RECORD OF DECISION

Emerson Street Dump
State Superfund Project
Rochester, Monroe County
Site No. 828023
March 2020

Prepared by
Division of Environmental Remediation
New York State Department of Environmental Conservation

DECLARATION STATEMENT - RECORD OF DECISION

Emerson Street Dump
State Superfund Project
Rochester, Monroe County
Site No. 828023
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Statement of Purpose and Basis

This document presents the remedy for the Emerson Street Dump site, a Class 2 inactive hazardous waste disposal site. The remedial program was chosen in accordance with the New York State Environmental Conservation Law and Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York (6 NYCRR) Part 375, and is not inconsistent with the National Oil and Hazardous Substances Pollution Contingency Plan of March 8, 1990 (40CFR300), as amended.

This decision is based on the Administrative Record of the New York State Department of Environmental Conservation (the Department) for the Emerson Street Dump site and the public's input to the proposed remedy presented by the Department. A listing of the documents included as a part of the Administrative Record is included in Appendix B of the ROD.

Description of Selected Remedy

The elements of the selected remedy are as follows:

1. Remedial Design

A remedial design program will be implemented to provide the details necessary for the construction, operation, optimization, maintenance, and monitoring of the remedial program. Green remediation principles and techniques will be implemented to the extent feasible in the design, implementation, and site management of the remedy as per DER-31. The major green remediation components are as follows;

- Considering the environmental impacts of treatment technologies and remedy stewardship over the long term;
- Reducing direct and indirect greenhouse gases and other emissions;
- Increasing energy efficiency and minimizing use of non-renewable energy;
- Conserving and efficiently managing resources and materials;
- Reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste;
- Maximizing habitat value and creating habitat when possible;
- Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals; and

- Integrating the remedy with the end use where possible and encouraging green and sustainable re-development.

2. Site Cover

A site cover will be required to allow for commercial or industrial use of the site in areas where the upper one foot of exposed surface soil will exceed the applicable soil cleanup objectives (SCOs). Where a soil cover is to be used it will be a minimum of one foot of soil placed over a demarcation layer, with the upper six inches of soil of sufficient quality to maintain a vegetative layer. Soil cover material, including any fill material brought to the site, will meet the SCOs for cover material for the use of the site as set forth in 6 NYCRR Part 375-6.7(d). Substitution of other materials and components may be allowed where such components already exist or are a component of the tangible property to be placed as part of site redevelopment. Such components may include, but are not necessarily limited to: pavement, concrete, paved surface parking areas, sidewalks, building foundations and building slabs.

3. Vapor Mitigation

Any on-site building will be required to have a sub-slab depressurization, or other acceptable measures, to mitigate the migration of vapors into the building from groundwater.

4. Zero-Valent Iron (ZVI) Permeable Reactive Barrier (PRB)

Zero Valent Iron (ZVI) will be added to a fracture enhanced bedrock trench perpendicular to groundwater flow to destroy VOC contaminants migrating off-site. The enhanced fracture zone will be approximately 375 linear feet long located downgradient of the CVOC source area within upper bedrock. The exact method for bedrock fracturing and the length of the enhanced fractured bedrock zone will be finalized during the remedial design

5. Monitored Natural Attenuation

Groundwater contamination downgradient of the PRB will be addressed with monitored natural attenuation (MNA). Groundwater will be monitored for site related contamination and also for MNA indicators which will provide an understanding of the (biological activity) breaking down the contamination. It is anticipated that contaminant plume will decrease in size and no longer be migrating off-site. Reports of the attenuation will be provided at regular intervals and active remediation will be proposed if it appears that natural processes alone will not address the contamination. The contingency remedial action will depend on the information collected, but it is currently anticipated that expansion of the PRB would be the expected contingency remedial action.

6. Institutional Control

Imposition of an institutional control in the form of an environmental easement for the controlled property 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 commercial 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.

7. Site Management Plan

A Site Management Plan is required, which includes the following:

a. an Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the site and details the steps and media-specific requirements necessary to ensure the following institutional and/or engineering controls remain in place and effective:

Institutional Controls: The environmental easement as discussed in paragraph 5 above.

Engineering Controls: The groundwater treatment system discussed in 3 above and the site cover, paragraph 2 above.

This plan includes, but may not be limited to:
- an Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination;
- descriptions of the provisions of the environmental easement including any land use, and/or groundwater use restrictions;
- provisions for the management and inspection of the identified engineering controls;
- maintaining site access controls and Department notification; and
- the steps necessary for the periodic reviews and certification of the institutional and/or engineering controls;

b. A Monitoring Plan to assess the performance and effectiveness of the remedy. The plan includes, but may not be limited to:
   - monitoring of groundwater to assess the performance and effectiveness of the remedy; and
   - a schedule of monitoring and frequency of submittals to the Department.

c. An Operation and Maintenance (O&M) Plan to ensure continued operation, maintenance, optimization, monitoring, inspection, and reporting of any mechanical or physical components of the remedy. The plan includes, but is not limited to:
   - Procedures for operating and maintaining the remedy;
   - compliance monitoring of treatment systems to ensure proper O&M as well as providing the data for any necessary permit or permit equivalent reporting;
   - maintaining site access controls and Department notification; and
   - providing the Department access to the site and O&M records.

New York State Department of Health Acceptance

The New York State Department of Health (NYSDOH) concurs that the remedy for this site is protective of human health.

Declaration

The selected remedy is protective of human health and the environment, complies with State and Federal requirements that are legally applicable or relevant and appropriate to the remedial action to the extent practicable, and is cost effective. This remedy utilizes permanent solutions and alternative treatment or resource recovery technologies, to the maximum extent practicable, and satisfies the preference for remedies that reduce toxicity, mobility, or volume as a principal element.

March 30, 2020
Date

Michael J. Ryan, P.E., Director
Division of Environmental Remediation

RECORD OF DECISION

Emerson Street Dump
Rochester, Monroe County
Site No. 828023
March 2020

SECTION 1: SUMMARY AND PURPOSE

The New York State Department of Environmental Conservation (the Department), in consultation with the New York State Department of Health (NYSDOH), has selected a remedy for the above referenced site. The disposal of hazardous wastes at the site has resulted in threats to public health and the environment that would be addressed by the remedy. The disposal or release of hazardous wastes at this site, as more fully described in this document, has contaminated various environmental media. Contaminants include hazardous waste and/or petroleum.

The New York State Inactive Hazardous Waste Disposal Site Remedial Program (also known as the State Superfund Program) is an enforcement program, the mission of which is to identify and characterize suspected inactive hazardous waste disposal sites and to investigate and remediate those sites found to pose a significant threat to public health and environment.

The Department has issued this document in accordance with the requirements of New York State Environmental Conservation Law and 6 NYCRR Part 375. This document is a summary of the information that can be found in the site-related reports and documents.

SECTION 2: CITIZEN PARTICIPATION

The Department seeks input from the community on all remedies. A public comment period was held, during which the public was encouraged to submit comment on the proposed remedy. All comments on the remedy received during the comment period were considered by the Department in selecting a remedy for the site. Site-related reports and documents were made available for review by the public at the following document repository:

DECInfo Locator - Web Application
https://gisservices.dec.ny.gov/gis/dil/index.html?rs=828023

A public meeting was also conducted. At the meeting, the findings of the remedial investigation (RI) and the feasibility study (FS) were presented along with a summary of the proposed remedy. After the presentation, a question-and-answer period was held, during which verbal or written comments were accepted on the proposed remedy.

Comments on the remedy received during the comment period are summarized and addressed in the responsiveness summary section of the ROD.

Receive Site Citizen Participation Information By Email

Please note that the Department's Division of Environmental Remediation (DER) is "going paperless" relative to citizen participation information. The ultimate goal is to distribute citizen participation information about contaminated sites electronically by way of county email listservs. Information will be distributed for all sites that are being investigated and cleaned up in a particular county under the State Superfund Program, Environmental Restoration Program, Brownfield Cleanup Program and Resource Conservation and Recovery Act Program. We encourage the public to sign up for one or more county listservs at http://www.dec.ny.gov/chemical/61092.html

SECTION 3: SITE DESCRIPTION AND HISTORY

Location:
This former landfill is located at the western edge of the City of Rochester and is bounded by Emerson Street, Lexington Avenue, Lee Road, and McCracken Street.

Site Features:
The size of the former landfill is approximately 250 acres. However, the area designated as an inactive hazardous waste disposal (i.e., Superfund) site is limited to an area 15.7 acres in size in the western portion of the landfill footprint. There is as much as 30 feet of landfill refuse on the Superfund site. The average amount of refuse on the remaining, now-developed portions of the former landfill is 8 to 10 feet. These areas are filled primarily with incinerated refuse (ash). There is a solar array located immediately to the north. Also, adjacent landfill properties are heavily developed. Some structures are built over refuse while others excavated refuse before building construction.

Current Uses/Zoning:
The majority of the site is undeveloped. The site consists of two parcels 1700 and 1740 Emerson Street and it is zoned M-1 which allows for various commercial and industrial development. The off-site remaining portion of the landfill property is developed and contains commercial and industrial developments. A technical high school is located at the northeast corner of the former landfill. There is no landfill refuse beneath the school building; however, refuse remains beneath the athletic fields west of the school.

Past Use of the Site:
This former 250-acre inactive landfill was owned and operated by the City of Rochester from the early 1940s until 1970. After its purchase by the New York State Urban Development Corporation in 1970, the site was developed into an industrial/commercial park by the New York State Urban Development Corporation.

Several independent investigations and interim remediation measures (IRMs) have been conducted by the City of Rochester over the past 30 years. Several small removal actions were conducted during the 1990s including removal and off-site disposal of lead and thorium containing waste, a drum removal, and soil removal. These actions led to the current 15.7- acre definition of the site.

A generic soil management plan is in place for the entire landfill (including the non-Superfund portions), and it is managed by the City of Rochester under their building permit management system. Prior to any site development, a site-specific soil management plan needs to be developed for Department approval. The site-specific management plans include provisions for air monitoring, soil and water sampling, vapor mitigation, and waste/fill management.

Site Geology and Hydrogeology:
Groundwater is predominantly in bedrock. The overburden consists mainly of landfill refuse. Groundwater flow is generally to the south towards the NYS Barge Canal. Localized groundwater flow is influenced by the area sewer system and other buried utilities. Bedrock beneath the site is either Lockport dolomite or Rochester shale.

A site location map is attached as Figure 1.

