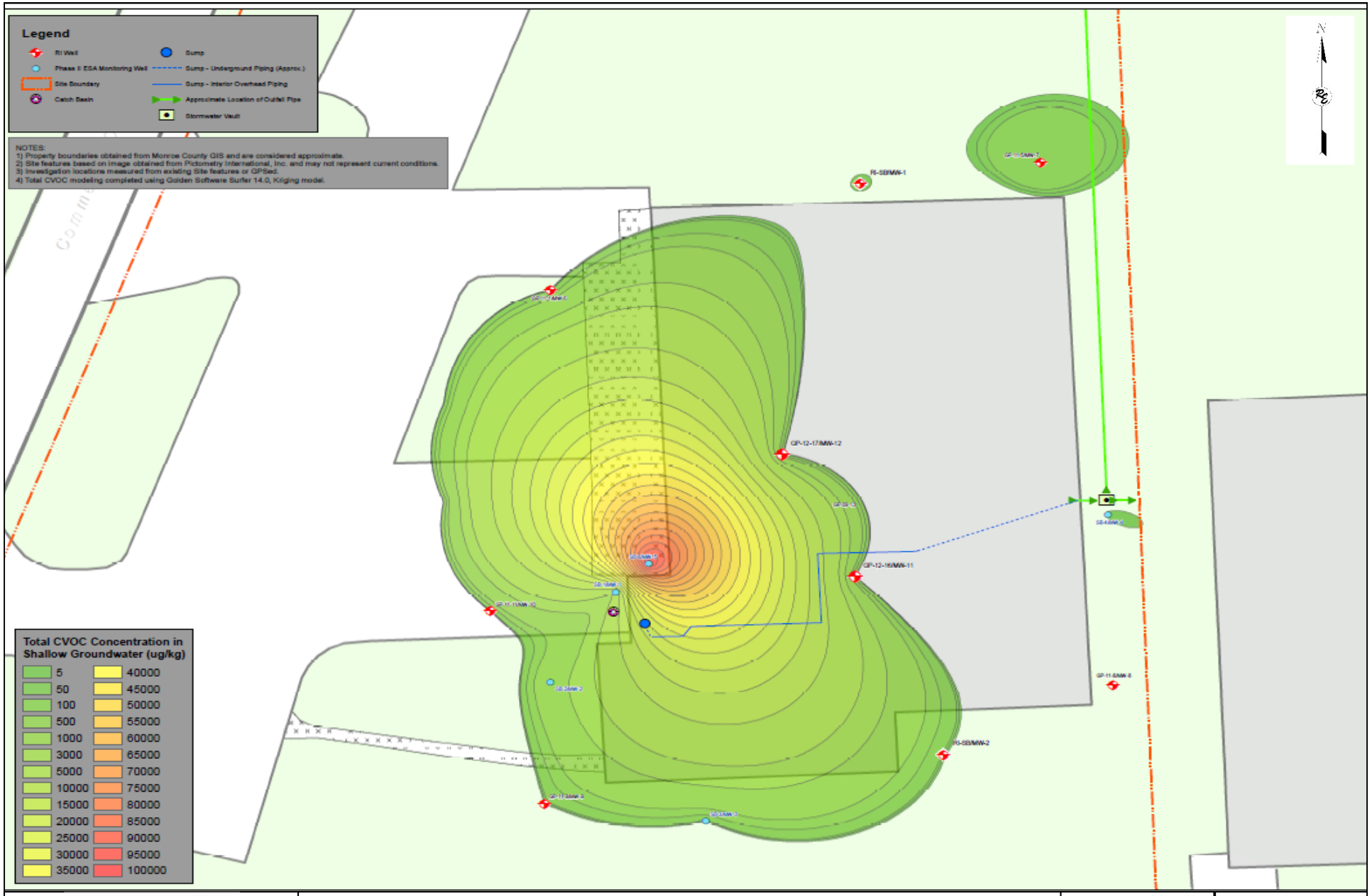
ROCHESTER, NEW YORK 14618
TL: (585) 223-3660 FX (585) 697-1764

Conceptual Model – Total cVOCs in Soil
300 Commerce Drive
Town of Henrietta, Rochester, New York 14623

PROJECT NO.	DATE:
45-19-005-B	June 2019
Scale: NTS	Figure No: 2



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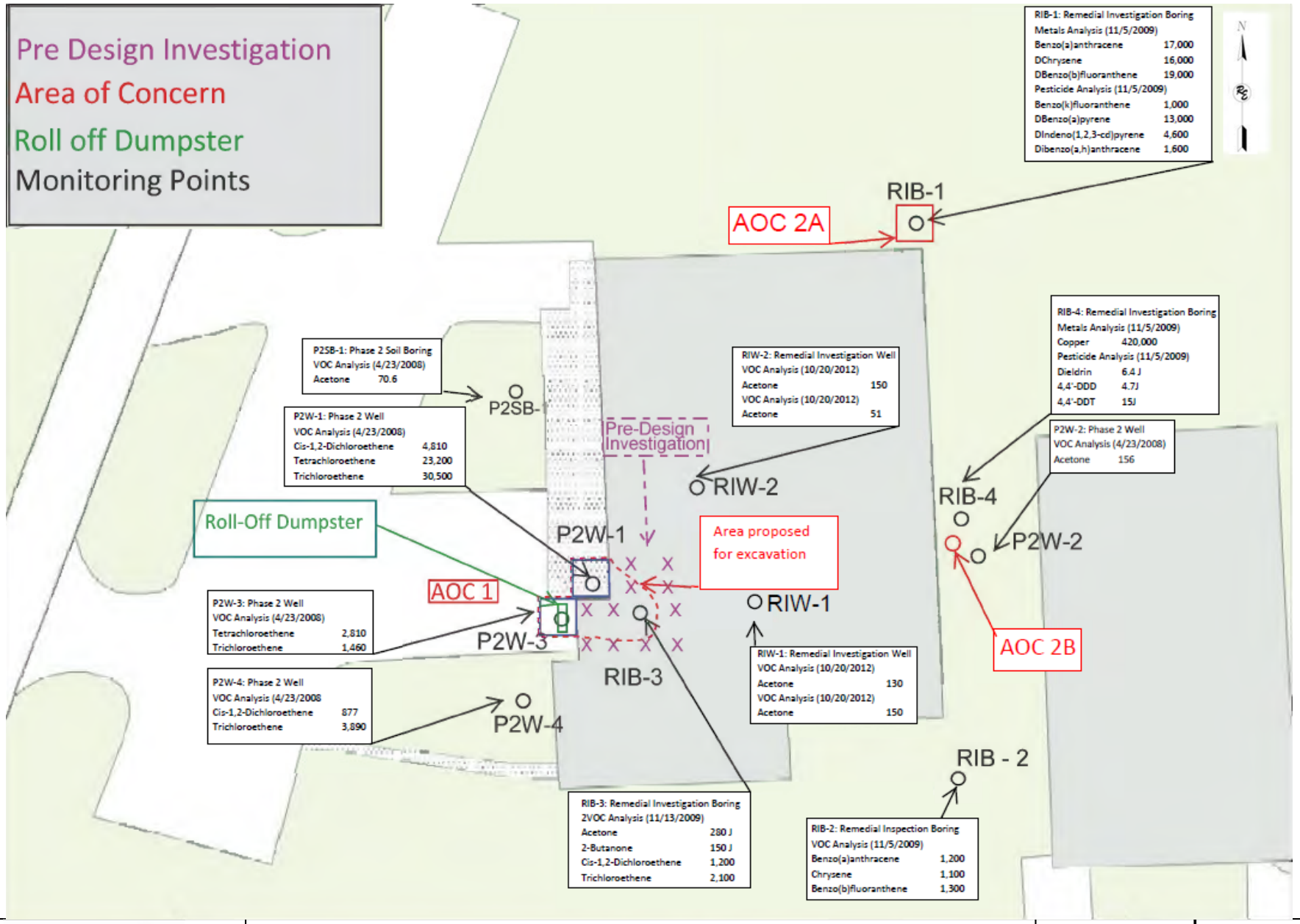
Conceptual Model – Total CVOCs in Shallow Groundwater
300 Commerce Drive
Town of Henrietta, Rochester, New York 14623

PROJECT NO.	DATE:
45-19-005-B	June 2019
Scale: NTS	Figure No: 3



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Areas of Concern and Proposed Soil Removal
300 Commerce Drive
Town of Henrietta, Rochester, New York 14623

PROJECT NO.	DATE:
45-19-005-B	June 2022
Scale: NTS	Figure No: 4

RAVI ENGINEERING & LAND SURVEYING, P.C.
2110 S. CLINTON AVENUE, SUITE 1
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TL: (585) 223-3660 FX (585) 697-1764

Proposed PFAS & Sediment Sample Locations
300 Commerce Drive
Town of Henrietta, Rochester, New York 14623

PROJECT NO.	DATE:
45-19-005-B	June 2022
Scale: NTS	Figure No: 5

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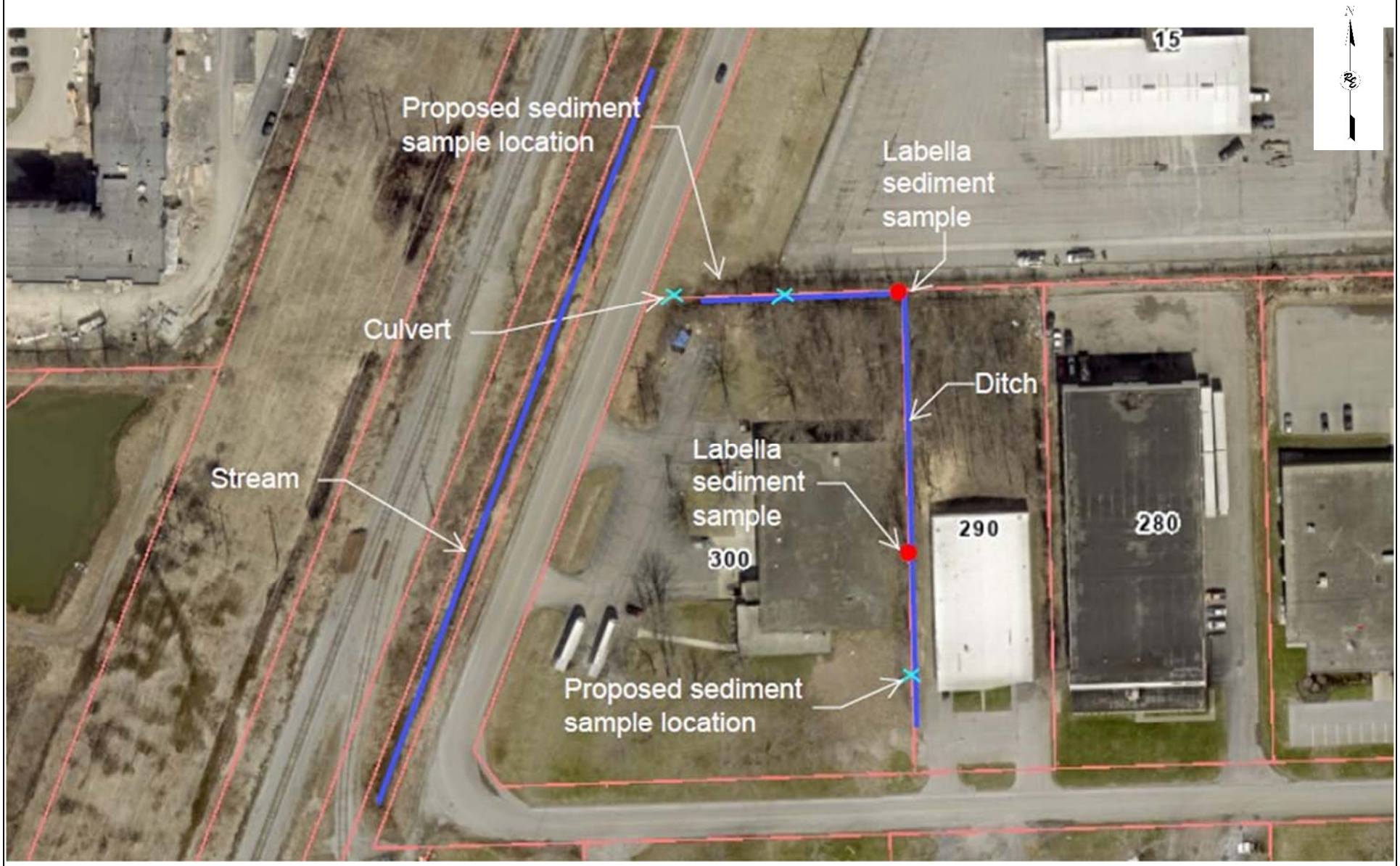
TL: (585) 223-3660 FX (585) 697-1764

Proposed Soil Gas Sample Locations
300 Commerce Drive
Town of Henrietta, Rochester, New York 14623

PROJECT NO. 45-19-005-B	DATE: September 2022
Scale: NTS	Figure No: 6



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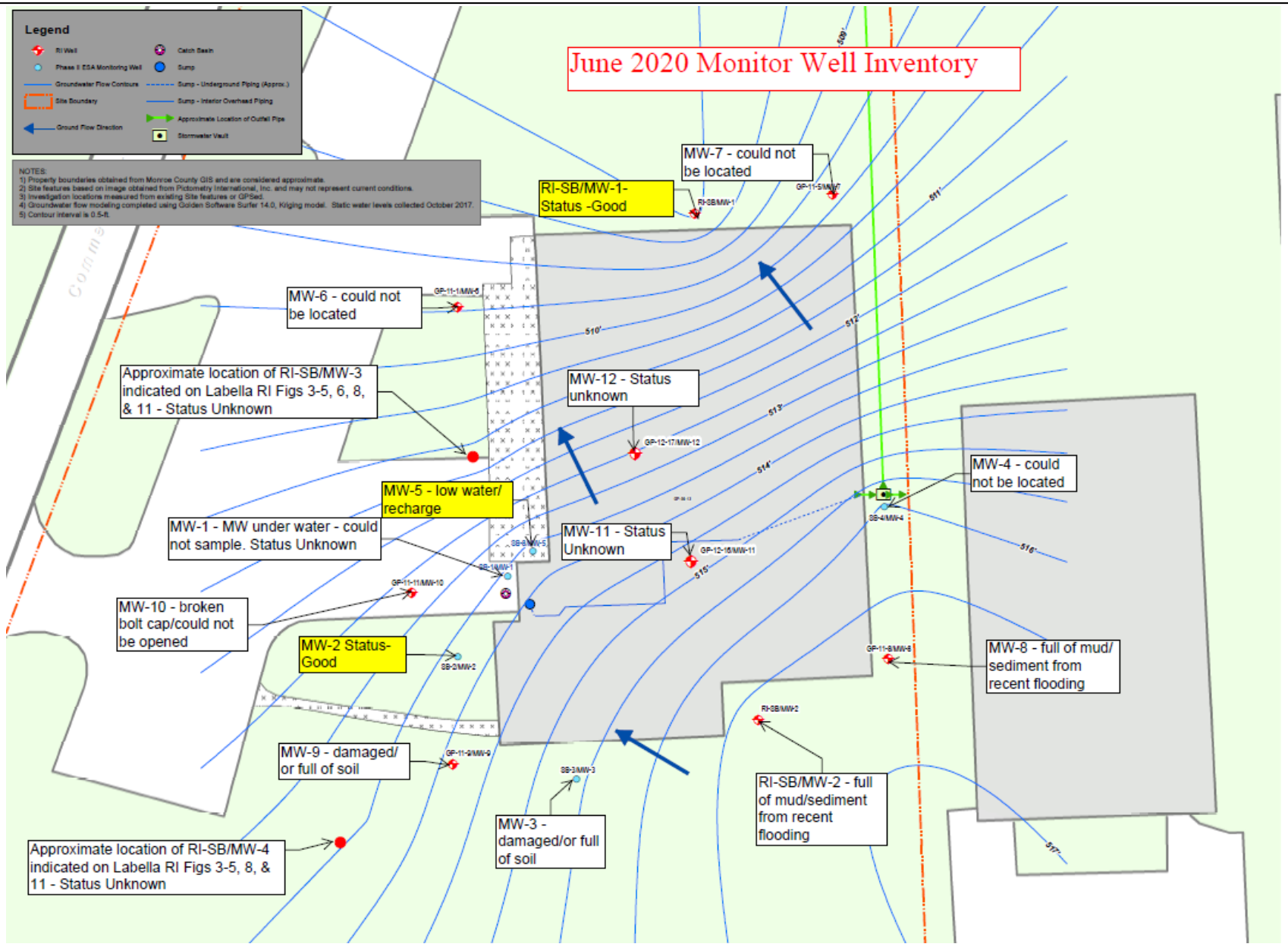
Proposed Sediment Sample Locations
300 Commerce Drive
Town of Henrietta, Rochester, New York 14623