SECTION 4: LAND USE AND PHYSICAL SETTING

The Department may consider the current, intended, and reasonably anticipated future land use of the site and its surroundings when evaluating a remedy for soil remediation. For this site, alternatives that restrict the use of the site to commercial use (which allows for industrial use) as described in Part 375-1.8(g) were evaluated in addition to an alternative which would allow for unrestricted use of the site.

A comparison of the results of the RI to the appropriate standards, criteria and guidance values (SCGs) for the identified land use and the unrestricted use SCGs for the site contaminants is included in the Tables for the media being evaluated in Exhibit A.

SECTION 5: ENFORCEMENT STATUS

Potentially Responsible Parties (PRPs) are those who may be legally liable for contamination at a site. This may include past or present owners and operators, waste generators, and haulers.

PRPs for the site, documented to date, include:
The City of Rochester

The Department and the City of Rochester entered into a Consent Order on August 27, 2009. The Order obligates the responsible party to implement a full remedial program.

SECTION 6: SITE CONTAMINATION

6.1: Summary of the Remedial Investigation

A Remedial Investigation (RI) has been conducted. The purpose of the RI was to define the nature and extent of any contamination resulting from previous activities at the site. The field activities and findings of the investigation are described in the RI Report.

The following general activities are conducted during an RI:

- Research of historical information,
- Geophysical survey to determine the lateral extent of wastes,
- Test pits, soil borings, and monitoring well installations,
- Sampling of waste, surface and subsurface soils, groundwater, and soil vapor,
- Sampling of surface water and sediment,
- Ecological and Human Health Exposure Assessments.

The analytical data collected on this site includes data for:

- groundwater
- soil
- soil vapor
- indoor air
- sub-slab vapor

6.1.1: <u>Standards, Criteria, and Guidance (SCGs)</u>

The remedy must conform to promulgated standards and criteria that are directly applicable or that are relevant and appropriate. The selection of a remedy must also take into consideration guidance, as appropriate. Standards, Criteria and Guidance are hereafter called SCGs.

To determine whether the contaminants identified in various media are present at levels of concern, the data from the RI were compared to media-specific SCGs. The Department has developed SCGs for groundwater, surface water, sediments, and soil. The NYSDOH has developed SCGs for drinking water and soil vapor intrusion. The tables found in Exhibit A list the applicable SCGs in the footnotes. For a full listing of all SCGs see: http://www.dec.ny.gov/regulations/61794.html

6.1.2: <u>RI Results</u>

The data have identified contaminants of concern. A "contaminant of concern" is a hazardous waste that is sufficiently present in frequency and concentration in the environment to require evaluation for remedial action. Not all contaminants identified on the property are contaminants of concern. The nature and extent of contamination and environmental media requiring action are summarized in Exhibit A. Additionally, the RI Report contains a full discussion of the data. The contaminant(s) of concern identified at this site is/are:

trichloroethene (TCE)
tetrachloroethene (PCE)
cis-1,2-dichloroethene
vinyl chloride
toluene
xylene (mixed)
1,1,1-trichloroethane
1,1 dichloroethene
1,1,2-TCA
1,1-dichloroethane
1,1,2-trichloro-1,2,2-triflouroethane
benzene, toluene, ethylbenzene and xylenes (BTEX)

As illustrated in Exhibit A, the contaminant(s) of concern exceed the applicable SCGs for:

- groundwater
- soil
- soil vapor intrusion

6.2: <u>Interim Remedial Measures</u>

An interim remedial measure (IRM) is conducted at a site when a source of contamination or exposure pathway can be effectively addressed before issuance of the Record of Decision.

The following IRM(s) has/have been completed at this site based on conditions observed during the RI.

<u>Vapor Mitigation</u>

From 2009-2011, an initial soil vapor intrusion (SVI) assessment including building inventory and field screening of indoor air was conducted at 40 of the 41 buildings overlying the former landfill site. The results of the screening were presented in a report prioritizing properties for additional investigations. Seven properties were identified for additional soil vapor intrusion assessment including indoor air and sub-slab sampling. The results of the additional studies identified two properties that required mitigation. Installation of sub-slab depressurization systems at one on-site building and one off-site building was completed in 2018. Both systems are operational and continue to be maintained. The limits of soil vapor intrusion were identified, and no further actions are required at the remaining properties

6.3: <u>Summary of Environmental Assessment</u>

This section summarizes the assessment of existing and potential future environmental impacts presented by the site. Environmental impacts may include existing and potential future exposure pathways to fish and wildlife receptors, wetlands, groundwater resources, and surface water.

Based upon the resources and pathways identified and the toxicity of the contaminants of ecological concern at this site, a Fish and Wildlife Resources Impact Analysis (FWRIA) was deemed not necessary for OU 01.

Nature and Extent of Contamination:

Soil: The upper 1 to 2 feet of soil consists of imported fill and top soil over 25 to 30 feet of landfill refuse. A thin, discontinuous layer of native sand/silt which is typically overlain by a layer of peat is present in some locations on top of bedrock and ranges from a few inches to a maximum observed thickness of 4.3-feet.

The current soil cover generally meets commercial soil cleanup objectives (SCOs); however, there are some minor exceedances for polycyclic aromatic hydrocarbons (PAHs). Native soils below the landfill refuse are contaminated with benzene, ethylbenzene, toluene, and xylene compounds (BTEX) and chlorinated volatile organic compounds (CVOCs). SCOs for protection of groundwater are exceeded for all of these volatile organic compounds (VOCs).

Groundwater:
Groundwater is generally within the upper bedrock zone, and the bulk of contamination is identified within the upper 3 feet of bedrock. CVOCs are the predominant contaminants in groundwater exceeding the NYS groundwater standards. A plume within the central portion of the site is migrating off-site to the south. Within the source area trichloroethene concentrations are as high as 33,600 parts per billion (ppb), tetrachloroethene concentrations are as high as 7,500 ppb, and cis-1,2-dichlorethene concentrations are as high as 38,000 ppb.

Soil Vapor:
A soil vapor intrusion (SVI) investigation of the site was completed in 2018. Initially, a survey of 45 properties on the entire landfill site was completed. Seven properties were identified for further investigations, and the results indicated that two properties required mitigation for site-related VOCs and/or landfill gases (methane). The mitigation systems were installed on these two properties in 2018 and they are currently operational and effective. Indoor air investigations have indicated there are no impacts to the high school. No further SVI investigations are required.

6.4: <u>Summary of Human Exposure Pathways</u>

This human exposure assessment identifies ways in which people may be exposed to site-related contaminants. Chemicals can enter the body through three major pathways (breathing, touching or swallowing). This is referred to as *exposure.*

People are not expected to come into contact with contaminated soil or groundwater unless they dig below the surface. People are not drinking the contaminated groundwater because the area is served by a public water supply that is not affected by this contamination. Volatile organic compounds in soil vapor (air spaces within soil) may move into future overlying buildings and affect indoor air quality. The process, which is similar to the movement of radon gas from the subsurface into the indoor air of buildings, is referred to as soil vapor intrusion. Currently, there is no on-site building. However, the potential exists for the inhalation of site contaminants due to soil vapor intrusion for any future on-site development. A sub-slab depressurization system (a system ventilates/removes the air beneath a building) was installed in two off-site buildings to address exposure associated with soil vapor intrusion. No additional actions are needed to address soil vapor intrusion off-site.

6.5: Summary of the Remediation Objectives

The objectives for the remedial program have been established through the remedy selection process stated in 6 NYCRR Part 375. The goal for the remedial program is to restore the site to pre-disposal conditions to the extent feasible. At a minimum, the remedy shall eliminate or mitigate all significant threats to public health and the environment presented by the contamination identified at the site through the proper application of scientific and engineering principles.

The remedial action objectives for this site are:

Groundwater

RAOs for Public Health Protection

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

RAOs for Environmental Protection

- Restore ground water aquifer to pre-disposal/pre-release conditions, to the extent practicable.

Soil

RAOs for Public Health Protection

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

RAOs for Environmental Protection

- Prevent migration of contaminants that would result in groundwater or surface water contamination.

Soil Vapor

RAOs for Public Health Protection

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

SECTION 7: SUMMARY OF THE SELECTED REMEDY

To be selected the remedy must be protective of human health and the environment, be cost-effective, comply with other statutory requirements, and utilize permanent solutions, alternative technologies or resource recovery technologies to the maximum extent practicable. The remedy must also attain the remedial action objectives identified for the site, which are presented in Section 6.5. Potential remedial alternatives for the Site were identified, screened and evaluated in the feasibility study (FS) report.

A summary of the remedial alternatives that were considered for this site is presented in Exhibit B. Cost information is presented in the form of present worth, which represents the amount of money invested in the current year that would be sufficient to cover all present and future costs associated with the alternative. This enables the costs of remedial alternatives to be compared on a common basis. As a convention, a time frame of 30 years is used to evaluate present worth costs for alternatives with an indefinite duration. This does not imply that operation, maintenance, or monitoring would cease after 30 years if remediation goals are not achieved. A summary of the Remedial Alternatives Costs is included as Exhibit C.

The basis for the Department's remedy is set forth at Exhibit D.

The selected remedy is referred to as the Permeable Reactive Barrier with MNA remedy.

The estimated present worth cost to implement the remedy is $3,100,000. The cost to construct the remedy is estimated to be $1,550,000 and the estimated average annual cost is $12,000.

The elements of the selected remedy are as follows:

1. Remedial Design

A remedial design program will be implemented to provide the details necessary for the construction, operation, optimization, maintenance, and monitoring of the remedial program. Green remediation principles and techniques will be implemented to the extent feasible in the design, implementation, and site management of the remedy as per DER-31. The major green remediation components are as follows;

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

2. Site Cover

A site cover will be required to allow for commercial or industrial use of the site in areas where the upper one foot of exposed surface soil will exceed the applicable soil cleanup objectives (SCOs). Where a soil cover is to be used it will be a minimum of one foot of soil placed over a demarcation layer, with the upper six inches of soil of sufficient quality to maintain a vegetative layer. Soil cover material, including any fill material brought to the site, will meet the SCOs for cover material for the use of the site as set forth in 6 NYCRR Part 375-6.7(d). Substitution of other materials and components may be allowed where such components already exist or are a component of the tangible property to be placed as part of site redevelopment. Such components may include, but are not necessarily limited to: pavement, concrete, paved surface parking areas, sidewalks, building foundations and building slabs.

3. Vapor Mitigation
Any on-site building will be required to have a sub-slab depressurization, or other acceptable measures, to mitigate the migration of vapors into the building from groundwater.