PROJECT NO.	DATE:
45-19-005-B	September 2022
Scale: NTS	Figure No: 7



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June 2020 Monitoring Well Inventory
300 Commerce Drive
Town of Henrietta, Rochester, New York 14623

PROJECT NO. 45-19-005-B	DATE: September 2022
Scale: NTS	Figure No: 8

APPENDIX 1

August 2021
"Contained-In" Determination

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Materials Management, Bureau of Hazardous Waste and Radiation Management
625 Broadway, 9th Floor, Albany, New York 12233-7256
P: (518) 402-8651 | F: (518) 402-9024
www.dec.ny.gov

August 31, 2021

Sent via e-mail, no hard copy to follow

Ms. Lynn Zicari
Environmental Scientist
Ravi Engineering & Land Surveying, P.C.
2110 South Clinton Avenue, Suite 1
Rochester, NY 14618

Re: "Contained-In" Determination Request
300 Commerce Drive
NYSDEC BCP: C828158

Dear Ms. Zicari:

The New York State Department of Environmental Conservation has reviewed the analytical soil data (Lab Sample ID: 213795-01) submitted with your August 30, 2021 requesting a "contained-in" determination for one (1) drum contains soil cuttings from beneath the building slab – which were generated during the installation of a sub-slab depressurization system at the above project.

Concentrations detected for individual VOCs, SVOCs, metals, pesticides and PCBs were all significantly less than their current "contained-in" soil action levels, and Land Disposal Restriction concentrations.

Concentration (Lab Sample ID: 213795-01) for trichloroethene was below the soil "contained-in" action level and the Land Disposal Restriction concentration. Therefore, one (1) drum contains soil cuttings from beneath the building slab – which were generated during the installation of a sub-slab depressurization system at the above project, does not have to be managed as a hazardous waste and may be transported off-site to either Waste Management - Chaffee Landfill or another Part 360 permit facility, able to accept this material as non-hazardous waste.

Should you have any questions regarding the content of this letter, please do not hesitate to contact me at (518) 402-9611 or email me at henry.wilkie@dec.ny.gov.

Sincerely,

Henry Wilkie
Assistant Environmental Engineer
RCRA Permitting Section

ec: C. Theobald, DEC

APPENDIX 2

Health & Safety Plan (HASP)

HEALTH AND SAFETY PLAN

Interim Remedial Measures

300 Commerce Drive
Town of Henrietta
Rochester, NY 14623

Prepared for:

Yaro Enterprises, Inc.
228 Rosemont Drive
Rochester, NY 14617

Prepared By:

Ravi Engineering & Land Surveying
2110 S. Clinton Avenue, Suite 1
Rochester, New York 14526

June 2019

Project No. 45-19-005-B

Contents

SITE HEALTH AND SAFETY PLAN

Project Title:	300 Commerce Drive, Interim Remedial Measures (IRM)
Project Number:	45-19-005-B
Project Location:	300 Commerce Drive, Town of Henrietta, New York
Environmental Director:	Nancy S. Van Dussen, P.E.
Project Manager:	Peter S. Morton, P.G., C.P.G.
Date:	June 2019
Site Safety Supervisor:	Benjamin Reddy
Site Contact:	Tony Kirik
Date(s) of Field Activities:	To Be Determined
Site Conditions:	Generally level and encompassing approximately 2.7 acres
Site Environmental Information Provided By:	draft Remedial Investigation Report (RIR)

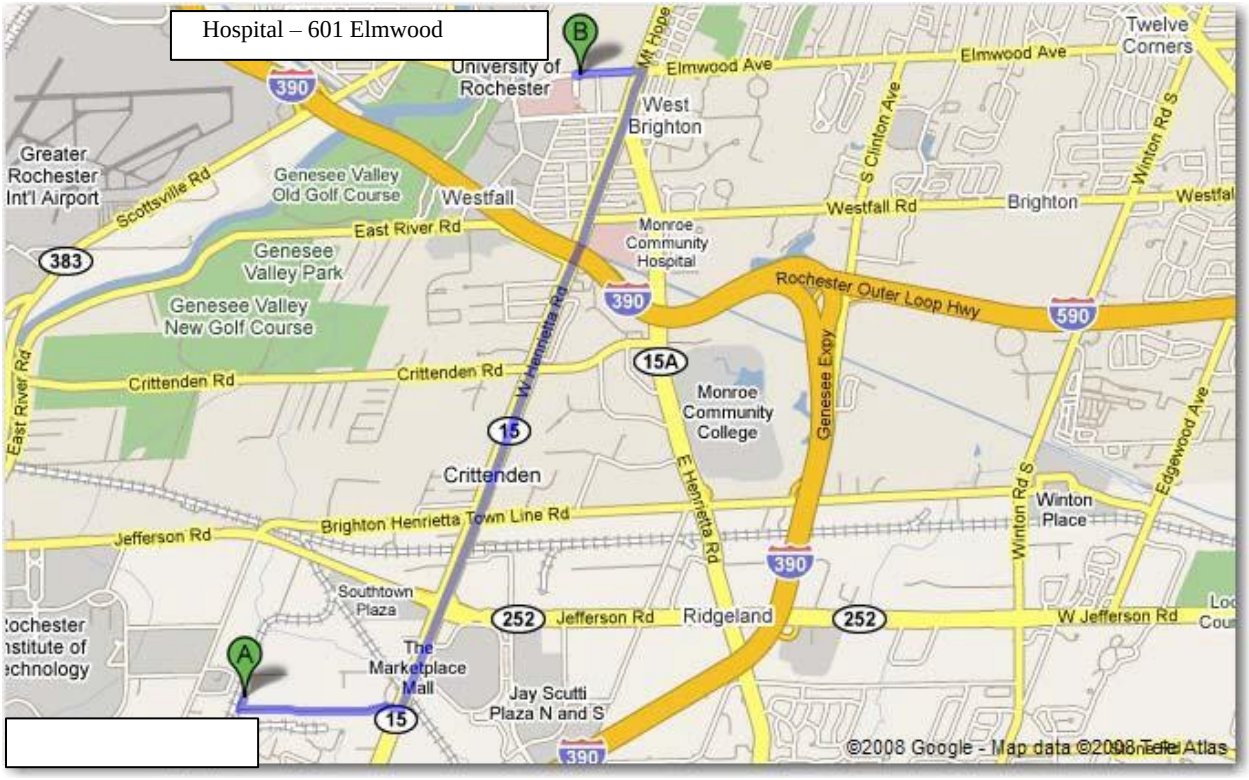
EMERGENCY CONTACTS

Ambulance:	As Per Emergency Service	911
Hospital Emergency:	Strong Memorial Hospital	585-275-3232
Poison Control Center	Finger Lakes Poison Control	585-275-3232
Police (local, state):	Monroe County Sheriff	911
Fire Department	Henrietta Fire Department	911
Site Contacts:	Tony Kirik (Site owner)	909-921-7353
Agency Contact	NYSDEC – Charlotte Theobald NYSDOH – TBD	585-226-5354 212-417-4100
Environmental Director:	Nancy S. Van Dussen	585-697-2075
Project Manager:	Peter S. Morton	585-697-2806
Site Safety Supervisor:	Benjamin Reddy	585-697-2083

MAP AND DIRECTIONS TO THE MEDICAL FACILITY
STRONG MEMORIAL HOSPITAL

Total Est. Time: 13 minutes **Total Est. Distance:** 4.4 miles

1.	North on West Henrietta Road/Rt. 15.	3.2 miles
2.	Turn Left (West) on Elmwood Avenue	0.3 mile
3.	Turn Left (South) into Emergency Room entrance (look for signs)	<0.1 mile
4.	End at **601 Elmwood Ave, Rochester, NY 14642-0001**	



1.0 Introduction

Ravi Engineering & Land Surveying, PC (RE&LS) prepared this Health and Safety Plan (HASP) it to provide guidelines for responding to potential health and safety issues that may be encountered during the Interim Remedial Measures (IRMs) at 300 Commerce Drive in the Town of Henrietta, New York (the "Site"). The requirements of this HASP are applicable to all approved personnel at the work site. The project specifications and Community Air Monitoring Plan (CAMP) are to be consulted for guidance in preventing and quickly abating any threat to human safety or the environment. The provisions of the HASP do not replace or supersede regulatory requirements of USEPA, NYSDEC, and/or OSHA

2.0 Responsibilities

This HASP presents guidelines to minimize the risk of injury to project personnel and to provide rapid response in the event of injury. It is only applicable to activities of approved RE&LS personnel and their authorized visitors. It is the responsibility of RE&LS employees and contractors to follow the requirements of this HASP as well as applicable company safety procedures.

3.0 Activities Covered

The activities covered under this HASP are limited to the following IRM activities:

- Drilling during duel-phase extraction system (DPES) Pilot Test;
- Drilling for waste characterization sampling;
- Collection of samples; and
- Management of study derived waste.

4.0 Work Area Access and Site Control

The contractor(s) will have primary responsibility for work area access and site control.

5.0 Potential Health and Safety Hazards

This section lists some potential health and safety hazards that project personnel may encounter at the Site and actions to be implemented to control and reduce the associated risks. It is not intended to be a complete listing of any and all potential health and safety hazards. New or different hazards may be encountered as site environmental and site work conditions change. The Site Safety Officer has responsibility for implementation of the HASP.

5.1 Hazards Due to Heavy Machinery

Potential Hazards:

Heavy machinery including trucks, excavators, backhoes, etc. will be in operation at the Site. The presence of such equipment presents the danger of being struck or crushed; use caution when working near heavy machinery.

Protective Action:

Make sure that operators are aware of your activities, and heed their instructions and warnings. Wear bright colored clothing and walk safe distances from heavy equipment. A hard hat, safety glasses, and steel toe shoes are required.

5.2 Excavation Hazards

Potential Hazards:

Excavations and trenches can collapse, causing injury or death. Edges of excavations can be unstable and collapse. Toxic vapors can accumulate in confined spaces and trenches. Excavations that require working within excavations (if applicable) will require air monitoring in the breathing zone (refer to Section 9.0).

Protective Action:

No excavation is proposed for the Pilot Test and Waste Characterization phases of this IRM. However, minor excavation will be performed during the subsequent "source removal" phase. The following precautions will be taken during source removal:

- Personnel must receive approval from the Project Manager to enter an excavation for any reason. Approved personnel are not to enter excavations over 4 feet in depth unless excavations are adequately sloped.
- Personnel should exercise caution near all excavations at the Site.
- Fencing and/or barriers accompanied by "no trespassing" signs should be placed around all excavations when let open for any period of time when work is not being conducted.

5.3 Cuts, Punctures and Other Injuries

Potential Hazards:

There is the potential for the presence of sharp or jagged edges on rock, metal materials, and other sharp objects. Cuts and punctures can result in loss of blood and infection.

Protective Action

The Project Manager is responsible for making First Aid supplies available to treat minor injuries. The Site Safety Officer is responsible for arranging the transportation to medical facilities when First Aid treatment is not sufficient. Seriously injured workers should not be moved. Injuries requiring treatment are to be reported to the Project Manager. Serious injuries are to be reported to the Site Safety Officer.

5.4 Injury Due to Exposure to Chemical Hazards

Potential Hazards:

Volatile organic vapors from petroleum products, chlorinated solvents, or other chemicals may be encountered during excavation activities at the Site. Inhalation of volatile organic compounds (VOCs) can cause headache, stupor, drowsiness, confusion, and other health effects. Skin contact can cause irritation, chemical bur, or dermatitis

Protective Action

The presence of VOCs may be detected by their odor and by organic vapor monitoring (OVM) instrumentation. Employees will not work in environments where hazardous concentrations of VOCs are present. Air monitoring (refer to Section 9.0) will be performed using a Photoionization Detector (PID). Personnel are to leave the work area whenever PID measurements of ambient air exceed 25 ppm consistently for a 5 minute period. In the event that sustained VOC readings of 25 ppm are encountered, personnel should upgrade personal protective equipment (PPE) to level C (refer to Section 8.0) and an Exclusion Zone should be established to limit and monitor access to this area (refer to Section 6.0).

5.5 Injury Due to Extreme Hot or Cold Weather

Potential Hazards:

Hot temperatures can cause heat exhaustion, heat stress, and heat stroke; cold weather can cause hypothermia.

Protective Action

Precautionary measures should be taken (i.e. dress appropriately) for the weather conditions and maintain hydration. If personnel suffer from any of the above conditions, techniques should be taken to cool down or heat up the body and affected personnel should be taken to the nearest hospital, if warranted.

6.0 Potential Health and Safety Hazards

In the event that conditions warrant establishing various work zones, the following work zones should be established.

Exclusion Zone (EZ):

The EZ will be established in the immediate vicinity and downwind perimeter of Site activities. These activities include soil excavation and sampling activities. If access to the Site is required to accommodate non-project related personnel, then an EZ will be established by constructing a barrier around the work area (yellow cation tape and/or construction fencing). The EZ barrier will encompass the work area and any equipment staging/soil staging areas necessary to perform the associated work. The contractor(s) will be responsible for establishing the EZ and limiting access to approved personnel. Depending on the condition for establishing the EZ, access to the EZ may require adequate PPE (e.g. Level C).

Contaminant Reduction Zone (CRZ):

The CRZ will be the area where personnel entering the EZ will don proper PPE prior to entering the EZ and the area where PPE may be removed. The CRZ will also be the area where decontamination of equipment and personnel will be conducted, as necessary.