4. Zero-Valent Iron (ZVI) Permeable Reactive Barrier (PRB)
Zero Valent Iron (ZVI) will be added to a fracture enhanced bedrock trench perpendicular to groundwater flow to destroy VOC contaminants migrating off-site. The enhanced fracture zone will be approximately 375 linear feet long located downgradient of the CVOC source area within upper bedrock. The exact method for bedrock fracturing and the length of the enhanced fractured bedrock zone will be finalized during the remedial design

5. Monitored Natural Attenuation
Groundwater contamination downgradient of the PRB will be addressed with monitored natural attenuation (MNA). Groundwater will be monitored for site related contamination and also for MNA indicators which will provide an understanding of the (biological activity) breaking down the contamination. It is anticipated that contaminant plume will decrease in size and no longer be migrating off-site. Reports of the attenuation will be provided at regular intervals and active remediation will be proposed if it appears that natural processes alone will not address the contamination. The contingency remedial action will depend on the information collected, but it is currently anticipated that expansion of the PRB would be the expected contingency remedial action.

6. Institutional Control
Imposition of an institutional control in the form of an environmental easement for the controlled property 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 commercial 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.

7. Site Management Plan
A Site Management Plan is required, which includes the following:

a. an Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the site and details the steps and media-specific requirements necessary to ensure the following institutional and/or engineering controls remain in place and effective:

Institutional Controls: The environmental easement as discussed in paragraph 5 above.

Engineering Controls: The groundwater treatment system discussed in 3 above and the site cover, paragraph 2 above.

This plan includes, but may not be limited to:

- an Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination;
- descriptions of the provisions of the environmental easement including any land use, and/or groundwater use restrictions;
- provisions for the management and inspection of the identified engineering controls;
- maintaining site access controls and Department notification; and
- the steps necessary for the periodic reviews and certification of the institutional and/or engineering controls;

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

- monitoring of groundwater to assess the performance and effectiveness of the remedy; and
- a schedule of monitoring and frequency of submittals to the Department.

c. An Operation and Maintenance (O&M) Plan to ensure continued operation, maintenance, optimization, monitoring, inspection, and reporting of any mechanical or physical components of the remedy. The plan includes, but is not limited to:

- Procedures for operating and maintaining the remedy;
- compliance monitoring of treatment systems to ensure proper O&M as well as providing the data for any necessary permit or permit equivalent reporting;
- maintaining site access controls and Department notification; and
- providing the Department access to the site and O&M records.

Exhibit A

Nature and Extent of Contamination

This section describes the findings of the Remedial Investigation for all environmental media that were evaluated. As described in Section 6.1, samples were collected from various environmental media to characterize the nature and extent of contamination.

For each medium for which contamination was identified, a table summarizes the findings of the investigation. The tables present the range of contamination found at the site in the media and compares the data with the applicable SCGs for the site. The contaminants are arranged into three categories; volatile organic compounds (VOCs), polyfluoroalkyl substances (PFAS), and inorganics (metals and cyanide). For comparison purposes, the SCGs are provided for each medium that allows for unrestricted use. For soil, if applicable, the Restricted Use SCGs identified in Section 4 and Section 6.1.1 are also presented.

Waste/Source Areas

As described in the RI report, waste/source materials were identified at the site and are impacting groundwater, subsurface soil and soil vapor.

Wastes are defined in 6 NYCRR Part 375-1.2 (aw) and include solid, industrial and/or hazardous wastes. Source areas are defined in 6 NYCRR Part 375 (au). Source areas are areas of concern at a site were substantial quantities of contaminants are found which can migrate and release significant levels of contaminants to another environmental medium. Wastes and source areas were identified at the site include, landfill refuse.

The remedial investigation focused on that portion of the former landfill that is listed on the State's Registry of inactive hazardous waste disposal sites (i.e.. the site). Municipal landfill refuse, industrial wastes, and ash from the City of Rochester incinerators are the bulk of wastes deposited within the listed portion of the landfill. Large portions of the site were filled during the 1970's, the last years of the landfill's operational life. During this period, the incinerator was no longer operating properly, resulting in un-incinerated putrescible waste being deposited in the landfill. These portions of the landfill are characterized by thicker fill, higher percentage of potentially putrescible solid waste and less incinerated ash, and higher landfill gas flux at the surface relative to other areas of the entire landfill. These areas are characterized by landfill gas methane concentrations above 5,000 ppm.

A total of 28 test pits were excavated on-site through the cover into the landfill material. Test pit soils generally consisted of a loamy topsoil cover approximately 1 to 2 feet in thickness, with un-incinerated waste directly below the cover to approximately 8 to 9-ft below ground surface (bgs), and black ash from 8 to 9-ft bgs to terminal depths (i.e., up to 14-ft bgs). A total of 33 waste/soil/fill samples were analyzed for volatile organic compounds (VOCs). Sample results did not identify an apparent source area within the fill material of the chlorinated volatile organic compounds (CVOCs) found in groundwater. Petroleum odors and sheen were noted throughout the test pits and automotive waste consisting of small drums, tires, oil filters, car parts, etc. were encountered at several locations. Sample analyses indicated benzene, toluene, ethylbenzene, and xylene (BTEX) as the predominant contaminants in the waste/fill. Other petroleum-related compounds such as naphthalene, n-propylbenzene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, and n-butylbenzene were also detected above protection of groundwater SCOs, but to a lesser extent.

A source area of CVOCs was identified in bedrock within the central portion of the site near well P-1 (P-1 Area). During the remedial investigations 48 bedrock core samples were analyzed at 18 different locations. These data when combined with sample results of soil/fill and groundwater identified that approximately 88% of the CVOC contaminant mass is within the bedrock matrix, and the bulk of contaminants are within the upper 3 feet of bedrock. These solvents are the primary contaminants on-site impacting groundwater and soil vapor. Please refer to Figure 4 showing the location and cross-section of the source area. Please refer to Table 1 for a detailed breakdown of CVOC mass by various zones. The waste/source areas identified will be addressed in the remedy selection process.

Table 1 – Geologic Zones and CVOC Mass

Zone	Description	Depth (feet below top of rock)	Calculated Percent CVOC Contaminant Mass[a]
Overburden/Fill	Topsoil un-incinerator landfill refuse, and ash. Some native soil and peat encountered at top of bedrock		11.78%
A	Highly fractured and weathered top of bedrock.	0-3	62.62%
Upper B	Spans the bedrock thickness between zone A and zone B. Does not exhibit laterally extensive fracturing	3-8	24.94%
B	First laterally extensive high transmissivity fracture zone.	8-16	
C	Second laterally extensive fracture system exhibits more continuous sections of competent rock	16-25	< 0.1 %
D	Significantly less fractures. Within Rochester shale at depths greater than 25 feet	>25	< 0.1 %

a - Calculations based upon soil and bedrock core sample results presented in the RI.

Groundwater

Groundwater was evaluated using 6 overburden wells and 16 shallow bedrock and 2 deep bedrock wells. Shallow bedrock was identified as a highly fractured weathered zone where the bulk of contamination is located. Groundwater flows generally to the south with season changes as influenced by the local sewer system. Please refer to Figure 3 for shallow bedrock groundwater flow.

The main contaminants of concern in groundwater are CVOCs. Figures 2 and 4 depict the extent of the plume in shallow bedrock and provide a cross section showing the depth of the plume and extent of bedrock contamination. BTEX compounds were also detected above groundwater standards and are generally located within the CVOC plume. Breakdown products such as vinyl chloride and cis-1,2-dichloroethene are generally present at greater concentrations in downgradient bedrock wells of the P-1 Area. Less than 1% of the CVOC contaminants mass is within the groundwater matrix.

Metals were detected above groundwater standards. Metals such as iron, sodium, manganese, and magnesium are commonly occurring ions in groundwater and are also common landfill-related contaminants. Due to the presence of ash within the fill, there are elevated levels of arsenic, lead, and selenium exceeding groundwater standards.

Perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS) were reported at concentrations of up to 440 and 170 parts per trillion (ppt), respectively, exceeding the 10 ppt screening levels for groundwater for each. Several other perfluorinated compounds were detected above 100 ppt screening level. The total concentration of PFAS, including PFOA and PFOS, were reported at concentrations of up to 521 ppt, above the 500 ppt screening level for total PFAS in groundwater.

1,4-dioxane was reported at concentrations of up to 2,200 parts per billion (ppb), exceeding the screening level of 1 ppb in groundwater.

Table #2 – Groundwater Monitoring Results

Detected Constituents	Concentration Range Detected (ppb)[a]	SCG[b] (ppb)	Frequency Exceeding SCG
VOCs			
Chlorobenzene	0.23 to 200	5	59/184
cis-1,2-Dichloroethene	0.3 to 38,000	5	134/193
1,1-Dichloroethene	1.0 to 200	5	77/188
1,1-Dichloroethane	0.52 to 2,200	5	125/193
1,2-Dichloroethane	1.0 to 200	0.6	184/184
1,1,1-Trichloroethane	1.0 to 4,220	5	111/191
1,1,2-Trichloroethane	0.36 to 200	1	111/184
1,1,2-Trichlorotrifluoroethane (Freon 113)	0.35 to 7,000	5	110/191
trans-1,2-Dichloroethene	1 to 200	5	72/187
Tetrachloroethene	0.24 to 7,500	5	88/190
Trichloroethene	0.27 to 33,600	5	102/192
Vinyl Chloride	0.34 to 4,600	2	128/194
1,4-dioxane	ND to 2,200	1	12/111

Detected Constituents	Concentration Range Detected (ppb)[a]	SCG[b] (ppb)	Frequency Exceeding SCG
Benzene	0.33 to 706	1	186/192
Toluene	0.21 to 20,100	5	117/190
Ethylbenzene	0.24 to 1,500	5	69/188
Total Xylenes	1.6 to 620	5	45/188
Metals			
Arsenic	0.175 to 20	3	1 of 16
Lead	0.123 to 249	25	2 of 16
Selenium	0.95 to 25	10	8 of 16
PFAS	Concentration Range Detected (ppt)	Proposed SCG (ppt)	Frequency Exceeding Proposed SCG
PFOA	72 - 440	10	4/4
PFOS	13-170	10	4/4

a - ppb: parts per billion, which is equivalent to micrograms per liter, ug/L, in water.
b- SCG: Standard Criteria or Guidance - Ambient Water Quality Standards and Guidance Values (TOGs 1.1.1), 6 NYCRR Part 703, Surface water and Groundwater Quality Standards, and Part 5 of the New York State Sanitary Code (10 NYCRR Part 5).

CVOCs are the primary contaminant impacting groundwater and they are migrating off-site within the shallow bedrock water bearing zone. Perfluorinated compounds (PFAS) were also detected above screening levels site wide. Due to the nature of the landfill material, a specific source of could not be identified and PFAS are most likely present throughout the landfill. Metals impacting groundwater are generally minor in extent and there is not a distinct source area within the landfill; therefore, metals are not considered as site specific contaminants of concern.

Based on the findings of the RI, the past disposal of hazardous waste has resulted in the contamination of groundwater. The site contaminants that are considered to be the primary contaminants of concern which will drive the remediation of groundwater to be addressed by the remedy selection process are: VOCs. Additionally, because PFAS were detected above screening values, a monitoring component for PFAS will be considered during the remedy selection process.

Soil

The overburden on-site consists of waste/fill generally placed directly on top of bedrock during landfill operations. A thin, discontinuous layer of native sand/silt which is typically overlain by a layer of peat is present in some locations on top of bedrock and ranges from a few inches to a maximum observed thickness of 4.3feet.

A cover of approximately two feet of loam is present across the site. Depth to bedrock ranges between approximately 23 and 27feet.

A total of 60 soil samples were collected during soil boring advancement, including soil samples collected during installation of monitoring wells during this RI. In addition, 21 membrane interface probe (MIP) borings were advanced in the P-1 Area. A large portion of the VOCs detected in overburden soil/fill material are BTEX compounds that were detected in several soil samples at elevated concentrations exceeding Protection of Groundwater SCOs. The highest total BTEX concentration was 3,040 parts per million (ppm). CVOCs were also detected in several soil samples at concentrations exceeding Protection of Groundwater SCOs. The highest concentration of CVOCs was 766 ppm in soils that were generally encountered near the top of bedrock. Figure 5 depicts CVOCs in soil at depths greater than 20 feet bgs.

The upper one to two feet of surface soil is generally imported soil and topsoil that meets the commercial SCOs. Large quantities of soil meeting the commercial SCOs have been stockpiled on-site in anticipation of final cover placement. It is anticipated that at least two feet of cover will placed over the entire site.

Table #3 – Soil

Detected Constituents	Concentration Range Detected (ppm)[a]	Restricted Commercial SCO (ppm)[c]	Groudwater Protection SCG[d] (ppm)	Frequency Exceeding Groundwater Protection SCG
VOCs				
cis-1,2,dichlorethene	ND to 214.7	500	0.25	12/60
trans-1,2,dichloroethene	ND to 15.5	500	0.19	5/60
1,1-dichloroethane	ND to 52.8	240	0.27	10/60
1,4-dioxane	ND to 1.8	130	0.1	5/60
Methylene Chloride	ND to 54.4	500	0.05	5/60
1,1,1-trichloroethene	ND to 26.3	500	0.68	3/60
Tetrachloroethene	ND to 233.8	150	1.3	3/60
Trichloroethene	ND to 293	200	0.47	6/60
Vinyl chloride	ND to 14.1	13	0.02	6/60
Benzene	ND to 2.5	44	0.06	18/60
Toluene	ND to 1,882	500	0.7	19/60

Detected Constituents	Concentration Range Detected (ppm)[a]	Restricted Commercial SCO (ppm)[c]	Groudwater Protection SCG[d] (ppm)	Frequency Exceeding Groundwater Protection SCG
Ethylbenzene	ND to 217	390	1	21/60
Total Xylenes	ND to 960	500	1.6 (0.26)[b]	25/60

a - ppm: parts per million, which is equivalent to milligrams per kilogram, mg/kg, in soil;
b - SCG: Part 375-6.8(a), Unrestricted Soil Cleanup Objectives.
c - SCG: Part 375-6.8(b), Restricted Use Soil Cleanup Objectives for the Protection of Public Health for Commercial Use, unless otherwise noted.
d - SCG: Part 375-6.8(b), Restricted Use Soil Cleanup Objectives for the Protection of Groundwater.

Contaminated soils are approximately 20 feet bgs or greater. The primary soil contaminants are CVOCs and BTEX compounds. As discussed in the Waste/Fill section, the bedrock matrix is impacted by CVOCs. Both have impacted groundwater and a VOC plume is migrating south from this source area. Based upon the remedial investigation data, the estimated area of the source is 16,000 square feet.

Based on the findings of the Remedial Investigation, the past disposal of hazardous waste has resulted in the contamination of soil. The site contaminants identified in soil which are considered to be the primary contaminants of concern, to be addressed by the remedy selection process are, CVOCs and BTEX compounds.

Soil Vapor

The evaluation of the potential for soil vapor intrusion resulting from the presence of site related soil or groundwater contamination was evaluated by the sampling of soil vapor, sub-slab soil vapor under structures, and indoor air inside structures. At this site no buildings were present in impacted areas, however, due landfill gas generation (methane) both soil vapor and adjacent structures were sampled for VOCs and methane.

Based upon SVI results, two adjacent properties were mitigated with sub-slab depressurization systems. The building at 575 Colfax Street had both VOC and methane impacts to indoor air. The structure at 1740 Emerson Street is closest to the P-1 area plume and had levels of TCE requiring continued monitoring. A sub-slab system was installed in lieu of continued monitoring. During the remedial investigation, soil vapor samples were obtained at five additional adjacent properties surrounding the P-1 Area and analyzed for site-related VOCs. Soil vapor samples were taken at one of the five adjacent properties and SVI studies (indoor air and sub-slab sampling) were conducted at structures on the four other properties. Of these five properties investigated, no further actions were required. Please refer to Figure 6 which depicts the properties investigated during the RI.

Based on the concentration detected, and in comparison with the NYSDOH Soil Vapor Intrusion Guidance, soil vapor contamination identified during the RI was addressed during the IRM described in Section 6.2.

Exhibit B

<u>Description of Remedial Alternatives</u>

The following alternatives were considered based on the remedial action objectives (see Section 6.5) to address the contaminated media identified at the site as described in Exhibit A.

Alternative 1: No Further Action

The No Further Action Alternative recognizes the remediation of the site completed by the IRM(s) described in Section 6.2. This alternative leaves the site in its present condition and does not provide any additional protection of the environment.

Alternative #2: Excavation and Off-site disposal of Source Area to Unrestricted SCOs

This alternative would include, excavation of the overburden, landfill refuse, and the top several feet of bedrock within the source area. An approximate 100,000 square feet (ft^2) area would be excavated to remove impacts above the Unrestricted Use SCOs. Material would be excavated bedrock (beginning at approximately 23 to 25 feet bgs and up to 5 feet of bedrock would be excavated. An estimated 100,000 cubic yards (CY) (approximately 185,000 tons) of material would be disposed of off-site based on hazardous waste characterization sampling. It is assumed that the soil/fill 2 feet above the top of bedrock, and the top 3 feet of bedrock would be characterized as hazardous waste (35,000 tons). It is assumed the remaining material would be characterized as non-hazardous waste (150,000 tons). Excavations would be dewatered and water would be stored temporarily in tanks prior to sampling, treatment, and discharge to the sanitary sewer via a permit through Monroe County Pure Waters. An amendment would be placed in the backfill to promote further biodegradation. Imported backfill would consist of crushed recycled concrete/ crushed stone/ and or other material that meets Unrestricted Use SCOs. It should be noted that although this alternative would meet Unrestricted Use SCOs within the excavation area, the areas outside the site excavation would still contain landfill materials (ash, cinders and some unincinerated putrescible waste); as such, institutional and engineering controls would still be necessary. Long-term groundwater monitoring for VOCs and PFAS would be implemented to monitor the effectiveness of the remedy. Additionally, establishment of a site cover, a site management plan, and an environmental easement would be included in this remedy.

Present Worth: *$24,700,000*
Capital Cost: *$24,500,000*
Annual Costs: .... *$22,800(year 1-2), $12,900(year 3-5), $7,950(year 6-30)*

Alternative #3: Monitored Natural Attenuation

Groundwater contamination would be addressed with monitored natural attenuation (MNA). Groundwater would be monitored for site-related contamination (VOCs), and also for MNA indicators which would provide an understanding of the (biological activity) breaking down the contamination. Reports of the attenuation would be provided at regular intervals, and active remediation would be proposed if it appears that natural processes alone will not address the contamination. Up to four additional bedrock monitoring wells would be installed. Long-term groundwater monitoring for VOCs and PFAS would be implemented to monitor the effectiveness of the remedy. Additionally, establishment of a site cover, a site management plan, and an environmental easement would be included in this remedy.

Present Worth: *$1,500,000*
Capital Cost: *$1,040,000*
Annual Costs: .... *$38,300(year 1-5), $20,650(year 6-10), $11,825(year 11-30)*

Alternative #4: Electrical Resistance Heating

This alternative would consist of installing a series of electrodes through the overburden/ fill and into bedrock and heating the wells to the boiling point of the water to vaporize CVOCs. Vapor recovery wells would be installed to collect vapors that would be treated in an on-Site treatment system using activated carbon or other treatment methods. An approximate 23,000 ft^2 area would be treated which includes the inferred source area and additional wells surrounding the source area to minimize back diffusion following treatment. Electrodes would extend through the overburden to approximately 15 feet below the top of bedrock. Temperature would be continuously monitored and mass reduction would be determined throughout the treatment period to determine when treatment goals have been met. Necessary utilities including sewer and electric would be brought to the Site. Long-term groundwater monitoring for VOCs and PFAS would be implemented to monitor the effectiveness of the remedy. Additionally, establishment of a site cover, a site management plan, and an environmental easement would be included in this remedy.

Present Worth: *$5,790,000*
Capital Cost: *$5,580,000*
Annual Costs: .... *$22,800(year 1-2), $12,900(year 3-5), $7,950(year 6-30)*

Alternative #5: Groundwater Extraction and Ex-Situ Treatment

Under this alternative, groundwater extraction and treatment would be implemented to treat VOCs in groundwater, and to ensure contaminated groundwater does not migrate off-site. The groundwater extraction system would be designed and installed so that the capture zone is sufficient to maintain hydraulic containment of the plume. The extraction system would create a depression of the water table so that contaminated groundwater is directed toward the extraction wells within the plume area. Groundwater would be extracted from the subsurface using up to six pumping wells installed to a depth of ten feet below the top of bedrock. A treatment system building would be constructed, and the necessary utilities would be installed at the site (e.g., electric, sewer, communication, etc). Further details of the extraction and treatment system would be determined during the remedial design. Long-term groundwater monitoring for VOCs and PFAS would be implemented to monitor the effectiveness of the remedy. Additionally, establishment of a site cover, a site management plan, and an environmental easement would be included in this remedy.