7.0 Decontamination Procedures

Upon leaving the work area, approved personnel shall decontaminate footwear as needed. Under normal work conditions, detailed personal decontamination procedures will not be necessary. Work clothing may become contaminated in the event of an unexpected splash or spill or contact with a contaminated substance. Minor splashes on clothing and footwear can be rinsed with clean water. Heavily contaminated clothing should be removed if it cannot be rinsed with water. Personnel assigned to this project should be prepared with a change of clothing whenever on site.

Personnel will use the contractor's disposal container for disposal of PPE.

8.0 Personal Protective Equipment (PPE)

Generally site conditions will require Level D or modified Level D protection. Air monitoring will be conducted to determine if up-grading to Level C PPE is required (refer to Section 9.0). Descriptions of the typical safety equipment associated with Level D and Level C are provided below:

Level D:

Hard hat, safety glasses, surgical sampling gloves, and steel toe construction grade boots.

Level C:

Level D PPE and full or ½-face respirator and Tyvek suit (if necessary). [*Note: Organic vapor cartridges are to be changed after each 8-hours of use or more frequently.*]

9.0 Air Monitoring

According to 29 CFR 1910.120(h), air monitoring will be used to identify and quantify VOCs in order to determine the appropriate level of employee protection required. Air monitoring activities are described below. Air monitoring instruments will be calibrated and maintained in accordance with the manufacturer's specifications.

Air monitoring will be conducted with a PID to screen the ambient air in the work areas for total VOCs and Community Air Monitoring Plan (CAMP) monitoring will be performed with a DustTrak tm Model 8520 aerosol monitor or equivalent for measuring particulates. Air monitoring of the work areas and downwind of the work areas will be performed at least every 60 minutes or more often using a PID and the DustTrak meter.

If sustained PID readings of greater than 25 ppm are recorded in the breathing zone, then wither personnel are to leave the work area until satisfactory readings are obtained, or approved personnel may re-enter the work areas wearing at a minimum a ½-face respirator with organic vapor cartridges for an 8-hour duration (i.e. upgrade to Level C PPE). Organic vapor cartridges are to be changed after each 8-hours of use or more frequently, if necessary. If sustained (PID) readings are measured in the work area at levels above 50 ppm for a 5-minutes average, work will be stopped until safe levels of VOCs are determined.

If downwind PID measurements reach or exceed 25 ppm consistently for a 5-minute period, readings will be taken within the buildings (if occupied) on Site to ensure that the vapors are not penetrating any occupied building. If the PID measurements reach or exceed 25 ppm within the nearby buildings, the personnel will be evacuated via a route in which they would not encounter the work area. The building will be ventilated until the PID measurements are at or below background levels.

10.0 Emergency Action Plan

In the event of an emergency, employees are to turn off and shut down all powered equipment and leave the work areas immediately. Employees are not authorized or trained to provide rescue and medical efforts. Rescue and medical efforts will be provided by local authorities.

11.0 Medical Surveillance

Medical surveillance will be provided to all employees who are injured due to overexposure from an emergency incident involving hazardous substances at the Site.

12.0 Employee Training

Individuals involved with the IRM must be 40-hour OSHA HAZWOPER trained with current 8-hour refresher certification.

Table 1
Exposure Limits and Recognition Qualities

Compound	PEL-TWA (ppm)(b)(d)	TLV-TWA (ppm)(c)(d)	STEL (ppm)(b)	LEL (%)(e)	UEL (%)(f)	IDLH (ppm)(g)(d)	Odor	Odor Threshold (ppm)	Ionization Potential
Acetone	750	500	NA	2.15	13.2	20,000	Sweet	4.58	9.69
Anthracene	.2	.2	NA	NA	NA	NA	Faint aromatic	NA	NA
Benzene	1	0.5	5	1.3	7.9	3000	Pleasant	8.65	9.24
Benzo (a) pyrene (coal tar pitch volatiles)	0.2	0.1	NA	NA	NA	700	NA	NA	NA
Benzo (a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo (b) Fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo (g,h,i)perylene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo (k) Fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	NA	NA	NA	NA	NA	NA	NA	NA	10.88
Carbon Disulfide	20	1	NA	1.3	50	500	Odorless or strong garlic type	.096	10.07
Chlorobenzene	75	10	NA	1.3	9.6	2,400	Faint almond	0.741	9.07
Chloroform	50	2	NA	NA	NA	1,000	ethereal odor	11.7	11.42
Chrysene	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethylene	200	200	NA	9.7	12.8	400	Acrid	NA	9.65
1,2-Dichlorobenzene	50	25	NA	2.2	9.2		Pleasant		9.07
Ethylbenzene	100	100	NA	1.0	6.7	2,000	Ether	2.3	8.76
Fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isopropylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene Chloride	500	50	NA	12	23	5,000	Chloroform-like	10.2	11.35
Naphthalene	10, Skin	10	NA	0.9	5.9	250	Moth Balls	0.3	8.12
n-propylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
p-Isopropylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA
sec-Butylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethane	NA	NA	NA	NA	NA	NA	Sweet	NA	NA
Toluene	100	100	NA	0.9	9.5	2,000	Sweet	2.1	8.82
Trichloroethylene	100	50	NA	8	12.5	1,000	Chloroform	1.36	9.45
1,2,4-Trimethylbenzene	NA	25	NA	0.9	6.4	NA	Distinct	2.4	NA
1,3,5-Trimethylbenzene	NA	25	NA	NA	NA	NA	Distinct	2.4	NA
Vinyl Chloride	1	1	NA	NA	NA	NA	NA	NA	NA
Xylenes (o,m,p)	100	100	NA	1	7	1,000	Sweet	1.1	8.56
Metals									
Arsenic	0.01	0.2	NA	NA	NA	100, Ca	Almond		NA
Cadmium	0.2	0.5	NA	NA	NA				NA
Chromium	1	0.5	NA	NA	NA				NA
Lead	0.05	0.15	NA	NA	NA	700			NA
Mercury	0.05	0.05	NA	NA	NA	28	Odorless		NA
Selenium	0.2	0.02	NA	NA	NA	Unknown			NA

All values are given in parts per million (PPM) unless otherwise indicated.
CA=Possible Human Carcinogen, no IDLH information.

APPENDIX 3

NYSDOH Community Air Monitoring Plan (CAMP)

CAMP Special Requirements

Special Requirements for Work Within 20 Feet of Potentially Exposed Individuals or Structures

When work areas are within 20 feet of potentially exposed populations or occupied structures, the continuous monitoring locations for VOCs and particulates must reflect the nearest potentially exposed individuals and the location of ventilation system intakes for nearby structures. The use of engineering controls such as vapor/dust barriers, temporary negative-pressure enclosures, or special ventilation devices should be considered to prevent exposures related to the work activities and to control dust and odors. Consideration should be given to implementing the planned activities when potentially exposed populations are at a minimum, such as during weekends or evening hours in non-residential settings.

- If total VOC concentrations opposite the walls of occupied structures or next to intake vents exceed 1 ppm, monitoring should occur within the occupied structure(s). Depending upon the nature of contamination, chemical-specific colorimetric tubes of sufficient sensitivity may be necessary for comparing the exposure point concentrations with appropriate pre-determined response levels (response actions should also be pre-determined). Background readings in the occupied spaces must be taken prior to commencement of the planned work. Any unusual background readings should be discussed with NYSDOH prior to commencement of the work.

- If total particulate concentrations opposite the walls of occupied structures or next to intake vents exceed 150 mcg/m^3, work activities should be suspended until controls are implemented and are successful in reducing the total particulate concentration to 150 mcg/m^3 or less at the monitoring point.

- Depending upon the nature of contamination and remedial activities, other parameters (e.g., explosivity, oxygen, hydrogen sulfide, carbon monoxide) may also need to be monitored. Response levels and actions should be pre-determined, as necessary, for each site.

Special Requirements for Indoor Work With Co-Located Residences or Facilities

Unless a self-contained, negative-pressure enclosure with proper emission controls will encompass the work area, all individuals not directly involved with the planned work must be absent from the room in which the work will occur. Monitoring requirements shall be as stated above under "Special Requirements for Work Within 20 Feet of Potentially Exposed Individuals or Structures" except that in this instance "nearby/occupied structures" would be adjacent occupied rooms. Additionally, the location of all exhaust vents in the room and their discharge points, as well as potential vapor pathways (openings, conduits, etc.) relative to adjoining rooms, should be understood and the monitoring locations established accordingly. In these situations, it is strongly recommended that exhaust fans or other engineering controls be used to create negative air pressure within the work area during remedial activities. Additionally, it is strongly recommended that the planned work be implemented during hours (e.g., weekends or evenings) when building occupancy is at a minimum.

Appendix 1A
New York State Department of Health
Generic Community Air Monitoring Plan

Overview

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical- specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for VOCs and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate DEC/NYSDOH staff.

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

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. “Periodic” monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or

overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions, particularly if wind direction changes. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

1. If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

2. If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

4. All 15-minute readings must be recorded and be available for State (DEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

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

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

December 2009

Appendix 1B
Fugitive Dust and Particulate Monitoring

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

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

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

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

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

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

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

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

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

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

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

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

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

APPENDIX 4

Regenesis Specifications

REGENESIS

Technology-Based Solutions for the Environment

PROJECT NAME

300 Commerce Drive

PREPARED FOR

Ravi Engineering
Pete Morton
pmorton@ravieng.com

PREPARED BY

REGENESIS

Alana Miller
amiller@regenesis.com

Ian Doliana
idoliana@regenesis.com

July 26, 2022

Project Summary

REGENESIS appreciates the opportunity to provide Ravi Engineering this remedial design and cost estimate for this project. Included within is a brief summary of our proposed solution, our understanding of your project goals, the technologies proposed, and a table summarizing the design.

Proposed Solution

We are proposing treatment utilizing 3D-Microemulsion and S-MicroZVI to address cVOC impacts. These reagents will be applied via direct push injection. Information on this page pertains to the Hot Spot treatment centered around MW-5.

Project Goals

- Reduce dissolved cVOC concentrations
- Reduce source area mass

Technologies Proposed

- 3-D Microemulsion
- S-MicroZVI®
- Bio-Dechlor INOCULUM® Plus (BDI Plus)

Click above to access product specification sheets

Technical Resources

- 3-D Microemulsion Technical Bulletin: Micellular Distribution
- 7 Business Reasons to Consider In Situ Chemical Reduction to Treat Your Site
- S-MicroZVI® Technical Bulletin: Benefits of Sulfidation

Design Summary (Hot Spot)

Design Parameters	Unit	Value
Treatment Type		Grid
Treatment Areal Extent (sq ft)		1,000
Top Application Depth (ft bgs)		3
Bottom Application Depth (ft. bgs)		12
Vertical Treatment Interval	ft	9
Soil Type		sand
Porosity	cm3/cm3	0.33
Effective Porosity	cm3/cm3	0.20
Hydraulic Gradient	ft/ft	0.003
GW Velocity	ft/yr	136.97
Eff. Pore Voume Occupancy		18%
Application Summary		
Spacing Within Rows (ft)		8
Spacing Between Rows (ft)		8
DPT Injection Points		16
Product Dosage		
3DME to be Applied	lbs	800
S-MZVI to be Applied	lbs	1,000
BDI Plus to be Applied	L	18
CRS to be Applied	lbs	
Water Required	gallons	2,301
Total Volume Applied	gallons	2,397

Project Summary

REGENESIS appreciates the opportunity to provide Ravi Engineering this remedial design and cost estimate for this project. Included within is a brief summary of our proposed solution, our understanding of your project goals, the technologies proposed, and a table summarizing the design.

Proposed Solution

We are proposing treatment utilizing 3D-Microemulsion and S-MicroZVI to address cVOC impacts. These reagents will be applied via direct push injection. Information on this page pertains to the Shallow Plume Treatment.

Project Goals

- Reduce dissolved cVOC concentrations

Technologies Proposed

- 3-D Microemulsion
- S-MicroZVI®
- Bio-Dechlor INOCULUM® Plus (BDI Plus)

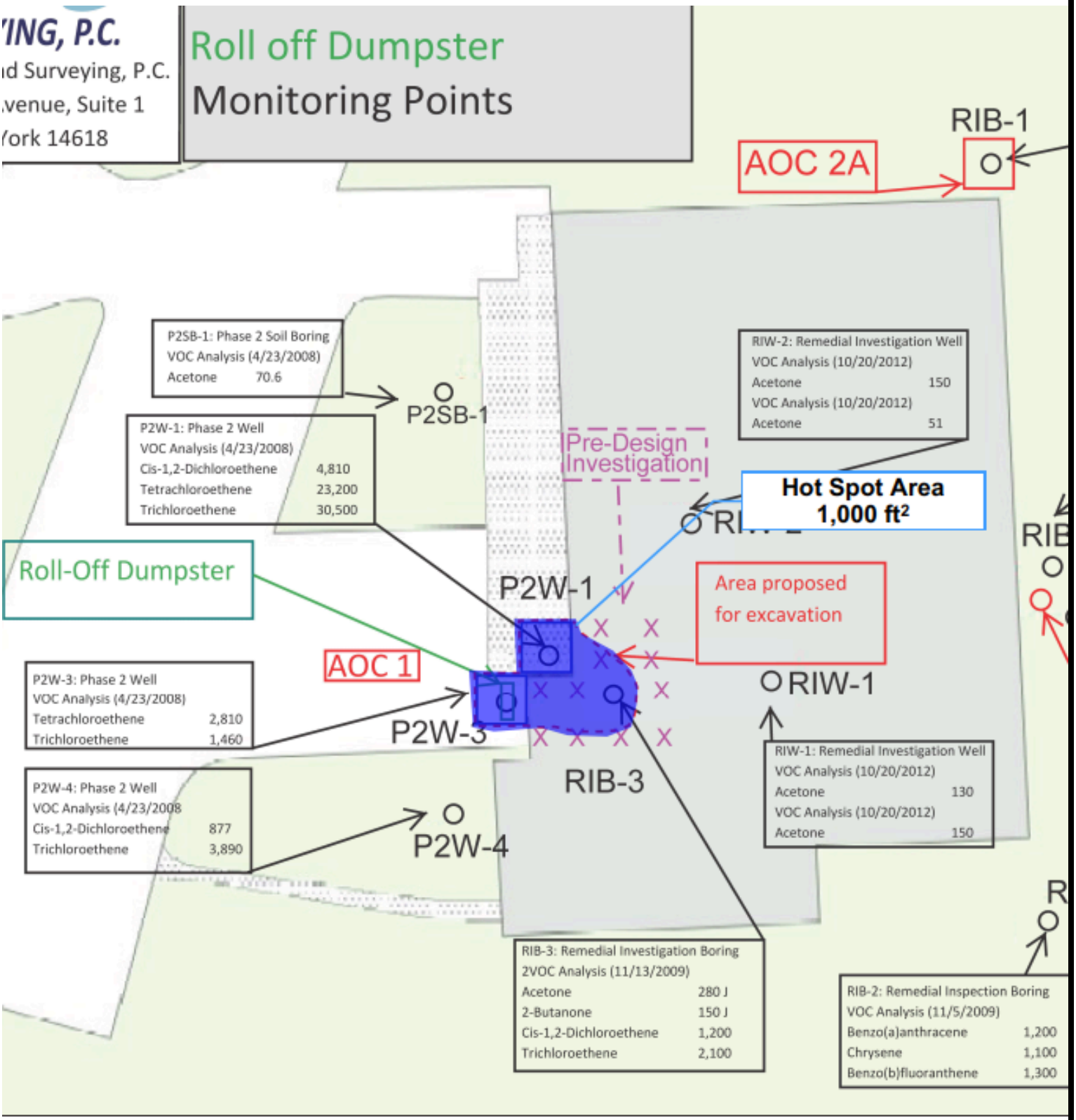
Click above to access product specification sheets

Technical Resources

- 3-D Microemulsion Technical Bulletin: Micellular Distribution
- 7 Business Reasons to Consider In Situ Chemical Reduction to Treat Your Site
- S-MicroZVI® Technical Bulletin: Benefits of Sulfidation

Design Summary (Shallow Plume Treatment)

Design Parameters	Unit	Value
Treatment Type		Grid
Treatment Areal Extent (sq ft)		18,000
Top Application Depth (ft bgs)		3
Bottom Application Depth (ft. bgs)		15
Vertical Treatment Interval	ft	12
Soil Type		sand
Porosity	cm3/cm3	0.33
Effective Porosity	cm3/cm3	0.20
Hydraulic Gradient	ft/ft	0.003
GW Velocity	ft/yr	136.97
Eff. Pore Voume Occupancy		9%
Application Summary		
Spacing Within Rows (ft)		8
Spacing Between Rows (ft)		18
DPT Injection Points		125
Product Dosage		
3DME to be Applied	lbs	12,400
S-MZVI to be Applied	lbs	10,000
BDI Plus to be Applied	L	123
CRS to be Applied	lbs	
Water Required	gallons	28,232
Total Volume Applied	gallons	29,718



300 Commerce Drive

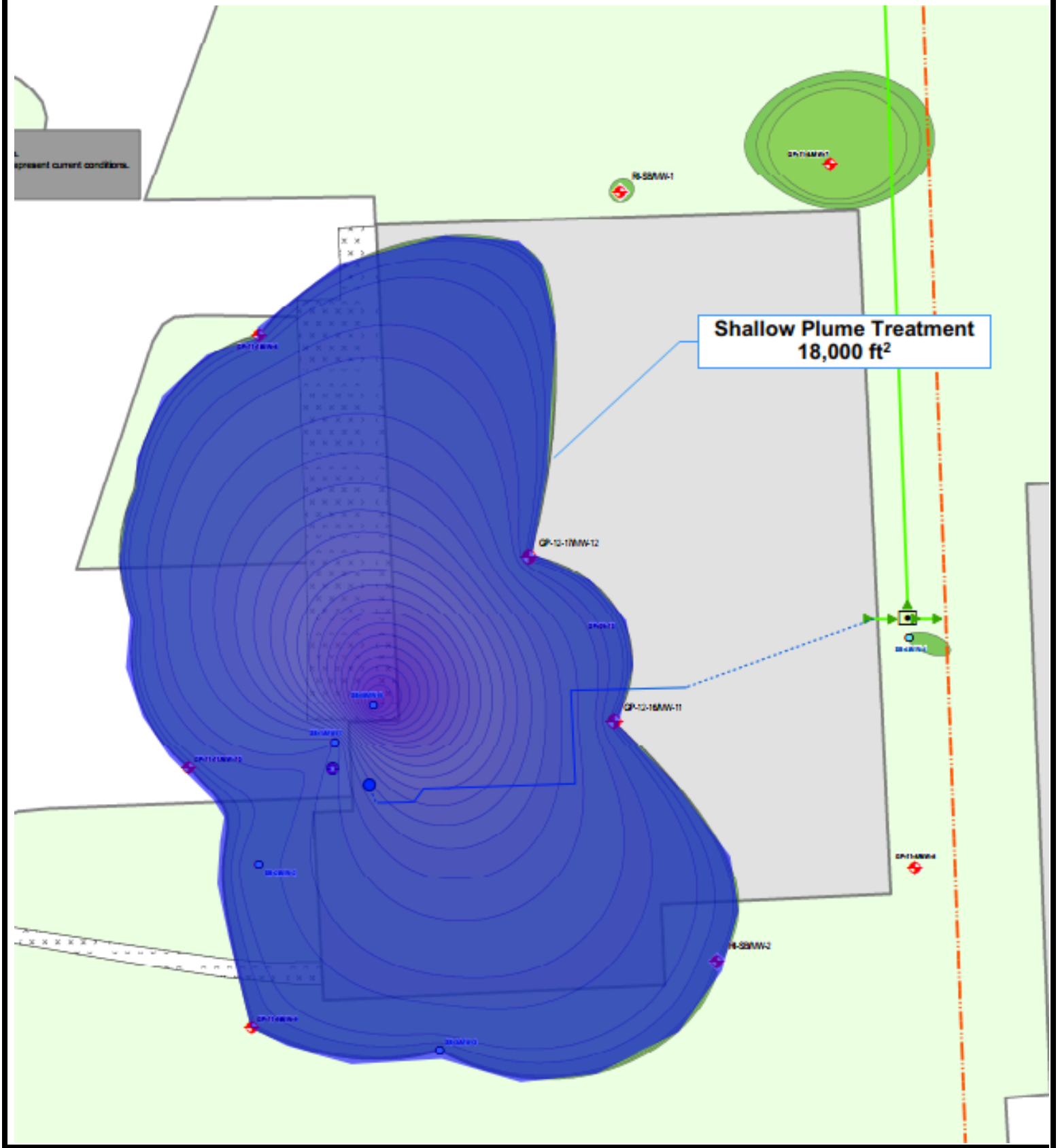
Ravi Engineering

July 26, 2022

Figure 1-Injection Location Map

REGENESIS

Technology-Based Solutions for the Environment



300 Commerce Drive

Ravi Engineering

July 26, 2022

Figure 1-Injection Location Map

REGENESIS

Technology-Based Solutions for the Environment

Technical Approach

This approach combines both biological enhanced reductive dechlorination (ERD) and abiotic *in-situ* chemical reduction (ISCR) degradation pathways for rapid reduction of chlorinated solvents. The self-distributing features of 3-D Microemulsion® (3DME) combined with its longevity (several years) allow for sufficient coverage with minimal pore volume displacement thereby minimizing application costs. Our colloidal zero-valent iron (ZVI) product, Sulfidated-MicroZVI (S-MicroZVI®), will provide a source of iron, creating conditions for abiotic reduction via the formation of iron sulfides, oxides, and hydroxides, while also maintaining strongly reducing conditions in the treatment area for an extended timeframe. This will foster rapid abiotic reduction of chlorinated solvents while reducing the potential for daughter product formation compared to a standard *in-situ* bioremediation approach. Bio-Dechlor INOCULUM® Plus (BDI Plus) is added to provide a live microbial culture that is known to fully degrade these compounds.

Table 2: Remedial Design Parameters Summary

Hot Spot

Target Treatment Zone (TTZ) Info	Unit	Value
Areal Extent	sq ft	1,000
Top Treat Depth	ft	3.0
Bot Treat Depth	ft	12.0
Vertical Treatment Interval	ft	9.0
Treatment Zone Volume	ft^3	9,000
Treatment Zone Volume	cy	333
Soil Type	---	sand
Porosity	cm^3/cm^3	0.33
Effective Porosity	cm^3/cm^3	0.20
Treatment Zone Pore Volume	gals	22,217
Treatment Zone Effective Pore Volume	gals	13,465
Fraction Organic Carbon (foc)	g/g	0.002
Soil Density	g/cm^3	1.7
Soil Density	lb/ft^3	108
Soil Weight	lbs	9.7E+05
Hydraulic Conductivity	ft/day	25.0
Hydraulic Conductivity	cm/sec	8.82E-03
Hydraulic Gradient	ft/ft	0.003
GW Velocity	ft/day	0.38
GW Velocity	ft/yr	137

Shallow Plume Area

Target Treatment Zone (TTZ) Info	Unit	Value
Areal Extent	sq ft	18,000
Top Treat Depth	ft	3.0
Bot Treat Depth	ft	15.0
Vertical Treatment Interval	ft	12.0
Treatment Zone Volume	ft^3	216,000
Treatment Zone Volume	cy	8,000
Soil Type	---	sand
Porosity	cm^3/cm^3	0.33
Effective Porosity	cm^3/cm^3	0.20
Treatment Zone Pore Volume	gals	533,211
Treatment Zone Effective Pore Volume	gals	323,158
Fraction Organic Carbon (foc)	g/g	0.002
Soil Density	g/cm^3	1.7
Soil Density	lb/ft^3	108
Soil Weight	lbs	2.3E+07
Hydraulic Conductivity	ft/day	25.0
Hydraulic Conductivity	cm/sec	8.82E-03
Hydraulic Gradient	ft/ft	0.003
GW Velocity	ft/day	0.38
GW Velocity	ft/yr	137

Pricing

Below is the cost estimate to provide the remediation technologies and execute the design provided in this proposal. Please also see the assumptions and qualifications section.

Hot Spot Treatment	Price	Qty	Subtotal
3-D Microemulsion® Drums (400 lb)	$5.91	800	$4,728
S-MicroZVI Drum (500 lb)	$11.31	1000	$11,310
Bio-Dechlor Inoculum® Plus	$198	18	$3,564
Estimated Shipping and Tax (15%)			+$2,940.30
Total			**$22,542.30**

Shallow Plume Area	Price	Qty	Subtotal
3-D Microemulsion® Totes (2000 lb)	$5.91 $5.63 Discount -0.28$	12000	$67,560
3-D Microemulsion® Drums (400 lb)	$5.91 $5.63 Discount -0.28$	400	$2,252
S-MicroZVI Tote (2000 lb)	$11.31 $10.79 Discount -0.52$	10000	$107,900
Bio-Dechlor Inoculum® Plus	$198	92	$18,216
Estimated Shipping and Tax (15%)			+$29,389.20
Total			**$225,317.20**
Total Savings			**$8,672**

COST ESTIMATE DISCLAIMER: The cost listed assumes conditions set forth within the proposed scope of work and assumptions and qualifications. Changes to either could impact the final cost of the project. This may include final shipping arrangements, sales tax, or application-related tasks such as product storage and handling, access to water, etc. If items listed need to be modified, please contact Regenesis for further evaluation.

Acknowledgement

This scope and associated costs are budgetary and should not be considered final. Listed below are the next steps to secure a final design and cost estimate from REGENESIS.

Steps to Final Design and Scope of Work

1. Signature notifying REGENESIS to proceed with final design.
2. REGENESIS technical team contacts Ravi Engineering to review final scope of work and provide detailed design and cost estimate
3. Provide Detailed Remediation Services Scope of Work, if applicable.
4. Confirm Implementation Schedule
5. Submit Detailed Design and Cost Estimate to Ravi Engineering for review and final approval

Signature below confirms signee accepts this preliminary scope of work and would like REGENESIS to proceed with a detailed design and cost estimate.

SIGNATURE
Pete Morton

Not yet accepted

Ravi Engineering | Pete Morton,

Terms & Conditions

1. **PAYMENT TERMS.** Net 30 Days. Accounts outstanding after 30 days will be assessed 1.5% monthly interest. Volume discount pricing will be rescinded on all accounts outstanding over 90 days. An early payment discount of 1.5% Net 10 is available for cash or check payments only. We accept Master Card, Visa and American Express.
2. **RETURN POLICY.** A 15% re-stocking fee will be charged for all returned goods. All requests to return product must be pre-approved by seller. Returned product must be in original condition and no product will be accepted for return after a period of 90 days.
3. **FORCE MAJEURE.** Seller shall not be liable for delays in delivery or services or failure to manufacture or deliver due to causes beyond its reasonable control, including but not limited to acts of God, acts of buyer, acts of military or civil authorities, fires, strikes, flood, epidemic, war, riot, delays in transportation or car shortages, or inability to obtain necessary labor, materials, components or services through seller's usual and regular sources at usual and regular prices. In any such event Seller may, without notice to buyer, at any time and from time to time, postpone the delivery or service dates under this contract or make partial delivery or performance or cancel all or any portion of this and any other contract with buyer without further liability to buyer. Cancellation of any part of this order shall not affect Seller's right to payment for any product delivered or service performed hereunder.
4. **LIMITED WARRANTY.** Seller warrants the product(s) sold and services provided as specified on face of invoice, solely to buyer. Seller makes no other warranty of any kind respecting the product and services, and expressly DISCLAIMS ALL OTHER WARRANTIES OF WHATEVER KIND RESPECTING THE PRODUCT AND SERVICES, INCLUDING ALL WARRANTIES OF MERCHANTABILITY, FITNESS FOR PARTICULAR PURPOSE AND NON-INFRINGEMENT.
5. **DISCLAIMER.** Where warranties to a person other than buyer may not be disclaimed under law, seller extends to such a person the same warranty seller makes to buyer as set forth herein, subject to all disclaimers, exclusions and limitations of warranties, all limitations of liability and all other provisions set forth in the Terms and Conditions herein. Buyer agrees to transmit a copy of the Terms and Conditions set forth herein to any and all persons to whom buyer sells, or otherwise furnishes the products and/or services provided buyer by seller and buyer agrees to indemnify seller for any liability, loss, costs and attorneys' fees which seller may incur by reason, in whole or in part, of failure by buyer to transmit the Terms and Conditions as provided herein.
6. **LIMITATION OF SELLER'S LIABILITY AND LIMITATION OF BUYER'S REMEDY.** Seller's liability on any claim of any kind, including negligence, for any loss or damage arising out of, connected with, or resulting from the manufacture, sale, delivery, resale, repair or use of any goods or performance of any services covered by or furnished hereunder, shall in no case exceed the lesser of (1) the cost of repairing or replacing goods and repeating the services failing to conform to the forgoing warranty or the price of the goods and/or services or part thereof which gives rise to the claim. IN NO EVENT SHALL SELLER BE LIABLE FOR SPECIAL INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING LOST PROFITS, OR FOR DAMAGES IN THE NATURE OF PENALTIES.
7. **INDEMNIFICATION.** Buyer agrees to defend and indemnify seller of and from any and all claims or liabilities asserted against seller in connection with the manufacture, sale, delivery, resale or repair or use of any goods, and performance of any services, covered by or furnished hereunder arising in whole or in part out of or by reason of the failure of buyer, its agents, servants, employees or customers to follow instructions, warnings or recommendations furnished by seller in connection with such goods and services, by reason of the failure of buyer, its agents, servants, employees or customers to comply with all federal, state and local laws applicable to such goods and services, or the use thereof, including the Occupational Safety and Health Act of 1970, or by reason of the negligence or misconduct of buyer, its agents, servants, employees or customers.