Present Worth: *$4,430,000*
Capital Cost: *$2,930,000*
Annual Costs: .... *$95,700(year 1-5), $69,900(year 6-30)*

Alternative #6: Ins-Situ Injection with Permeable Reactive Barrier

This alternative would include, injection of a reducing agent such as zero-valent iron (ZVI) into the overburden and top of bedrock within the source area to destroy the VOC contaminants in groundwater. In addition, ZVI would be added to a fracture enhanced bedrock trench perpendicular to groundwater flow to destroy VOC contaminants migrating off-site. The enhanced fracture zone would be approximately 375 linear feet long located downgradient of the CVOC source area within upper bedrock. The exact method for bedrock fracturing and the length of the enhanced fractured bedrock zone would be finalized during the remedial design. For costing purposes, a blast fractured trench and a pneumatic fractured trench were examined and ZVI replenishment is assumed at years 10, 20, and 30. Long-term groundwater monitoring for VOCs and PFAS would be implemented to monitor the effectiveness of the remedy. Additionally, establishment of a site cover, a site management plan, and an environmental easement would be included in this remedy.

Present Worth:..*$6,680,000 to $8,390,000*
Capital Cost:..*$4,880,000 to $5,430,000*
Annual Costs:...*$38,300(year 1-2), $20,650(year 3-5), $5,648(year 6-30)*

Alternative #7: Permeable Reactive Barrier with Monitored Natural Attenuation

This alternative would include the addition of ZVI to a fracture enhanced bedrock trench perpendicular to groundwater flow to destroy VOC contaminants migrating off-site. The enhanced fracture zone would be approximately 375 linear feet long located downgradient of the CVOC source area within upper bedrock. The exact method for bedrock fracturing and the length of the enhanced fractured bedrock zone will be finalized during the remedial design. For costing purposes, blast fractured trench and pneumatic fractured trench were examined and ZVI replenishment is assumed at years 10, 20, and 30. Groundwater contamination downgradient of the PRB would be addressed with monitored natural attenuation Long-term groundwater monitoring for VOCs, PFAS, and MNA parameters would be implemented to monitor the effectiveness of the remedy. Additionally, establishment of a site cover, a site management plan, and an environmental easement would be included in this remedy.

Present Worth:..*$3,310,000 to $3,700,000*
Capital Cost:..*$1,550,000 to $1,780,000*
Annual Costs:...*$38,300(year 1), $20,650(year 2-3), $11,825(year 4-30)*

Exhibit C

Remedial Alternative Costs

Remedial Alternative	Capital Cost ($)	Annual Costs ($)	Total Present Worth ($)
#1 No Further Action	0	0	0
#2 Excavation and Off-site disposal (Excavation)	$24,500,000	*$22,800(year 1-2)* *$12,900(year 3-5)* *$7,950(year 6-30)*	$24,700,000
#3 Monitored Natural Attenuation (MNA)	$1,040,000	*$38,300(year 1-5)* *$20,650(year 6-10)* *$11,825(year 11-30)*	$1,500,000
#4 Electrical Resistance Heating (ERH)	$5,580,000	*$22,800(year1-2)* *$12,900(year3-5)* *$7,950(year 6-30)*	$5,790,000
#5 Groundwater Extraction and Ex-Situ Treatment (P&T)	$2,930,000	*$95,700(year 1-5)* *$69,900(year 6-30)*	$4,430,000
#6 In-situ Injection with Permeable Reactive Barrier (Injection/PRB)	$4,880,000[a] to $5,430,000[b]	*$38,300(year 1-2)* *$20,650(year 3-5)* *$5,648(year 6-30)*	$6,680,000[a] to $8,390,000[b]
#7 Permeable Reactive Barrier with Monitored Natural Attenuation (PRB/MNA)	$1,550,000[a] to $1,780,000[b]	*$38,300(year 1)* *$20,650(year 2-3)* *$11,825(year 4-30)*	$3,310,000[a] to $3,700,000[b]

a-blasted fracture zone and
b-pneumatic fracture zone

Exhibit D

SUMMARY OF THE SELECTED REMEDY

The Department has selected Alternative #7, zero-valent iron permeable reactive barrier and MNA as the remedy for this site. Alternative #7 would achieve the remediation goals for the site by preventing off-site migration of groundwater contamination, providing a site cover, and long-term monitoring and maintenance. The elements of this remedy are described in Section 7. The selected remedy is depicted in Figure 7.

Basis for Selection

The selected remedy is based on the results of the RI and the evaluation of alternatives. The criteria to which potential remedial alternatives are compared are defined in 6 NYCRR Part 375. A detailed discussion of the evaluation criteria and comparative analysis is included in the FS report.

The first two evaluation criteria are termed "threshold criteria" and must be satisfied in order for an alternative to be considered for selection.

1. Protection of Human Health and the Environment. This criterion is an overall evaluation of each alternative's ability to protect public health and the environment.

The selected remedy Alternative #7 would satisfy this criterion by preventing contaminated groundwater from migrating off-site and mitigating any exposure via direct contact to site contaminants. Alternative #1 does not provide any protection to public health and the environment and will not be evaluated further. While on-site studies have indicated that contaminants are undergoing biological degradation, Alternative #3 does not address the groundwater source area, nor prevent groundwater from migrating off-site; therefore, Alternative #3 does not meet this criterion and will not be further considered. A site cover and an environmental easement are components of all remedial alternatives except Alternative #1, and mitigate exposure via direct contact. All other alternatives either address the groundwater source area and/or prevent off-site groundwater migration. There are currently no exposures to contamination in groundwater because the area is served by a public water supply. Continued groundwater monitoring addresses the potential for any threats to public health or the environment.

2. Compliance with New York State Standards, Criteria, and Guidance (SCGs). Compliance with SCGs addresses whether a remedy will meet environmental laws, regulations, and other standards and criteria. In addition, this criterion includes the consideration of guidance which the Department has determined to be applicable on a case-specific basis.

Alternative 2 complies with SCGs because it completely removes the source area of groundwater contamination Alternatives 4 complies with SCGs to a lesser extent because some residual contamination will remain. Alternatives 5, 6, and 7 meet SCGs; however, they do not aggressively address the source of groundwater contamination. Since approximately 88% of the CVOC contaminant mass is within the bedrock matrix, injections as presented in Alternative 6 would have transient effects as contaminant would continue to diffuse out of the rock matrix causing significant rebound. Alternative 5, 6 and 7 would contain the groundwater plume on-site.

The next six "primary balancing criteria" are used to compare the positive and negative aspects of each of the remedial strategies.

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

Long-term effectiveness is best accomplished by those alternatives involving excavation of the source or aggressive source area treatment as in Alternatives 2 and 4. Alternative 2 completely removes the source area and a large volume of contaminated groundwater. Alternative 4, aggressively treats the source area and will permanently reduce the contaminant concentrations in the groundwater plume. Alternative 6 would treat groundwater in the source area, but not have enough contact with the contaminants in the bedrock matrix to have long term impacts. Contaminant concentrations will rebound due to diffusion from the rock matrix. Alternatives 5, 6 and 7 would contain the groundwater plume. Alternatives 5 and 7 would have greater long-term impacts because contaminants would be destroyed in the PRB. The on-site pilot studies confirmed that ZVI effectively treated the groundwater contaminants. Alternative 6 would most likely not reduce groundwater contaminant concentrations due to the persistent source in bedrock.

4. Reduction of Toxicity, Mobility or Volume. Preference is given to alternatives that permanently and significantly reduce the toxicity, mobility or volume of the wastes at the site.

Alternatives 2 and 4 will significantly reduce the volume of contamination and lower the toxicity by decreasing or eliminating contaminant concentrations in groundwater. Residual contamination will not have reduced mobility. Alternatives 6 and 7 will reduce the volume and mobility of contaminants with the ZVI/PRB. Contaminant concentration may slowly decline over time. On-site pilot studies indicated that ZVI effectively treated the groundwater contaminants. Alternative 5 will reduce the mobility of contaminants in groundwater by providing hydraulic containment, but not significantly reduce the toxicity or volume.

5. Short-term Impacts and Effectiveness. The potential short-term adverse impacts of the remedial action upon the community, the workers, and the environment during the construction and/or implementation are evaluated. The length of time needed to achieve the remedial objectives is also estimated and compared against the other alternatives.

Alternative 2 will have significant short-term impacts to the area and require significant engineering controls to mitigate exposure to contaminants on adjacent properties. It is estimated that over 10,000 truckloads of material would need to be hauled off-site. Impacts to carbon footprint and traffic would be significant. Alternatives 6 and 7 have the least short-term impacts. During on-site pilot studies, both blasted and pneumatic fracturing methods had minimal short-term impacts. No utilities or permanent buildings would be required. Alternative 4 would require installation of electrodes, placement of site cover, construction of temporary treatment building and utility corridor (electric, water, sewer). Alternative 5 would require installation of additional wells, placement of a site cover, construction of a permanent treatment building, and construction of a utility corridor.

6. Implementability. The technical and administrative feasibility of implementing each alternative are evaluated. Technical feasibility includes the difficulties associated with the construction of the remedy and the ability to monitor its effectiveness. For administrative feasibility, the availability of the necessary personnel and materials is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, institutional controls, and so forth.

Alternative 2 will be the most difficult to implement due the scale and magnitude of the excavation. Alternative 4 will be moderately difficult to implement due to the large electrical energy requirements to operate the ERH system. Alternatives 5 will also be difficult to implement because permanent infrastructure associated with the treatment building and long-term operation of the treatment system will need to be constructed. Alternatives 6 and 7 will be the easiest to implement because no utilities or permanent infrastructure are required to be constructed. Pilot studies were conducted on-site using blasted and pneumatic fracturing technologies. Both technologies were easy to implement and effectively treated groundwater contamination.

7. Cost-Effectiveness. Capital costs and annual operation, maintenance, and monitoring costs are estimated for each alternative and compared on a present worth basis. Although cost-effectiveness is the last balancing criterion evaluated, where two or more alternatives have met the requirements of the other criteria, it can be used as the basis for the final decision.

Costs for the alternatives range from $3.3 million to $24.7 million. Alternative 2 is the most costly remedy due to the scale and magnitude of the cleanup. Even though Alternative 2 removes the source, it is cost prohibitive, difficult to implement, has a high carbon footprint, and there are many short-term impacts. Alternative 7 has the lowest overall and capital costs and results in the most economical environmental benefit. While Alternative 6 adds injections of ZVI within the source area, little additional environmental benefit would be gained for the extra $4 million in capital cos due to the nature of contaminants bound within the bedrock matrix. Capital costs associated with Alternative 4 are cost prohibitive. Long-term costs associated with Alternative 5 are also cost prohibitive.

8. Land Use. When cleanup to pre-disposal conditions is determined to be infeasible, the Department may consider the current, intended, and reasonable anticipated future land use of the site and its surroundings in the selection of the soil remedy.

Even though Alternatives 2 and 4 significantly reduce or eliminate the source of contamination, the site is within a municipal landfill with limited options for redevelopment. The anticipated use is commercial or industrial, including the potential expansion of the adjacent solar array upon completion of the selected remedy. Alternatives 6 and 7 both prevent off-site migration of groundwater, provide a site cover, and will have minimal impacts on the proposed development. Alternative 5 will require a permanent treatment building that would interfere with expansion of the adjacent solar array.

The final criterion, Community Acceptance, is considered a "modifying criterion" and is taken into account after evaluating those above. It is evaluated after public comments on the Proposed Remedial Action Plan have been received.

9. Community Acceptance. Concerns of the community regarding the investigation, the evaluation of alternatives, and the PRAP are evaluated. A responsiveness summary was prepared that describes public comments received and the manner in which the Department will address the concerns raised. If the selected remedy differs significantly from the proposed remedy, notices to the public will be issued describing the differences and reasons for the changes

Alternative #7 was selected because, as described above, it satisfies the threshold criteria and provides the best balance of the balancing criterion.

NYSDEC - December 2019
Monroe County 2018 Orthoimagery

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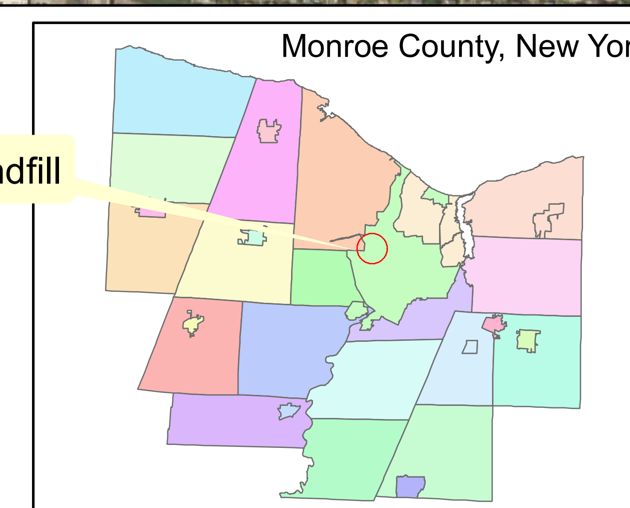
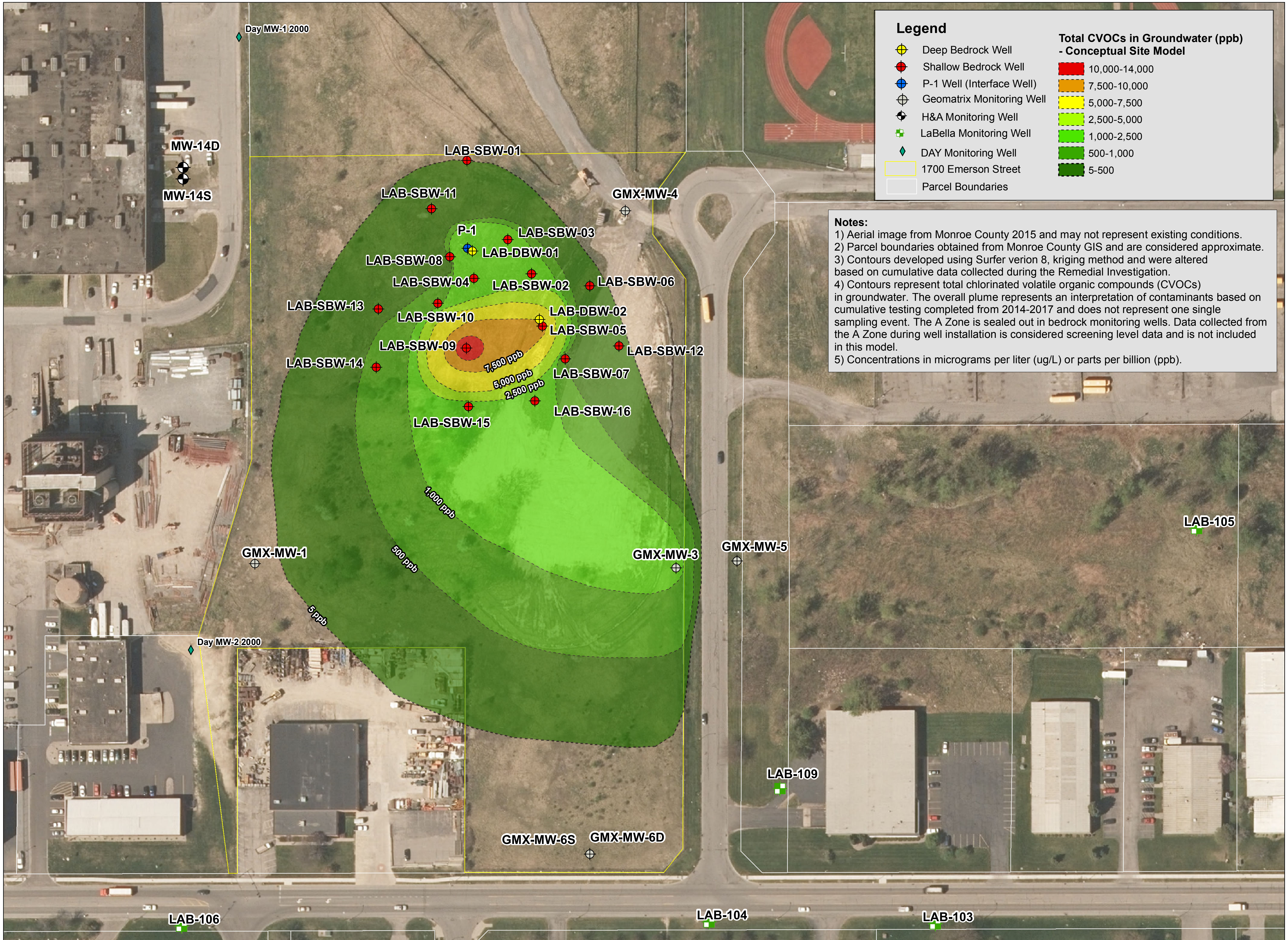
0 250 500 1,000 1,500 2,000
Feet

Legend

- Approximate Fill Limits
- Former Landfill Site
- Emerson Street Site

Figure 1
Former Emerson Street Landfill Site
828023





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REMEDIAL INVESTIGATION REPORT
P-1 PLUME AREA
FORMER EMERSON STREET LANDFILL
NYSDEC SITE #828023

CITY OF ROCHESTER

P-1 PLUME
CONCEPTUAL SITE MODEL

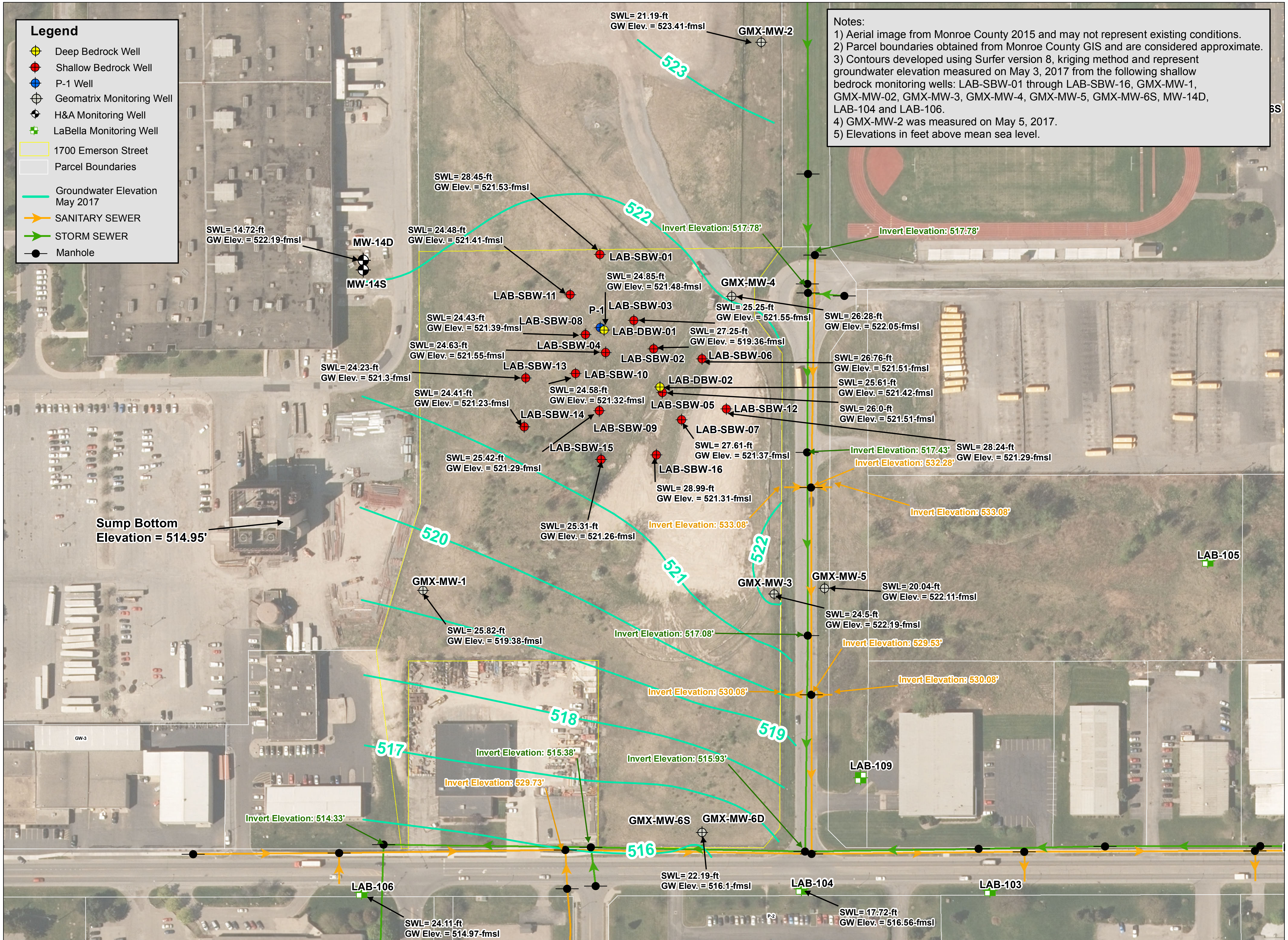
1 inch = 125 feet

Intended to print on 11x17

210173

FIGURE 2

Path: \\Projects2\Projects\NZ-2\Rochester, City\210173 FESL\Drawings\P-1 RI Report\Figure 8- Overall P1 Plume.mxd