8. **EXPENSES OF ENFORCEMENT.** In the event seller undertakes any action to collect amounts due from buyer, or otherwise enforce its rights hereunder, Buyer agrees to pay and reimburse Seller for all such expenses, including, without limitation, all attorneys and collection fees.
9. **TAXES.** Liability for all taxes and import or export duties, imposed by any city, state, federal or other governmental authority, shall be assumed and paid by buyer. Buyer further agrees to defend and indemnify seller against any and all liabilities for such taxes or duties and legal fees or costs incurred by seller in connection therewith.
10. **ASSISTANCE AND ADVICE.** Upon request, seller in its discretion will furnish as an accommodation to buyer such technical advice or assistance as is available in reference to the goods and services. Seller assumes no obligation or liability for the advice or assistance given or results obtained, all such advice or assistance being given and accepted at buyer's risk.
11. **SITE SAFETY.** Buyer shall provide a safe working environment at the site of services and shall comply with all applicable provisions of federal, state, provincial and municipal safety laws, building codes, and safety regulations to prevent accidents or injuries to persons on, about or adjacent to the site.
12. **INDEPENDENT CONTRACTOR.** Seller and Buyer are independent contractors and nothing shall be construed to place them in the relationship of partners, principal and agent, employer/employee or joint ventures. Neither party will have the power or right to bind or obligate the other party except as may be expressly agreed and delegated by other party, nor will it hold itself out as having such authority.
13. **REIMBURSEMENT.** Seller shall provide the products and services in reliance upon the data and professional judgments provided by or on behalf of buyer. The fees and charges associated with the products and services thus may not conform to billing guidelines, constraints or other limits on fees. Seller does not seek reimbursement directly from any government agency or any governmental reimbursement fund (the "Government"). In any circumstance where seller may serve as a supplier or subcontractor to an entity which seeks reimbursement from the Government for all or part of the services performed or products provided by seller, it is the sole responsibility of the buyer or other entity seeking reimbursement to ensure the products and services and associated charges are in compliance with and acceptable to the Government prior to submission. When serving as a supplier or subcontractor to an entity which seeks reimbursement from the Government, seller does not knowingly present or cause to be presented any claim for payment to the Government.
14. **APPLICABLE LAW/JURISDICTION AND VENUE.** The rights and duties of the parties shall be governed by, construed, and enforced in accordance with the laws of the State of California (excluding its conflict of laws rules which would refer to and apply the substantive laws of another jurisdiction). Any suit or proceeding hereunder shall be brought exclusively in state or federal courts located in Orange County, California. Each party consents to the personal jurisdiction of said state and federal courts and waives any objection that such courts are an inconvenient forum.
15. **ENTIRE AGREEMENT.** This agreement constitutes the entire contract between buyer and seller relating to the goods or services identified herein. No modifications hereof shall be binding upon the seller unless in writing and signed by seller's duly authorized representative, and no modification shall be effected by seller's acknowledgment or acceptance of buyer's purchase order forms containing different provisions. Trade usage shall neither be applicable nor relevant to this agreement, nor be used in any manner whatsoever to explain, qualify or supplement any of the provisions hereof. No waiver by either party of default shall be deemed a waiver of any subsequent default.

Detailed Design Table

Project Information		
300 Commerce Drive		
Henrietta, NY		
Shallow Plume Treatment		
Prepared For:		
Pete Norton, Ravi Engineering		
Target Treatment Zone (TTZ) Info	**Unit**	**Value**
Areal Extent	sq ft	1,000
Top Treat Depth	ft	3.0
Bot Treat Depth	ft	12.0
Vertical Treatment Interval	ft	9.0
Treatment Zone Volume	ft^3	9,000
Treatment Zone Volume	cy	333
Soil Type	---	sand
Porosity	cm^3/cm^3	0.33
Effective Porosity	cm^3/cm^3	0.20
Treatment Zone Pore Volume	gals	22,217
Treatment Zone Effective Pore Volume	gals	13,465
Fraction Organic Carbon (foc)	g/g	0.002
Soil Density	g/cm^3	1.7
Soil Density	lb/ft^3	108
Soil Weight	lbs	9.7E+05
Hydraulic Conductivity	ft/day	25.0
Hydraulic Conductivity	cm/sec	8.82E-03
Hydraulic Gradient	ft/ft	0.003
GW Velocity	ft/day	0.38
GW Velocity	ft/yr	137
Contaminant Mass	**Unit**	**Value**
Dissolved Phase Contaminant Mass	lbs	11
Sorbed Phase Contaminant Mass	lbs	25
Competing Electron Acceptor Mass	lbs	17
Total Mass Contributing to H2 Demand	**lbs**	**52**
Mass Flux and 3DME Demand	**Unit**	**Value**
Groundwater Flux	L/day	604
Stoichiometric 3DME Demand	lbs	176
Total Mass Flux 3DME Demand	lbs	432
Total 3DME Demand	**lbs**	**608**
Application Dosing		
3-D Microemulsion to be Applied	**lbs**	**800**
S-MZVI to be Applied	**lbs**	**1,000**
BDI Plus to be Applied	**liters**	**18**

3-D Microemulsion®, S-MZVI®, BDI® Plus Application Design Summary		
Shallow Plume Treatment		
Treatment Type	**Grid**	
Treatment Areal Extent (sq ft)	1,000	
Spacing Within Rows (ft)	8	
Spacing Between Rows (ft)	8	
DPT Injection Points	16	
Top Application Depth (ft bgs)	3	**Field Mixing Ratios**
Bottom Application Depth (ft bgs)	12	3DME Concentrate per Pt (gals)
3DME to be Applied (lbs)	**800**	6
3DME to be Applied (gals)	96	Mix Water per Pt (gals)
3DME Mix %	4%	144
Volume Water (gals)	**2,301**	3DME Mix Volume per Pt (gals)
3DME Mix Volume (gals)	2,397	150
S-MZVI to be Applied (lbs)	**1,000**	S-MZVI Volume per Pt (gals)
S-MZVI Volume (gals)	66	4
BDI Plus to be Applied (L)	**18**	BDI Volume per Pt (L)
BDI Plus Mix Water Volume (gals)	180	1.1
	0	
	0	
Total Application Volume (gals)	**2,648**	Volume per pt (gals)
Estimated Radius of Injection (ft)	3.8	165
Prepared by: Ian Doliana - Design Specialist		Volume per vertical ft (gals)
Date: 7/25/2022		18
Technical Notes/Discussion		

Detailed Design Table (continued)

Project Information		
300 Commerce Drive		
Henrietta, NY		
Hot Spot		
Prepared For:		
Pete Norton, Ravi Engineering		
Target Treatment Zone (TTZ) Info	**Unit**	**Value**
Areal Extent	sq ft	18,000
Top Treat Depth	ft	3.0
Bot Treat Depth	ft	15.0
Vertical Treatment Interval	ft	12.0
Treatment Zone Volume	ft^3	216,000
Treatment Zone Volume	cy	8,000
Soil Type	---	sand
Porosity	cm^3/cm^3	0.33
Effective Porosity	cm^3/cm^3	0.20
Treatment Zone Pore Volume	gals	533,211
Treatment Zone Effective Pore Volume	gals	323,158
Fraction Organic Carbon (foc)	g/g	0.002
Soil Density	g/cm^3	1.7
Soil Density	lb/ft^3	108
Soil Weight	lbs	2.3E+07
Hydraulic Conductivity	ft/day	25.0
Hydraulic Conductivity	cm/sec	8.82E-03
Hydraulic Gradient	ft/ft	0.003
GW Velocity	ft/day	0.38
GW Velocity	ft/yr	137
Contaminant Mass	**Unit**	**Value**
Dissolved Phase Contaminant Mass	lbs	260
Sorbed Phase Contaminant Mass	lbs	593
Competing Electron Acceptor Mass	lbs	401
Total Mass Contributing to H2 Demand	**lbs**	**1,254**
Mass Flux and 3DME Demand	**Unit**	**Value**
Groundwater Flux	L/day	3,419
Stoichiometric 3DME Demand	lbs	4,228
Total Mass Flux 3DME Demand	lbs	2,443
Total 3DME Demand	**lbs**	**6,670**
Application Dosing		
3-D Microemulsion to be Applied	**lbs**	**12,400**
S-MZVI to be Applied	**lbs**	**10,000**
BDI Plus to be Applied	**liters**	**92**

3-D Microemulsion®, S-MZVI®, BDI® Plus Application Design Summary		
Hot Spot		
Treatment Type	**Grid**	
Treatment Areal Extent (sq ft)	18,000	
Spacing Within Rows (ft)	8	
Spacing Between Rows (ft)	18	
DPT Injection Points	125	
Top Application Depth (ft bgs)	3	**Field Mixing Ratios**
Bottom Application Depth (ft bgs)	15	3DME Concentrate per Pt (gals)
3DME to be Applied (lbs)	**12,400**	12
3DME to be Applied (gals)	1,486	Mix Water per Pt (gals)
3DME Mix %	5%	226
Volume Water (gals)	**28,232**	3DME Mix Volume per Pt (gals)
3DME Mix Volume (gals)	29,718	238
S-MZVI to be Applied (lbs)	**10,000**	S-MZVI Volume per Pt (gals)
S-MZVI Volume (gals)	662	5
BDI Plus to be Applied (L)	**92**	BDI Volume per Pt (L)
BDI Plus Mix Water Volume (gals)	920	0.7
	0	
	0	
Total Application Volume (gals)	**31,325**	Volume per pt (gals)
Estimated Radius of Injection (ft)	4.1	251
Prepared by: Ian Doliana - Design Specialist		Volume per vertical ft (gals)
Date: 7/25/2022		21
Technical Notes/Discussion		

APPENDIX 5

Terracon SVE Pilot Test

Su□sur□ace In□esti□ation and S□E Pilot Testin□ Re□ort

300 Commerce Drive
Henrietta, Monroe County, NY
No□em□er □□□□□□
Terracon Pro□ect No□BU□□□□□□

Prepared for:

Ra□i En□ineerin□ and □and Sur□e□in□□P□C□
□□□□ S□Clinton A□e□□ Suite □
Rochester□NY

Prepared by:

Terracon Consultants□NY□Inc□
Bu□alo□Ne□ Yor□

No□em□er □□□□□□

Ra□i En□ineerin□ □ □and Sur□e□in□□P□C□
□□□□ S□Clinton A□e□□ Suite □
Rochester□NY □□□□□

Attn□ Mr□Peter Morton□P□G□
P□ □□□□□□□□□□□□□
E□ □morton□ ra□ien□□com

Re□ Su□sur□ace In□esti□ation and S□E Pilot Testin□ Re□ort
□□□ Commerce □ri□e
□enrietta□Monroe Count□□NY
Terracon Pro□ect No□BU□□□□□□

□ear Mr□Morton□

□ e ha□e com□leted the Su□sur□ace In□esti□ation and S□E Pilot Testin□ and □ilot □a□or e□traction testin□ ser□ices □or the a□o□e re□erenced □ro□ect□ This stud□ □as □er□ormed in □eneral accordance □ith Terracon Pro□osal No□PBU□□□□□□ dated □ul□7□□□□□□This re□ort □resents the □indin□s o□the su□sur□ace e□□loration and testin□ □er□ormed at the □□□ Commerce □ri□e site in □enrietta□Ne□ Yor□□

□ e a□□reciate the o□□ortunit□ to □e o□ser□ice to □ou on this □ro□ect□I□□ou ha□e an□ □uestions concernin□ this re□ort or i□□e ma□ □e o□□urther ser□ice□□lease contact us□

Sincerel□□
Terracon Consultants-NY, Inc.

□ran□R□Minnolera
Pro□ect Geolo□ist□□ocal E□□loration Mana□er

Charles B□Gu□□etta
□ □ice Mana□er

REPORT TOPICS

Note: This report was originally delivered in a web-based format. For more interactive features, please view our project online at client.terracon.com.

ATTACHMENTS

SITE LOCATION AND EXPLORATION PLANS
EXPLORATION RESULTS
SUPPORTING INFORMATION

Note: Refer to each individual Attachment for a listing of contents.

Subsurface Investigation and SVE Pilot Testing Report

300 Commerce Drive

Henrietta, Monroe County, NY

Terracon Project No. BU205023

November 5, 2020

INTRODUCTION

This re□ort □resents the results o□our su□sur□ace e□□loration and soil □a□or e□traction □ilot testin□ ser□ices □er□ormed at a commercial □ro□ert□ located at □□□ Commerce □ri□e in □enrietta□ Monroe Count□□NY□The □ur□ose o□these ser□ices is to □ro□ide su□sur□ace in□ormation relati□e to□

- Su□sur□ace soil conditions
- □easi□ilit□ o□ utili□in□ soil □a□or e□traction □or site remediation
- Ground□ater conditions

The □eotechnical in□esti□ation Sco□e o□Ser□ices □or this □ro□ect included the ad□ancement o□si□ test □orin□s □□ith su□se□uent con□ersion to test □ell □oints□at de□ths ran□in□ □rom □ to □□ □eet □elo□ e□istin□ site □rades □ithin the □ilot testin□ area□

Ma□s sho□in□ the site and □orin□ locations are sho□n in the **Site Location** and **Exploration Plan** sections□res□ecti□el□□The results o□tained □rom the site durin□ the □ield e□□loration are included on the □orin□ lo□s in the **Exploration Results** section□

SITE CONDITIONS

The □ollo□in□ descri□tion o□site conditions is deri□ed □rom our site □isit in association □ith the □ield e□□loration and our re□ie□ o□□u□licl□a□aila□le □eolo□ic and to□o□ra□hic ma□s□

Item	Description
Parcel Information	The □ro□ect is located at □□□ Commerce □ri□e□To□n o□□enrietta□Monroe Count□□Ne□ Yor□ See **Site Location map**
Existing Improvements	E□istin□ ele□ated sla□□on□□rade commercial use structure □ith truc□□loadin□ doc□ and attached o□□ice□□arehouse□□roduction area
Current Ground Cover	Concrete and as□halt □a□ed in area o□interest□remainder o□site is □rass□a□n

SITE CHARACTERIZATION

Subsurface Investigation and Conditions

A limited su□sur□ace in□esti□ation □as initiall□ com□leted at the site □□ Terracon as □art o□the □ilot testin□ □or the antici□ated Soil □a□or E□traction □S□E□s□stem□A □iedrich □□□□ rotar□drill ri□ e□ui□□ed □ith □oth □□□□□and □□□□inch I□ hollo□ stem au□ers □as utili□ed to ad□ance the si□ test □orin□s re□uired □or this □ilot stud□□ The su□sur□ace in□esti□ation □or□ □as com□leted □□ Terracon on Se□tem□er □□ and □□□□□□□□

A total o□si□ □orin□s and □ells □ere installed as □art o□this □ilot test in□esti□ation□Borin□s□□ells □ere located in three □airs o□t□o each consistin□ o□a □shallo□□□□□oot de□th BGS□and □dee□□ □□□□oot de□th BGS□□orin□□□ell□Borin□s E□□□ and E□□□ □□acuum e□traction test □oints□□ere located at the assumed □oint source o□the contamination □ased on □re□ious □or□ com□leted at the site □□ others□Borin□ E□□□ □as sam□led and com□leted at □□□BGS and □orin□ E□□□ □as com□leted at □□BGS□□□inch I□ P□C □round□ater □ells □ere installed at each o□these locations□