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REMEDIAL INVESTIGATION REPORT
P-1 PLUME AREA
FORMER EMERSON STREET LANDFILL
NYSDEC SITE #828023

CITY OF ROCHESTER

SHALLOW BEDROCK GROUNDWATER ELEVATION CONTOURS

MAY 2017

N
W E
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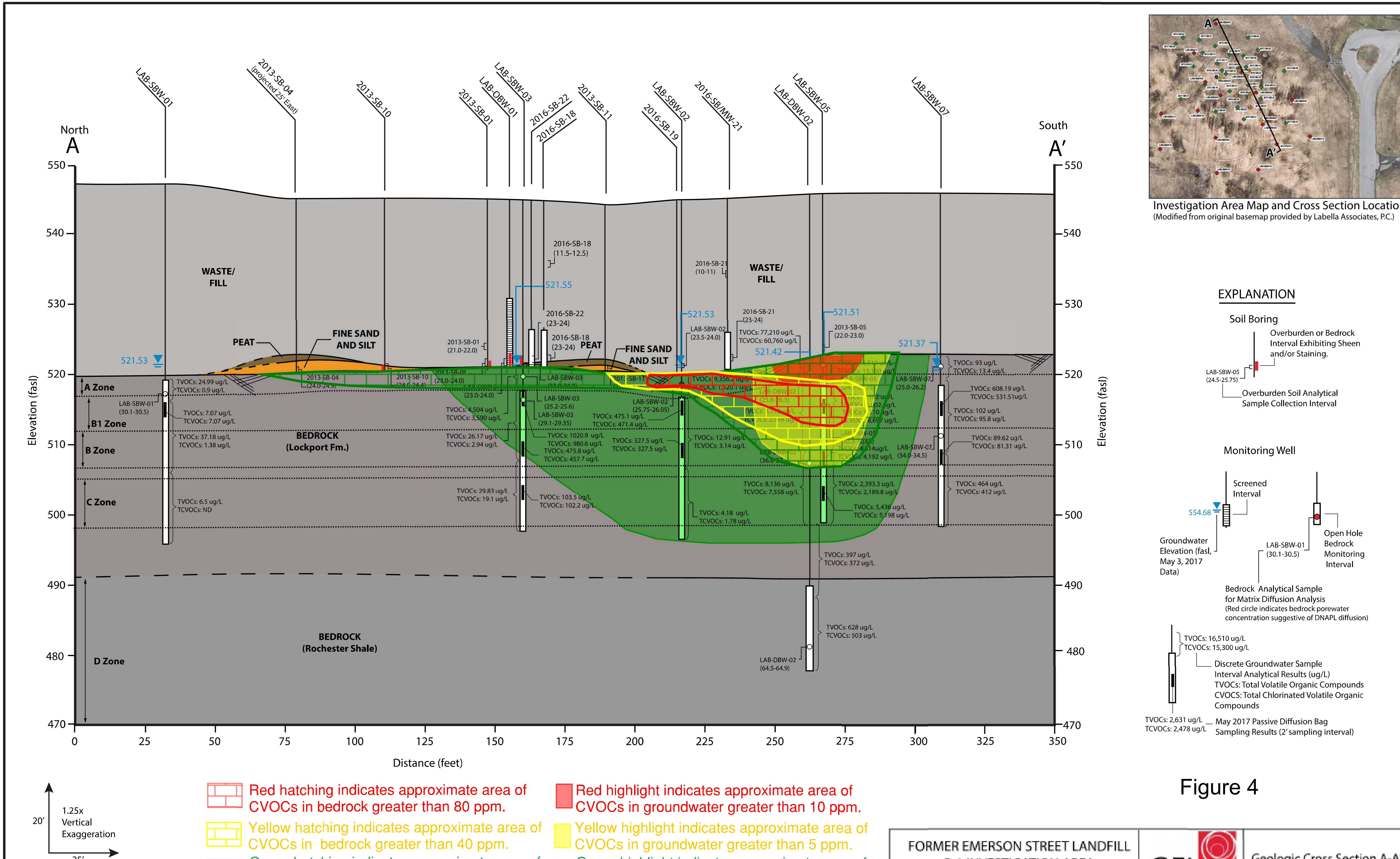
0 150
Feet
1 inch = 150 feet
Intended to print on 11x17

210173

FIGURE 3

Path: \\Projects2\ProjectsNZ-2\Rochester, City\210173 FESL\Drawings\P-1 RI Report\Figure 11A- GW Elevations May 2017.mxd



Red hatching indicates approximate area of CVOCs in bedrock greater than 80 ppm.

Yellow hatching indicates approximate area of CVOCs in bedrock greater than 40 ppm.

Green hatching indicates approximate area of CVOCs in bedrock greater than 1 ppm.

Red highlight indicates approximate area of CVOCs in groundwater greater than 10 ppm.

Yellow highlight indicates approximate area of CVOCs in groundwater greater than 5 ppm.

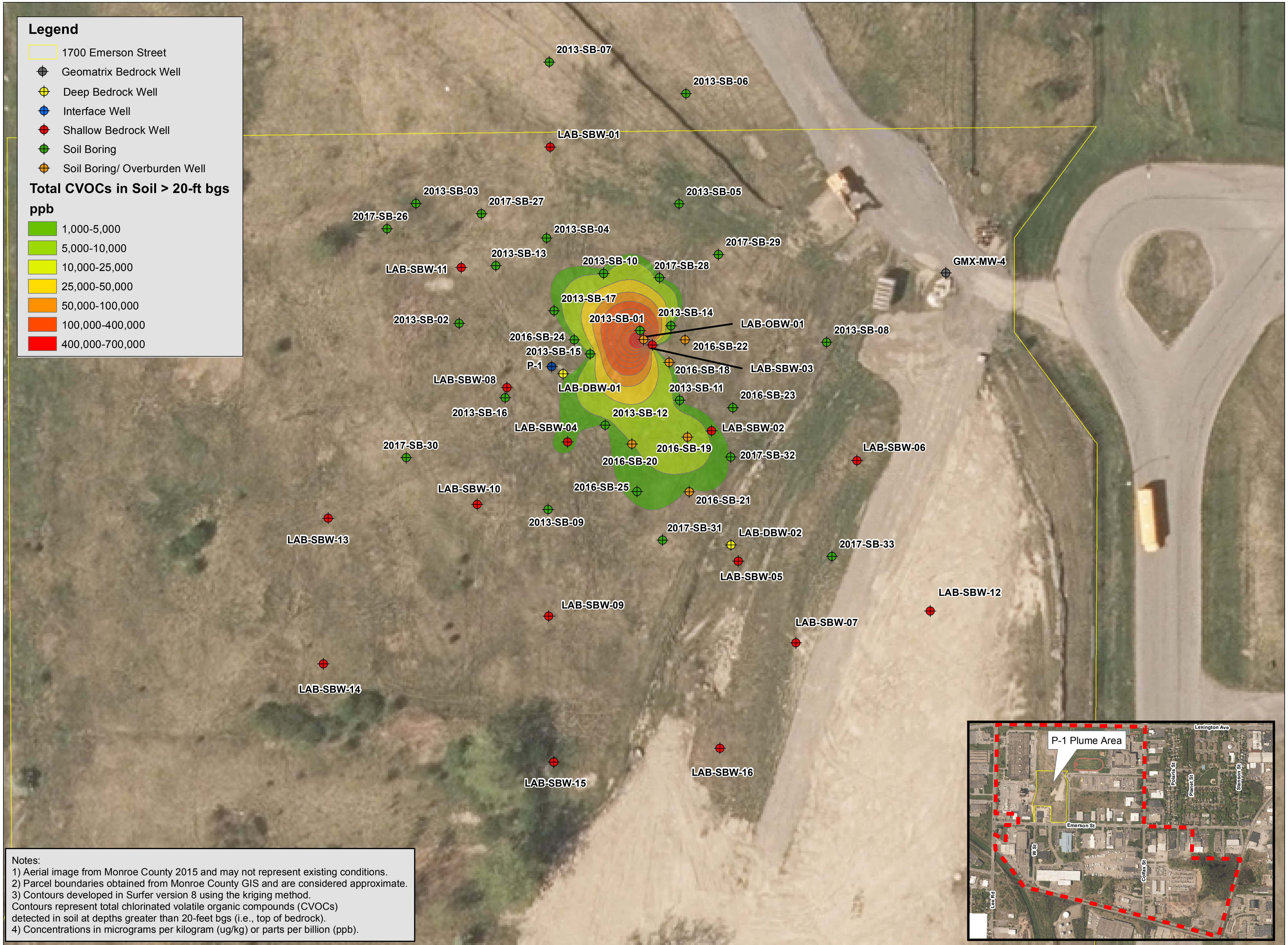
Green highlight indicates approximate area of CVOCs in groundwater greater than 1 ppm.

Figure 4

FORMER EMERSON STREET LANDFILL
P-1 INVESTIGATION AREA
Rochester, New York

GEI Consultants

Geologic Cross Section A-A′
Conceptual Site Model
October 2016



Notes:
1) Aerial image from Monroe County 2015 and may not represent existing conditions.
2) Parcel boundaries obtained from Monroe County GIS and are considered approximate.
3) Contours developed in Surfer version 8 using the kriging method.
Contours represent total chlorinated volatile organic compounds (CVOCs) detected in soil at depths greater than 20-feet bgs (i.e., top of bedrock).
4) Concentrations in micrograms per kilogram (ug/kg) or parts per billion (ppb).

Path: \\Projects2\ProjectsNZ-2\Rochester, City\210173 FESL\Drawings\P-1 RI Report\Figure 5- CVOCs in soi no callouts.mxd

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REMEDIAL INVESTIGATION REPORT
P-1 PLUME AREA
FORMER EMERSON STREET LANDFILL
NYSDEC SITE #828023

CITY OF ROCHESTER

TOTAL CVOCS IN SOIL

GREATER THAN 20 FT BGS (TOP OF BEDROCK)

N
W E
S

0 25 50
Feet

1 inch = 50 feet

Intended to print on 11x17

210173

FIGURE 5

NYSDEC - December 2019
Monroe County 2018 Orthoimagery

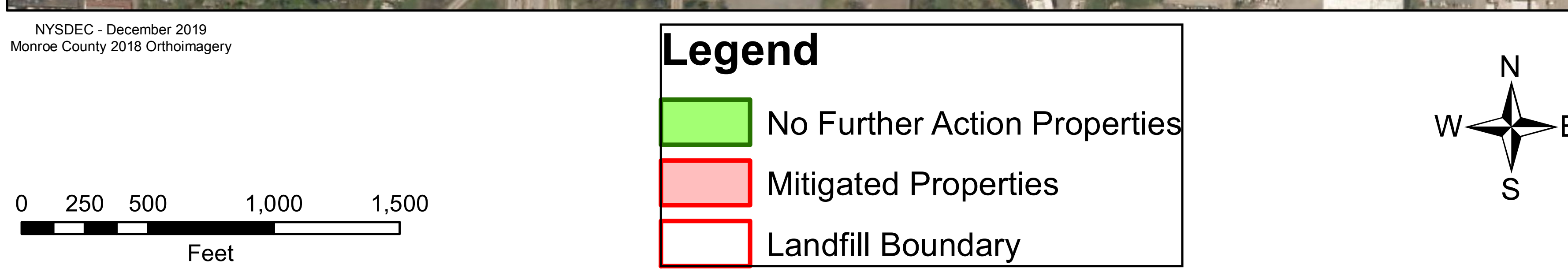
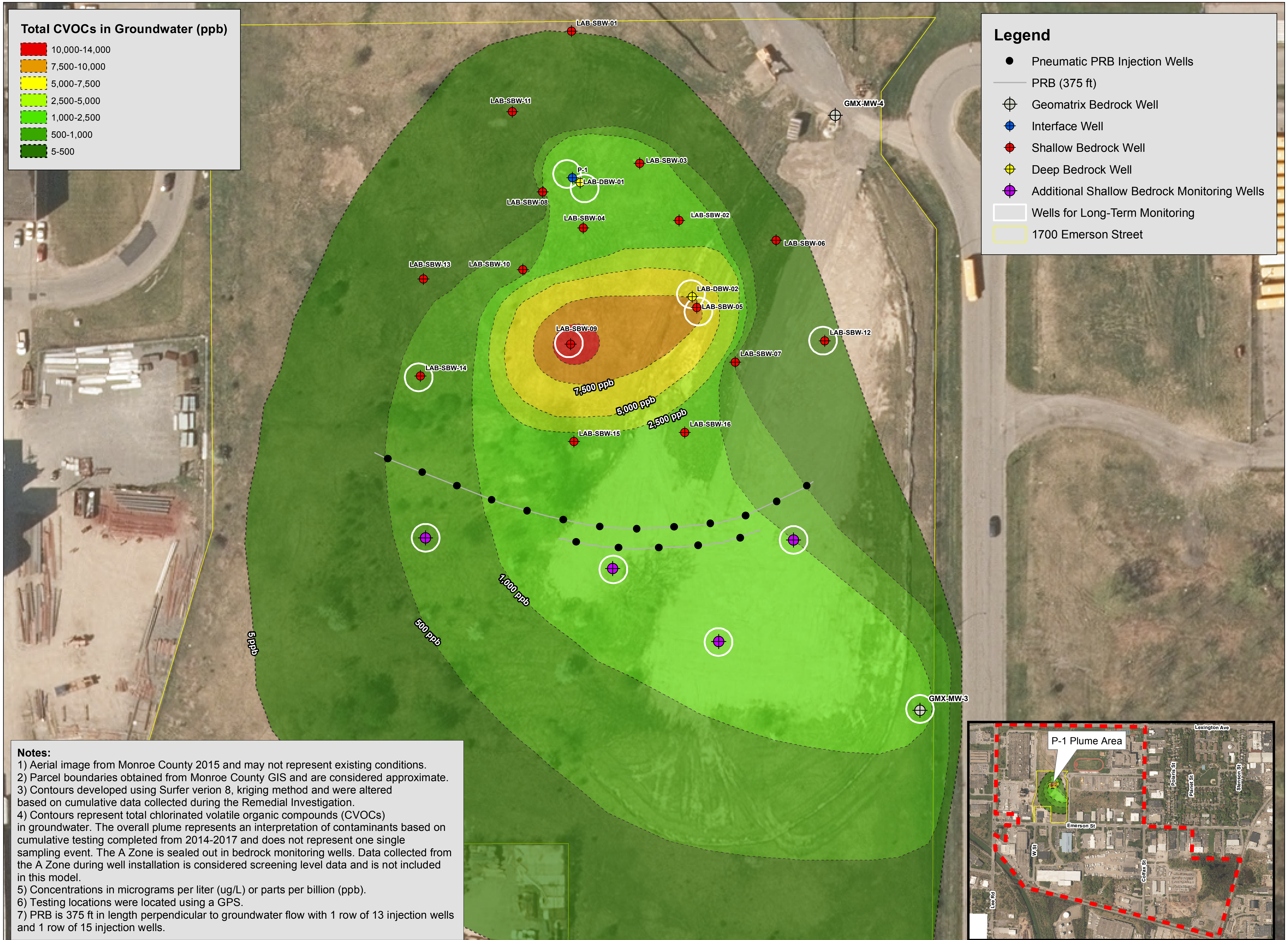


Figure 6
Former Emerson Street Landfill Site
Soil Vapor Instrusion Results



Notes:
1) Aerial image from Monroe County 2015 and may not represent existing conditions.
2) Parcel boundaries obtained from Monroe County GIS and are considered approximate.
3) Contours developed using Surfer verion 8, kriging method and were altered based on cumulative data collected during the Remedial Investigation.
4) Contours represent total chlorinated volatile organic compounds (CVOCs) in groundwater. The overall plume represents an interpretation of contaminants based on cumulative testing completed from 2014-2017 and does not represent one single sampling event. The A Zone is sealed out in bedrock monitoring wells. Data collected from the A Zone during well installation is considered screening level data and is not included in this model.
5) Concentrations in micrograms per liter (ug/L) or parts per billion (ppb).
6) Testing locations were located using a GPS.
7) PRB is 375 ft in length perpendicular to groundwater flow with 1 row of 13 injection wells and 1 row of 15 injection wells.

Path: \\Projects2\ProjectsNZ-2\Rochester, City\210173 FES\Drawings\FS\Figure 11B - PRB pneumatic.mxd

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FEASIBILITY STUDY
P-1 PLUME AREA
FORMER EMERSON STREET LANDFILL
NYSDEC SITE #828023

CITY OF ROCHESTER

ALTERNATIVE E
PERMEABLE REACTIVE BARRIER
(PNEUMATIC)

N W E S

0 75
Feet
1 inch = 75 feet
Intended to print on 11x17

210173

FIGURE 7

APPENDIX A

Responsiveness Summary
RESPONSIVENESS SUMMARY

Emerson Street Dump
State Superfund Project
City of Rochester Monroe County, New York
Site No. 828023

The Proposed Remedial Action Plan (PRAP) for the Emerson Street Dump site was prepared by the New York State Department of Environmental Conservation (the Department) in consultation with the New York State Department of Health (NYSDOH) and was issued to the document repositories on February 26, 2020. The PRAP outlined the remedial measure proposed for the contaminated soil, groundwater, and soil vapor at the Emerson Street Dump site.

The release of the PRAP was announced by sending a notice to the public contact list, informing the public of the opportunity to comment on the proposed remedy.

A public meeting was held on March 10, 2020, which included a presentation of the remedial investigation feasibility study (RI/FS) for the Emerson Street Dump site as well as a discussion of the proposed remedy. The meeting provided an opportunity for citizens to discuss their concerns, ask questions and comment on the proposed remedy. These comments have become part of the Administrative Record for this site. The public comment period for the PRAP ended on March 26, 2020.

This responsiveness summary responds to all questions and comments raised during the public comment period. The following are the comments received, with the Department's responses:

No comments were received at the public meeting on March 10, 2020 or during the 30-day comment period.

APPENDIX B

Administrative Record

Administrative Record

Emerson Street Dump
State Superfund Project
City of Rochester Monroe County, New York
Site No. 828023

1. *Proposed Remedial Action Plan for the Emerson Street Dump site,* dated February 2020, prepared by the Department.

2. Order on Consent, Index No. B8-0798-09-01, between the Department and the City of Rochester, New York, executed on August 27, 2009.

3. “Vapor Intrusion Assessment Work Plan- Data Review, Site Screening, and Site Prioritization, Former Emerson Street Landfill,” June 2010, prepared by LaBella Associates, P.C.

4. “Soil Vapor Intrusion Assessment Report - Data Review, Site Screening, and Site Prioritization, Former Emerson Street Landfill,” June 2011, prepared by LaBella Associates, P.C.

5. “Soil Vapor Intrusion Assessment Work Plan: Additional Investigation and Mitigation of Tier 1 Properties and Buildings,” April 2013, prepared by LaBella Associates, P.C.

6. “Sub-slab Depressurization Work Plan – 575 Colfax Street,” November 2016, prepared by LaBella Associates, D.P.C.

7. “Sub-slab Depressurization Work Plan – 1740 Emerson Street,” October 2017, prepared by LaBella Associates, D.P.C.

8. “Soil Vapor Intrusion Investigation Report – Former Emerson Street Landfill,” March 2018, prepared by LaBella Associates, D.P.C.

9. “Construction Completion Report – Sub-slab Depressurization System 575 Colfax Street,” September 2018, prepared by LaBella Associates, D.P.C.

10. “Construction Completion Report – Sub-slab Depressurization System 1740 Emerson Street,” September 2018, prepared by LaBella Associates, D.P.C.

11. “Remedial Investigation Work Plan – P-1 Plume Area Former Emerson Street Landfill,” November 2012, prepared by LaBella Associates, D.P.C.

12. “Remedial Investigation Work Plan Amendment #1 – P-1 Plume Area,” July 2013, prepared by LaBella Associates, D.P.C.

13. "Remedial Investigation Work Plan Amendment #2 – P-1 Plume Area," July 2014, prepared by LaBella Associates, D.P.C.

14. "Remedial Investigation Work Plan Amendment #3 – P-1 Plume Area," January 2015, prepared by LaBella Associates, D.P.C.

15. "Remedial Investigation Work Plan Amendment #4 – P-1 Plume Area," December 2016, prepared by LaBella Associates, D.P.C.

16. "Remedial Investigation Work Plan Amendment #5 – P-1 Plume Area," March 2017, prepared by LaBella Associates, D.P.C.

17. "Remedial Investigation Report – P-1 Plume Former Emerson Street Landfill," June 2018, by LaBella Associates, D.P.C.

18. "Feasibility Study – P-1 Plume Area Former Emerson Street Landfill," April 2019, by LaBella Associates, D.P.C.