Borin□s□□ells G□ □□ throu□h G□ □□ □ere utili□ed as monitorin□ □oints to determine the radius o□ in□uence o□the □acuum a□□lied to e□traction □ells E□□□ and E□□□□The □orin□□□ell □air consistin□ o□G□ □□ and G□ □□ □ere located □□□north o□the e□traction □oints□□ith G□ □□ installed at a de□th o□□□□BGS and G□ □□ at a de□th o□□□BGS□The □ell □air G□ □□ and G□ □□ □ere installed □□□ north o□the e□traction □ells□□ith G□ □□ installed at a de□th o□□□□BGS and G□ □□ installed at a de□th o□□□BGS□Re□er to the site □lan □resented in the Site □ocation and E□□loration Plans section o□this re□ort □or details□

The e□istin□ concrete sla□ □ithin the area o□stud□ □as initiall□ sa□cut and remo□ed □or ease o□ au□erin□ and □ell installation□Standard s□lit □arrel o□er□urden sam□lin□ methods □ere then utili□ed to ad□ance the □orin□s and collect soil sam□les □rom the e□istin□ sur□ace □rade to the com□letion de□th at the □orin□s□

In the s□lit□arrel sam□lin□ □rocedure□a standard □inch outer diameter s□lit□arrel sam□lin□ s□oon □as dri□en into the □round □□a □□□□□ound automatic hammer □allin□ a distance o□□□ inches□The num□er o□□lo□s re□uired to ad□ance the sam□lin□ s□oon the last □□ inches o□a normal □□□inch □enetration is recorded as the Standard Penetration Test □SPT□ resistance □alue□ The SPT resistance □alues□also re□erred to as N□□alues□are indicated on the □orin□ lo□s at the test de□ths □ e o□ser□ed and recorded □round□ater le□els durin□ drillin□ and sam□lin□□

A Terracon en□ironmental □eolo□ist □as □resent durin□ the □ield e□□lorations to direct the e□□loration □ro□ram□lo□ the encountered soils and □screen□the reco□ered sam□les □or the □resence o□□olatile or□anic □a□ors□A □MiniRae □□□□□Photoioni□ation □etector □PI□□□as utili□ed onsite to □screen□the reco□ered sam□les□The PI□ meter □as □ield cali□rated □rior to use□The PI□ meter □ro□ide a □uantitati□e □alue o□the amount o□an□□olatile or□anic □a□ors □resent □ithin the su□sur□ace soils□□Screenin□□o□the reco□ered sam□les □as accom□lished □□ □lacin□ the

inta□e □and o□the meter at □arious locations throu□hout the s□lit s□oon sam□le and allo□in□the □a□ors i□an□□to □e anal□□ed□PI□ readin□s are e□□ressed in □arts□□er□million □PPM□and the recorded □alues i□an□□are indicated in the □PI□ □□□m□□column o□the attached □orin□lo□s□

The □ells □ere constructed □□ □lacin□ a □re□slotted section o□either □□inch I□ or □□inch P□C screen attached to a riser □ortion o□P□C □i□e inside the hollo□ stem au□ers and constructin□ a sand □ilter □ac□ □ith □entonite chi□ seal around the □ell □i□e □hile remo□in□the au□ers □rom the □orehole□The test locations □ere □inished □ith an at□□rade cur□ □o□ □or □rotection□

The □eneral su□sur□ace conditions encountered at the □orin□s com□leted □ithin the test area consisted o□construction □ills underlain □□silts and silt□cla□soils□A thin □eneer o□□□ossi□le □uried to□soil □as encountered in □orin□G□ □□□PI□ readin□s ran□in□ □rom □ac□□round le□els □B□G□or □□□ □□m□to □□□□□□□□ □□m □ere noted on the sam□les□

□ e monitored the □oreholes □or the □resence and le□el o□□round□ater □hile drillin□□There □as no □round□ater encountered in an□ o□the □orin□s durin□ or immediatel□ a□ter drillin□ and sam□lin□□ □ ater le□els □ere o□tained □rior to the □acuum e□traction test and are indicated on the □orin□lo□s attached as □art o□this re□ort□

SVE Pilot Test

□n □cto□er □□□□□□□ Terracon returned to the site to □er□orm a limited Soil □a□or E□traction □S□E□□ □ual Phase □ilot test to determine the □easi□ilit□ o□ utili□in□ S□E to remediation method □or the site□ It □as noted that the site currentl□ has a su□□sla□ □a□or remo□al s□stem installed in a □ortion o□the structure□This s□stem □as o□ser□ed to □e □resent in the middle □ortion o□the □uildin□ and o□erational at the time o□Terracon's testin□on the e□terior o□the □uildin□□This s□stem □as installed □□ others□and there □ere no details re□ardin□ construction made a□aila□le to Terracon□T□o manometer □au□es that □ere □art o□this s□stem □ere □resent in the structure□one located alon□ the □esternmost □all o□the □uildin□ □northeast o□the G□ □□ and G□ □□ cluster o□□ells □desi□nated Interior Manometer □□and one □as o□ser□ed in the a□□ro□imate center o□the interior o□the □uildin□ □desi□nated Interior Manometer □□□These manometer □au□es □ere read as durin□ this □ilot testin□ to determine i□an□ in□luence occurred due to the a□□lication o□□acuum to the □ells on the e□terior o□the structure□

The □round□ater le□els in the si□ test □ells □ere read □rior to and immediatel□ a□ter □er□ormin□ the □acuum testin□□The □acuum test a□□aratus consistin□ o□a Re□enair□ R□□□□□ re□enerati□e □lo□er □ith associated □i□in□ □as attached to a li□uid dro□□out drum and □lum□ed to a connectin□ cou□lin□ on the e□traction □ell□□al□in□to allo□ □aria□le □acuum le□els □as installed inline o□the test s□stem□ There □as a □acuum □au□e installed at the test □ell and at each o□the other □ells□This allo□ed Terracon to o□tain an a□□lied □acuum le□el readin□ at the e□traction □ell location and determine the in□luence □i□an□□at the other □ells □ithin the test area□

Testin□ commenced at e□traction □ell location E□□□□The □lo□er □as started□and □acuum ad□usted to a□□ro□imatel□ □□□□ o□□ull ca□acit□□The □au□es at the ad□acent □ells □ere read a□ter □ hour and the s□stem increased to a□□ro□imatel□ □□□□ o□□ull ca□acit□□The s□stem □as allo□ed to sta□ili□e and □ull □acuum at this le□el □or a□□ro□imatel□ □ hour□Readin□s o□the □acuum □au□es at the □ells □ere o□tained and the s□stem increased to □ull ca□acit□□□inal readin□s □ere then o□tained at the □ell locations□The □lo□er s□stem □as then shut do□n and reinstalled on e□traction □ell E□□□□The □acuum test □as then re□eated in a similar manner □or a similar duration o□time at location E□□□□ The ensuin□ ta□les □resent the results o□the □acuum □ilot test data□

Vacuum Applied to Extraction Well EX-1
Influence on Surrounding Wells

Well	25% Vacuum Reading	50% Vacuum Reading	100% Vacuum Reading
E□□□	□	□	□
G□ □□	□	□	□
G□ □□	□	□	□
G□ □□	□	□	□
G□ □□	□	□	□
G□ □□	□	□	□
Interior Manometer □□	□□□	□□□	□□□
Interior Manometer □□	□□□	□□□	□□□

Vacuum Applied to Extraction Well EX-2
Influence on Surrounding Wells

Well	25% Vacuum Reading	50% Vacuum Reading	100% Vacuum Reading
E□□□	□	□	□
G□ □□	□	□	□
G□ □□	□	□	□
G□ □□	□	□	□
G□ □□	□	□	□
G□ □□	□	□	□
Interior Manometer □□	□□□	□□□	□□□
Interior Manometer □□	□□□	□□□	□□□

□ Initial readin□s o□□□□mm and □□□mm □ere o□tained res□ecti□el□on Interior Manometers □ and □□ there a□□eared to □e no o□ser□a□le in□uence on due to Terracon□s testin□

□ ater le□els □ere o□tained in the □ells □rior to and immediatel□ a□ter □acuum e□traction testin□□ The ensuin□ ta□le □ro□ides the □ater le□els o□tained in the test □ells□

Well Number	Total Depth of well (Below Grade)	Initial water level (depth below grade) PRIOR TO TEST	Ending water level (depth below grade) AFTER TEST
E□□□	□□□□□	□□□□	□□□□
E□□□	□□□□	□□□□	□7□
G□ □□	□□□□□	□□□□	□□□□
G□ □□	□□□□	□□□□	□□□□
G□ □□	□□□□□	□□□□	□□□□
G□ □□	□□□□	□□□□	□□□□

GENERAL COMMENTS

Based on the results o□our su□sur□ace in□esti□ation and su□se□uent □acuum □ilot testin□□it a□□ears that this site ma□not □e suita□le □or the use o□dual □hase e□traction o□□a□or and li□uids as a remediation method□It a□□ears that the o□erl□in□ □ills consistin□ o□silt□ sand□and the underl□in□ nati□e silts and silt□ cla□s □ill not allo□ su□□icient □enetration o□□acuum to □e an economicall□□ia□le o□tion to e□tract □oth □a□or and □round□ater at this site□It is our o□inion that alternati□e o□tions □or remediation should □e considered□

□ur Sco□e o□Ser□ices does not include either s□eci□icall□or □□ im□lication □iolo□ical □e□□□mold□ □un□□□acteria□assessment o□the site or identi□ication or □re□ention o□□ollutants□ha□ardous materials or conditions□I□the o□ner is concerned a□out the □otential □or such contamination or □ollution□other studies should □e underta□en□

□ur ser□ices and an□ corres□ondence or colla□oration throu□h this s□stem are intended □or the sole □ene□it and e□clusi□e use o□our client □or s□eci□ic a□□lication to the □ro□ect discussed and are accom□lished in accordance □ith □enerall□acce□ted □eotechnical en□ineerin□ □ractices □ith no third□□art□ □ene□iciaries intended□An□ third□□art□ access to ser□ices or corres□ondence is solel□ □or in□ormation □ur□oses to su□□ort the ser□ices □ro□ided □□ Terracon to our client□ Reliance u□on the ser□ices and an□ □or□ □roduct is limited to our client and is not intended □or third □arties□An□use or reliance o□the □ro□ided in□ormation □□third □arties is done solel□at their o□n ris□□No □arranties□either e□□ress or im□lied□are intended or made□

ATTACHMENTS

SITE LOCATION AND EXPLORATION PLANS

Contents:

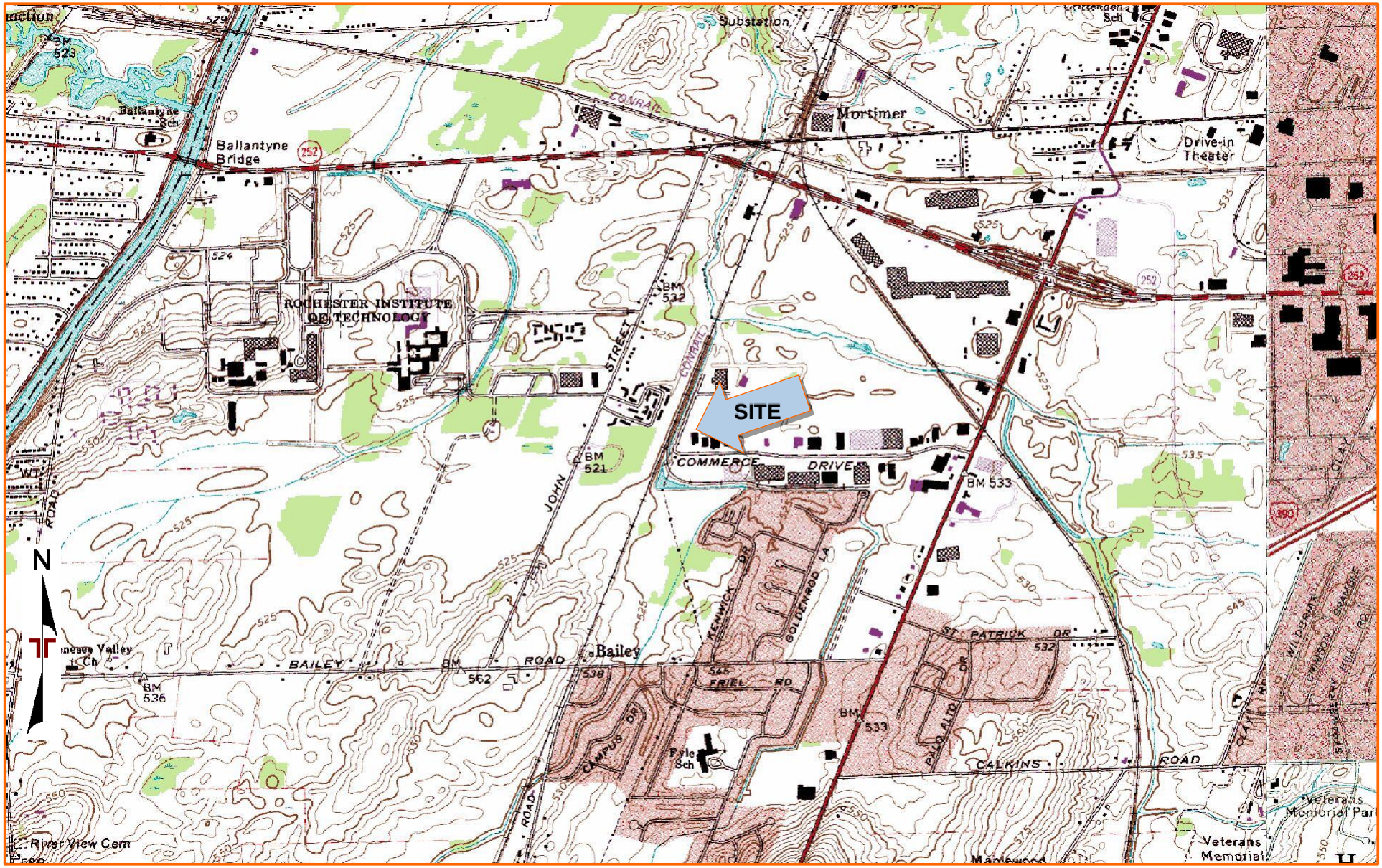
Site □ocation Plan
E□□loration Plan

Note□All attachments are one □a□e unless noted a□o□e□

SITE LOCATION

□ual Phase E□traction Pilot Test ■ □enrietta□NY
Se□tem□er □□□□□□□ ■ Terracon Pro□ect No□BU□□□□□□

Terracon GeoReport



□IAGRAM IS □□R GENERA□ □□CATI□N □N□Y□AN□ IS N□T INTEN□E□ □□R C□NSTRUCTI□N PURP□SES

T□P□GRAP□IC MAP IMAGE C□URTESY □□ T□E U□S□GE□ □□GICA□SUR□EY □UA□RANG□ES INC□U□E□□ EST □ENRIETTA□NY □□□□□□7□□and PITTS□□R□□NY □□□□□□□□□

EXPLORATION PLAN

□ual Phase E□traction Pilot Test ■ □enrietta□NY
Se□tem□er □□□□□□□ ■ Terracon Pro□ect No□BU□□□□□□

□IAGRAM IS □□R GENERA□ □□CATI□N □N□Y□AN□ IS N□T INTEN□E□ □□R C□NSTRUCTI□N PURP□SES

AERIA□P□□T□GRAP□Y PR□□I□E□ BY MICR□S□□T BING MAPS

EXPLORATION RESULTS

Contents:

Note□All attachments are one □a□e unless noted a□o□e□

BORING LOG NO. EX-1

PROJECT: Dual Phase Extraction Pilot Test

CLIENT: Yaro Enterprises Inc
Rochester, NY

SITE: 300 Commerce
Henrietta, NY

DEPTH	LOCATION See Exploration Plan	INSTALLATION DETAILS	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	Recovery (In.)	FIELD TEST RESULTS	PID (PPM)
0.5	**CONCRETE**	Flush Mount					SAWCUT	
3.0	**FILL - SILTY SAND WITH GRAVEL**, brown and red-brown					2	5-6-6-5 N=12	BKG -5
4.5	**FILL - SILTY SAND**, red brown	4" PVC riser Bentonite Seal				0	3-2-2 N=4	
5.0	**SILT (ML)**, trace sand, olive gray		5			19	2-4-5-6 N=9	50-100
10.0	**SILTY CLAY (CL-ML)**, trace sand, occasional silt partings and seams, occasional fine sand lenses, red brown, stiff to very stiff	Filter Sand Pack				20	13-15-17-17 N=32	200-350
						20	2-6-8-8 N=14	300 -11,000
12.0	**SILT (ML)**, trace sand, stiff	4" PVC screen	10			14	5-5-5-6 N=10	40-120
	Boring Terminated at 12 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
6.25 inch ID Hollow Stem Augers and 2 inch OD Split Barrel Sampler

Abandonment Method:
4" PVC groundwater observation well installed at 12' at completion

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

PID readings obtained using a MiniRAE 3000 Photoionization Detector. Readings expressed in parts per million (PPM).
BKG = Background (0-1 PPM)

WATER LEVEL OBSERVATIONS

None encountered prior to installing well

6.3' BGS prior to test on 10/29/20

4.6' BGS after test

Terracon
461 Tonawanda St
Buffalo, NY

Boring Started: 09-22-2020 | Boring Completed: 09-22-2020

Drill Rig: Diedrich D-50 | Driller: J. Tojdowski

Project No.: BU205023

BORING LOG NO. EX-2

PROJECT: Dual Phase Extraction Pilot Test

CLIENT: Yaro Enterprises Inc
Rochester, NY

SITE: 300 Commerce
Henrietta, NY

GRAPHIC LOG	LOCATION See Exploration Plan DEPTH	INSTALLATION DETAILS	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	Recovery (In.)	FIELD TEST RESULTS	PID (PPM)
	0.5 **CONCRETE**	Flush Mount					SAWCUT	
	FILL - CONSTRUCTION FILL, (unsampled)	Bentonite Seal 4" PVC Riser					AUGER	
	4.0 **FILL - SAND WITH GRAVEL**, brown	4" PVC Screen Filter Sand Pack	5			20	3-6-11-16 N=17	200-2000+
	6.0 ***Boring Terminated at 6 Feet***							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
6.25 inch ID Hollow Stem Augers and 2 inch OD Split Barrel Sampler

Abandonment Method:
4" PVC groundwater observation well installed at 6' at completion

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

PID readings obtained using a MiniRAE 3000 Photoionization Detector. Readings expressed in parts per million (PPM).
BKG = Background (0-1 PPM)

WATER LEVEL OBSERVATIONS

None encountered prior to installing well
3.2' BGS prior to test on 10/29/20
1.7' BGS after test

Terracon
461 Tonawanda St
Buffalo, NY

Boring Started: 09-22-2020	Boring Completed: 09-22-2020
Drill Rig: Diedrich D-50	Driller: J. Tojdowski
Project No.: BU205023	

BORING LOG NO. GW-1

PROJECT: Dual Phase Extraction Pilot Test

CLIENT: Yaro Enterprises Inc
Rochester, NY

SITE: 300 Commerce
Henrietta, NY

DEPTH	LOCATION See Exploration Plan	INSTALLATION DETAILS	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	Recovery (In.)	FIELD TEST RESULTS	PID (PPM)
0.5	**CONCRETE**	Flush Mount					SAWCUT	
	UNSAMPLED FILL AND NATIVE SOILS	2" PVC riser Bentonite Seal	5				AUGER	
8.0	**SILTY CLAY (CL-ML)**, red-brown, very stiff	Filter Sand Pack				17	6-6-16-13 N=22	2-10
9.0	**SILT (ML)**, brown, stiff	2" PVC screen	10			18	5-5-6-7 N=11	3-30
12.0	***Boring Terminated at 12 Feet***							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4.25 inch ID Hollow Stem Augers and 2 inch OD Split Barrel Sampler

Abandonment Method:
2" PVC groundwater observation well installed at 12' at completion

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

PID readings obtained using a MiniRAE 3000 Photoionization Detector. Readings expressed in parts per million (PPM).
BKG = Background (0-1 PPM)

WATER LEVEL OBSERVATIONS

None encountered prior to installing well
6.0' BGS prior to test on 10/29/20
5.1' BGS after test

Terracon
461 Tonawanda St
Buffalo, NY

Boring Started: 09-22-2020	Boring Completed: 09-22-2020
Drill Rig: Diedrich D-50	Driller: J. Tojdowski
Project No.: BU205023	

BORING LOG NO. GW-2

PROJECT: Dual Phase Extraction Pilot Test

CLIENT: Yaro Enterprises Inc
Rochester, NY

SITE: 300 Commerce
Henrietta, NY

DEPTH	LOCATION See Exploration Plan	INSTALLATION DETAILS	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	Recovery (In.)	FIELD TEST RESULTS	PID (PPM)
0.5	**CONCRETE**	Flush Mount					SAWCUT	
1.5	**FILL - WELL GRADED SAND WITH SILT AND GRAVEL**, brown	Bentonite Seal				12	10-15-7 N=22	BKG-15
2.5	**FILL - SILTY CLAY WITH SAND**, black	2" PVC Riser						
3.0	**TOPSOIL**, (possible buried native topsoil horizon)					15	2-2-3-4 N=5	BKG-1.4
4.0	**SILT WITH SAND (ML)**, olive brown, medium stiff	2" PVC Screen						
6.0	**SILTY CLAY (CL-ML)**, trace sand, occasional silt partings, very stiff	Filter Sand Pack	5	▼		21	4-6-10-12 N=16	BKG-15
	Boring Terminated at 6 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4.25 inch ID Hollow Stem Augers and 2 inch OD Split Barrel Sampler

Abandonment Method:
2" PVC groundwater observation well installed at 6' at completion

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

PID readings obtained using a MiniRAE 3000 Photoionization Detector. Readings expressed in parts per million (PPM).
BKG = Background (0-1 PPM)

WATER LEVEL OBSERVATIONS

None encountered prior to installing well

▽ *4.8' BGS prior to test on 10/29/20*

▼ *4.8' BGS aftert test*

Terracon
461 Tonawanda St
Buffalo, NY

Boring Started: 09-23-2020	Boring Completed: 09-23-2020
Drill Rig: Diedrich D-50	Driller: J. Tojdowski
Project No.: BU205023	

BORING LOG NO. GW-3

PROJECT: Dual Phase Extraction Pilot Test

CLIENT: Yaro Enterprises Inc
Rochester, NY

SITE: 300 Commerce
Henrietta, NY

DEPTH	LOCATION See Exploration Plan	INSTALLATION DETAILS	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	Recovery (In.)	FIELD TEST RESULTS	PID (PPM)
0.5	**CONCRETE**	Flush Mount					SAWCUT	
	UNSAMPLED FILL AND NATIVE SOILS	2" PVC riser Bentonite Seal	5				AUGER	
8.0	**SILT WITH SAND (ML)**, trace clay, red brown, stiff	Filter Sand Pack				19	6-8-6-9 N=14	5-30
	Contains occasional clay partings and seams	2" PVC screen	10			10	4-5-7-7 N=12	30-50
12.0	***Boring Terminated at 12 Feet***							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4.25 inch ID Hollow Stem Augers and 2 inch OD Split Barrel Sampler

Abandonment Method:
2" PVC groundwater observation well installed at 12' at completion

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

PID readings obtained using a MiniRAE 3000 Photoionization Detector. Readings expressed in parts per million (PPM).
BKG = Background (0-1 PPM)

WATER LEVEL OBSERVATIONS

None encountered prior to installing well
6.0' BGS prior to test on 10/29/20
5.9' BGS after test

Terracon
461 Tonawanda St
Buffalo, NY

Boring Started: 09-23-2020 | Boring Completed: 09-23-2020
Drill Rig: Diedrich D-50 | Driller: J. Tojdowski
Project No.: BU205023

BORING LOG NO. GW-4

PROJECT: Dual Phase Extraction Pilot Test

CLIENT: Yaro Enterprises Inc
Rochester, NY

SITE: 300 Commerce
Henrietta, NY

DEPTH	LOCATION See Exploration Plan	INSTALLATION DETAILS	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	Recovery (In.)	FIELD TEST RESULTS	PID (PPM)
0.5	**CONCRETE**	Flush Mount					SAWCUT	
2.0	**FILL - SILTY SAND WITH GRAVEL**, brown	Bentonite Seal 2" PVC Riser				9	2-4-7 N=11	2-3
4.0	**FILL - SILTY SAND**, brown-black					4	4-4-5-4 N=9	3-10
6.0	**SILTY CLAY (CL-ML)**, trace sand, occasional silt partings, red brown	2" PVC Screen Filter Sand Pack	5	▼		11	5-8-8-11 N=16	50-1000
	Boring Terminated at 6 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4.25 inch ID Hollow Stem Augers and 2 inch OD Split Barrel Sampler

Abandonment Method:
2" PVC groundwater observation well installed at 6' at completion

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

PID readings obtained using a MiniRAE 3000 Photoionization Detector. Readings expressed in parts per million (PPM).
BKG = Background (0-1 PPM)

WATER LEVEL OBSERVATIONS

None encountered prior to installing well

▽ *5.5' BGS prior to test on 10/29/20*

▼ *5.5' BGS after test*

Terracon
461 Tonawanda St
Buffalo, NY

Boring Started: 09-23-2020	Boring Completed: 09-23-2020
Drill Rig: Diedrich D-50	Driller: J. Tojdowski
Project No.: BU205023	

SUPPORTING INFORMATION

Contents:

Note□All attachments are one □a□e unless noted a□o□e□

GENERAL NOTES

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS
Dual Phase Extraction Pilot Test ■ Henrietta, NY
Terracon Project No. BU205023

Terracon GeoReport

SAMPLING	WATER LEVEL	FIELD TESTS
Auger Cuttings Standard Penetration Test	**Water Initially Encountered** **Water Level After a Specified Period of Time** **Water Level After a Specified Period of Time** **Cave In Encountered** Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.	**N** Standard Penetration Test Resistance (Blows/Ft.) **(HP)** Hand Penetrometer **(T)** Torvane **(DCP)** Dynamic Cone Penetrometer **UC** Unconfined Compressive Strength **(PID)** Photo-Ionization Detector **(OVA)** Organic Vapor Analyzer

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification as noted on the soil boring logs is based Unified Soil Classification System. Where sufficient laboratory data exist to classify the soils consistent with ASTM D2487 "Classification of Soils for Engineering Purposes" this procedure is used. ASTM D2488 "Description and Identification of Soils (Visual-Manual Procedure)" is also used to classify the soils, particularly where insufficient laboratory data exist to classify the soils in accordance with ASTM D2487. In addition to USCS classification, coarse grained soils are classified on the basis of their in-place relative density, and fine-grained soils are classified on the basis of their consistency. See "Strength Terms" table below for details. The ASTM standards noted above are for reference to methodology in general. In some cases, variations to methods are applied as a result of local practice or professional judgment.

LOCATION AND ELEVATION NOTES

Exploration point locations as shown on the Exploration Plan and as noted on the soil boring logs in the form of Latitude and Longitude are approximate. See Exploration and Testing Procedures in the report for the methods used to locate the exploration points for this project. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

STRENGTH TERMS

RELATIVE DENSITY OF COARSE-GRAINED SOILS (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance		CONSISTENCY OF FINE-GRAINED SOILS (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance		
Descriptive Term (Density)	**Standard Penetration or N-Value Blows/Ft.**	**Descriptive Term (Consistency)**	**Unconfined Compressive Strength Qu, (tsf)**	**Standard Penetration or N-Value Blows/Ft.**
Very Loose	0 - 3	Very Soft	less than 0.25	0 - 1
Loose	4 - 9	Soft	0.25 to 0.50	2 - 4
Medium Dense	10 - 29	Medium Stiff	0.50 to 1.00	4 - 8
Dense	30 - 50	Stiff	1.00 to 2.00	8 - 15
Very Dense	> 50	Very Stiff	2.00 to 4.00	15 - 30
		Hard	> 4.00	> 30

RELEVANCE OF SOIL BORING LOG

The soil boring logs contained within this document are intended for application to the project as described in this document. Use of these soil boring logs for any other purpose may not be appropriate.

UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]					Soil Classification	
					Group Symbol	Group Name [B]
Coarse-Grained Soils: More than □□□ retained on No□□□□ sie□e	**Gravels:** More than □□□ o□ coarse □raction retained on No□□ sie□e	**Clean Gravels:** □ess than □□ □ines [C]	Cu ≥ □ and □ ≤ Cc ≤ □ [E]		G□	□ ell□□raded □ra□el [F]
			Cu < □ and□or □Cc□□ or Cc□□□□□ [E]		GP	Poorl□ □raded □ra□el [F]
		Gravels with Fines: More than □□□ □ines [C]	□ines classi□□as M□ or M□		GM	Silt□ □ra□el [F, G, H]
			□ines classi□□as C□ or C□		GC	Cla□e□ □ra□el [F, G, H]
	Sands: □□□ or more o□coarse □raction □asses No□□ sie□e	**Clean Sands:** □ess than □□ □ines [D]	Cu ≥ □ and □ ≤ Cc ≤ □ [E]		S□	□ ell□□raded sand [I]
			Cu < □ and□or □Cc□□ or Cc□□□□□ [E]		SP	Poorl□ □raded sand [I]
		Sands with Fines: More than □□□ □ines [D]	□ines classi□□as M□ or M□		SM	Silt□sand [G, H, I]
			□ines classi□□as C□ or C□		SC	Cla□e□sand [G, H, I]
Fine-Grained Soils: □□□ or more □asses the No□□□□ sie□e	**Silts and Clays:** □i□uid limit less than □□	**Inorganic:**	PI > 7 and □lots on or a□o□e □A□		C□	□ean cla□ [K, L, M]
			PI < □ or □lots □elo□ □A□line [J]		M□	Silt [K, L, M]
		Organic:	□i□uid limit □o□en dried	< □7□	□ □	□r□anic cla□ [K, L, M, N]
			□i□uid limit □not dried			□r□anic silt [K, L, M, O]
	Silts and Clays: □i□uid limit □□ or more	**Inorganic:**	PI □lots on or a□o□e □A□line		C□	□at cla□ [K, L, M]
			PI □lots □elo□ □A□line		M□	Elastic Silt [K, L, M]
		Organic:	□i□uid limit □o□en dried	< □7□	□ □	□r□anic cla□ [K, L, M, P]
			□i□uid limit □not dried			□r□anic silt [K, L, M, Q]
Highly organic soils:	Primaril□ or□anic matter□dar□ in color□and or□anic odor				PT	Peat

[A] Based on the material □assin□ the □inch □7□mm□sie□e□

[B] I□□ield sam□le contained co□□les or □oulders□or □oth□add □□ith co□□les or □oulders□or □oth□to □rou□ name□

[C] Gra□els □ith □ to □□□ □ines re□uire dual s□m□ols□ G□ □GM □ell□□raded □ra□el □ith silt□G□ □GC □ell□□raded □ra□el □ith cla□□GP□GM □oorl□ □raded □ra□el □ith silt□GP□GC □oorl□ □raded □ra□el □ith cla□□

[D] Sands □ith □ to □□□ □ines re□uire dual s□m□ols□ S□ □SM □ell□□raded sand □ith silt□S□ □SC □ell□□raded sand □ith cla□□SP□SM □oorl□ □raded sand □ith silt□SP□SC □oorl□ □raded sand □ith cla□□

[E] Cu = $\frac{D_{60}}{D_{10}}$ Cc = $\frac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] I□soil contains ≥ □□□ sand□add □□ith sand□to □rou□ name□

[G] I□□ines classi□□as C□□M□□use dual s□m□ol GC□GM□or SC□SM□

[H] I□□ines are or□anic□add □□ith or□anic □ines□to □rou□ name□

[I] I□soil contains ≥ □□□ □ra□el□add □□ith □ra□el□to □rou□ name□

[J] I□Atter□er□ limits □lot in shaded area□soil is a C□□M□□silt□cla□□

[K] I□soil contains □□ to □□□ □lus No□□□□□add □□ith sand□or □□ith □ra□el□□□hiche□er is □redominant□

[L] I□soil contains ≥ □□□ □lus No□□□□ □redominantl□sand□add □sand□□to □rou□ name□

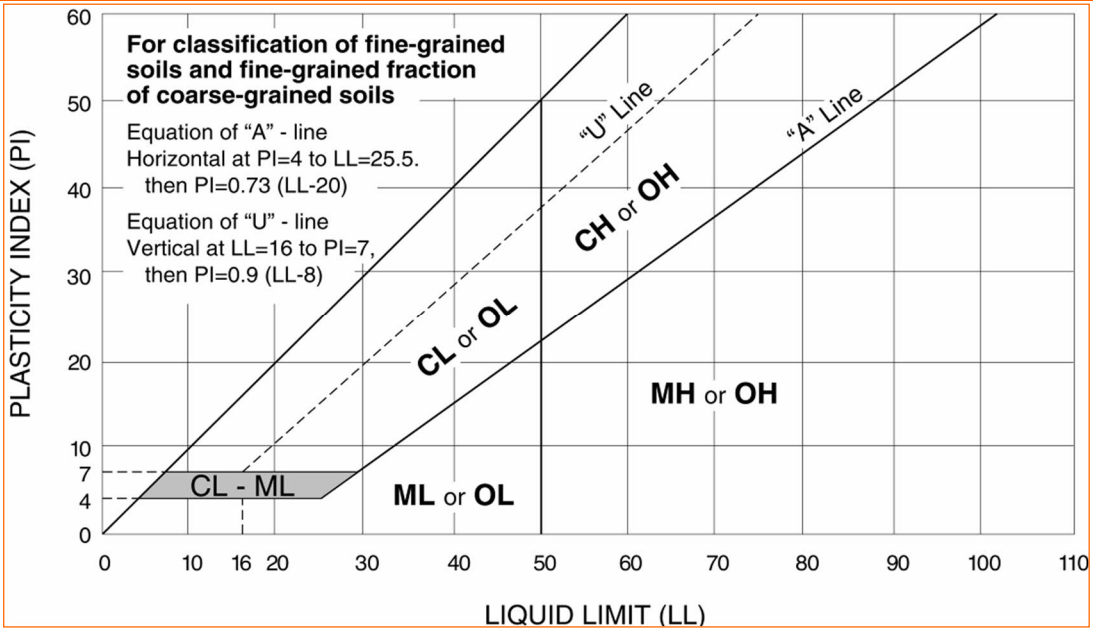
[M] I□soil contains ≥ □□□ □lus No□□□□□□redominantl□ □ra□el□add □□ra□ell□□to □rou□ name□

[N] PI ≥ □ and □lots on or a□o□e □A□line□

[O] PI < □ or □lots □elo□ □A□line□

[P] PI □lots on or a□o□e □A□line□

[Q] PI □lots □elo□ □A□line□



NON-HAZARDOUS WASTE MANIFEST

1. Generator ID Number	2. Page 1 of	3. Emergency Response Phone	4. Waste Tracking Number
N / A	1	800-807-7455	SUN - 10741

GENERATOR

5. Generator's Name and Mailing Address
COMMERCE CRE, LLC
105 McLAUGHLIN ROAD, SUITE A
ROCHESTER NY 14615
Generator's Phone: 585 467-6675
ATT: TONY KIRIK

Generator's Site Address (if different than mailing address)
COMMERCE CRE, LLC
300 COMMERCE DRIVE
ROCHESTER NY 14623

6. Transporter 1 Company Name
SUN ENVIRONMENTAL CORP
U.S. EPA ID Number: NYR000176958

7. Transporter 2 Company Name
U.S. EPA ID Number:

8. Designated Facility Name and Site Address
CHAFFEE LANDFILL
10880 OLEAN ROAD
CHAFFEE NY 14030
Facility's Phone: 716 492-3420
U.S. EPA ID Number: NYD000517458

	9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	
1.	NON RCRA NON DOT REGULATED MATERIAL (SOIL CUTTINGS)	004	DM	02000	P	
2.						
3.						
4.						

13. Special Handling Instructions and Additional Information
a. 123261NY Job #J000131 (Ravi Eng)

14. GENERATOR'S/OFFEROR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.
Generator's/Offeror's Printed/Typed Name: YAROSLAV Kirik
Signature: Yaro
Month 12 Day 9 Year 22

INT'L

15. International Shipments ☐ Import to U.S. ☐ Export from U.S.
Transporter Signature (for exports only):
Port of entry/exit:
Date leaving U.S.:

TRANSPORTER

16. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name: Jeff Grant
Signature:
Month 12 Day 14 Year 22
Transporter 2 Printed/Typed Name:
Signature:
Month Day Year

DESIGNATED FACILITY

17. Discrepancy
17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection
Manifest Reference Number:
17b. Alternate Facility (or Generator)
U.S. EPA ID Number:
Facility's Phone:
17c. Signature of Alternate Facility (or Generator)
Month Day Year

WM Chaffee LF 707760

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a
Printed/Typed Name: K. Baker
Signature: K. Baker
Month 12 Day 16 Year 22

APPENDIX 6

LaBella Well Logs
MW-11, MW-12

Pesticides:

Pesticides were not detected above laboratory MDLs in any of the surface soil samples.

4.2 *Overburden Soil Borings*

The overburden soil evaluation was implemented using direct-push Geoprobe® equipment to advance soil sampling equipment into the shallow overburden. The RI borings were advanced in the following four (4) stages:

Table A: Summary of Overburden Soil Borings

Dates	Number of Soil Borings	Soil Boring IDs	Terminal Depths (bgs)	Number of Monitoring Wells Installed	Monitoring Well IDs
November 5, 2009 through November 13, 2009	15	GP-09-1 through GP-09-15	8-ft to 16-ft*	0	NA
February 16, 2011 through February 17, 2011	12	GP-11-1 through GP-11-12	12-ft to 16-ft	5	GP-11-1/MW-6 GP-11-5/MW-7 GP-11-8/MW-8 GP-11-9/MW-9 GP-11-11/MW-10
October 20, 2012 and October 22, 2012	2	GP-12-16 and GP-12-17	13.1-ft to 15.3-ft	2	GP-12-16/MW-11 GP-12-17/MW-12
September 7, 2017	4	RI-SB/MW-1 through RI-SB/MW-4	19-ft to 34.6-ft	4	RI-SB/MW-1 RI-SB/MW-2 RI-SB/MW-3 RI-SB/MW-4

During all soil boring advancement, a LaBella field representative was on-site to continuously assess soils for evidence of impairment, screen soils with a PID and log soils.

The following laboratory analysis was performed for soil borings during this RI.

- 35 samples for USEPA TCL and NYSDEC CP-51 list VOCs including TICs using USEPA Method 8260;
- 11 samples for USEPA TCL SVOCs including TICs using USEPA method 8270;
- 7 samples for USEPA TAL metals using USEPA Methods 6010/7470;
- 7 samples for Pesticides using USEPA Method 8081;
- 7 samples for PCBs using USEPA Method 8082; and,

One (1) duplicate and one (1) matrix spike/ matrix spike duplicate (MS/MSD) was collected and a field blank was submitted per sample set. Subsurface soil data are summarized on attached Tables 2A through 2E, Figures 4A and 4B and below. Sample locations are depicted on attached Figure 3.

Soil borings were generally advanced to depths between 12-ft and 16-ft bgs, with the exception of the 2017 soil borings. The objective of the 2017 borings (i.e., RI-SB/MW-01 through RI-SB/MW-04)

LABELLA Associates, D.P.C.

300 STATE STREET, ROCHESTER, NY
ENVIRONMENTAL ENGINEERING CONSULTANTS

PROJECT
Interior Well Installation
300 Commerce Drive
Henrietta, NY

BORING: GP-12-16-1
SHEET 1 OF 1
JOB: 208723
CHKD BY:

CONTRACTOR: TREC Environmental
DRILLER: J. Agar
LABELLA REP: SRD
BORING LOCATION: Production Area
GROUND SURFACE ELEVATION: NA
START DATE: 10/22/2012
END DATE: 10/22/2012
TIME: TO
DATUM: NA

TYPE OF DRILL RI(Dolly-mtd. Geoprobe
AUGER SIZE AND TYPE: NA
OVERBURDEN SAMPLING METHOD: Direct Push
DRIVE SAMPLER TYPE: 4-foot Macrocore
INSIDE DIAMETER: ~1.8 Inch
OTHER:

DEPTH	SAMPLE NO. AND DEPTH	SAMPLE RECOVERY	STRATA CHANGE	VISUAL CLASSIFICATION	PID FIELD SCREEN (PPB)	REMARKS
0	S-1 0' to 2'	1.5	0.5	Concrete slab (~10")		
				med. brown Sandy Loam, no odors	0.0	
2	2'-4'	2	2	AA, moist to wet, no odors		
			3.5	grey Silty Clay, moist, no odors	0.0	
4	S-2 4' - 6'	2	4	AA, becoming more brown, moist, no odors	0.0	
6	6'-8'	2	6	brown Silty Clay, moist, no odors	0.0	
8	S-3 8' - 10'	1.5	8	AA, becoming wet, no odors	0.0	
10	10'-12'	1.5	10	brown Silty Clay, wet, no odors	0.0	
12	12'-15.3'	1.5	12	AA, wet, no odors		
14						
				Refusal at 15.3'		
16						
18						

WATER LEVEL DATA			BOTTOM OF BORING	GROUNDWATER ENCOUNTERED
DATE	TIME	ELAPSED TIME		
			15.3 ft. BGS	yes - 10+/- ft. BGS

NOTES:
MW installed to 15.3' with 10' screen

GENERAL NOTES
1) STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY BETWEEN SOIL TYPES, TRANSITIONS MAY BE GRADUAL.
2) WATER LEVEL READINGS HAVE BEEN MADE AT TIMES AND UNDER CONDITIONS STATED, FLUCTUATIONS OF GROUNDWATER
3) Abbreviations
and = 35 to 50 %
some = 20 to 35%
little = 10 to 20%
trace = 1 to 10%
c = coarse
m = medium
f = fine
vf = very fine
BGS = Below the Ground Surface
NA = Not Applicable

BORING: GP-12-16-1

LABELLA Associates, D.P.C.

300 STATE STREET, ROCHESTER, NY
ENVIRONMENTAL ENGINEERING CONSULTANTS

PROJECT
Interior Well Installation
300 Commerce Drive
Henrietta, NY

BORING: GP-12-17
SHEET 1 OF 1
JOB: 208723
CHKD BY:

CONTRACTOR: TREC Environmental
DRILLER: J. Agar
LABELLA REP: SRD
BORING LOCATION: Production Area
GROUND SURFACE ELEVATION: NA
START DATE: 10/20/2012
END DATE: 10/20/2012
TIME: TO
DATUM: NA

TYPE OF DRILL RI(Dolly-mtd. Geoprobe
AUGER SIZE AND TYPE: NA
OVERBURDEN SAMPLING METHOD: Direct Push
DRIVE SAMPLER TYPE: 4-foot Macrocore
INSIDE DIAMETER: ~1.8 Inch
OTHER:

DEPTH	SAMPLE NO. AND DEPTH	SAMPLE RECOVERY	STRATA CHANGE	VISUAL CLASSIFICATION	PID FIELD SCREEN (PPB)	REMARKS
0	S-1 0' to 2'	1.5	0.5	Concrete slab (~10")		
			1	med. brown Sandy Loam, reddish subconcrete rock, damp, no odors brown, mf Sand, little Silt, damp, no odors	72.0	
2	2'-4'	2	2	AA, damp to wet, no odors		
			3.5	grey/brown Clay and Silt, wet, no odors	10.0	
4	S-2 4' - 6'	2	4	AA, becoming more brown, moist, no odors	127.0	
6	6'-8'	2	6	brown Silty Clay, moist, no odors	101.0	
8	S-3 8' - 10'	1.5	8	AA, becoming wet, no odors	27.0	
10	10'-13.1'	1.5	10	brown Silty Clay, less dense, wet, no odors	20.0	
12				Refusal at 13.1'		
14						
16						
18						

WATER LEVEL DATA			BOTTOM OF BORING	GROUNDWATER ENCOUNTERED
DATE	TIME	ELAPSED TIME		
			13.1 ft. BGS	yes - 10+/- ft. BGS

NOTES:
MW installed to 13.1' with 10' screen

GENERAL NOTES
1) STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY BETWEEN SOIL TYPES, TRANSITIONS MAY BE GRADUAL.
2) WATER LEVEL READINGS HAVE BEEN MADE AT TIMES AND UNDER CONDITIONS STATED, FLUCTUATIONS OF GROUNDWATER
3) Abbreviations
and = 35 to 50 %
some = 20 to 35%
little = 10 to 20%
trace = 1 to 10%
c = coarse
m = medium
f = fine
vf = very fine
BGS = Below the Ground Surface
NA = Not Applicable

BORING: GP-12-17