RECORD OF DECISION

Monroe Electronics
State Superfund Project
Lyndonville, Orleans County
Site No. 837013
March 2016

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

DECLARATION STATEMENT - RECORD OF DECISION

Monroe Electronics
State Superfund Project
Lyndonville, Orleans County
Site No. 837013
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Statement of Purpose and Basis

This document presents the remedy for the Monroe Electronics 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 Monroe Electronics 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. Enhanced Bioremediation
Enhanced in-situ bioremediation (EISB) will be employed to treat CVOCs (primarily TCA, TCE, and associated daughter compounds) in overburden and bedrock groundwater in the area downgradient of the suspected source area located beneath the manufacturing building. Groundwater exhibiting concentrations of total CVOCs greater than 1,000 ug/L will be targeted. The treatment area will be confirmed during the remedial design investigation. The biological breakdown of contaminants through anaerobic reductive dechlorination, which is already occurring naturally, will be enhanced by the injection of a controlled-release carbon source (e.g. lactate or emulsified vegetable oil), electron donor (sulfate), and pH buffer to stimulate microbial growth. In addition to these bioamendments, bacterial cultures (bioaugments) will be injected into the subsurface via injection wells to "seed" the aquifer with appropriate microbes necessary for complete metabolization of CVOCs. The method and depth of injection will be determined during the remedial design. Multiple injections of bioamendments and bioaugments may be required to achieve RAOs.

3. In-Situ Chemical Reduction
In-situ chemical reduction (ISCR) will be implemented to supplement the bioremediation groundwater remedy to further treat CVOCs in overburden and bedrock groundwater. A chemical reducing agent (e.g., zero-valent iron particles in solution) will be injected into the subsurface following or concurrent with the introduction of bioamendments and bioaugments (described in remedy element 2) to boost the rate of abiotic dechlorination of CVOCs in groundwater. The method and depth of injection will be determined during the remedial design.

4. Cover System
A cover system will be required to allow for commercial use of the site. The cover will consist either of the structures such as buildings, pavement, and sidewalks comprising the site development or a soil cover in areas where the upper one foot of exposed surface soil will exceed the applicable soil cleanup objectives (SCOs). The extent of impacted soil as well as the areas to be covered will be determined during the remedial design. Where the soil cover is required 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. As an option to the placement of a cover, blending of impacted surface soil in the upper 1 foot (above commercial SCOs) with clean soil from lower soil horizons to produce a cover material will be considered. Soil cover material, including any fill material brought to the site or soil produced using the blending option, will meet the SCOs for cover material as set forth in 6 NYCRR Part 375-6.7(d). Any site redevelopment will maintain the site cover, which consists either of the structures such as buildings, pavement, sidewalks or the soil cover.

5. 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 use as defined by Part 375-1.8(g), although land use is subject to local zoning laws;
- Prohibit use of the on-site house for residential purposes;
- 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. 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 discussed in Paragraph 6 above; and
- Engineering Controls: The soil cover discussed in Paragraph 5 above.

This plan includes, but may not be limited to:

o an Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination;

o a provision for further investigation and remediation should large scale redevelopment occur, if any of the existing structures are demolished, or if the subsurface is otherwise made accessible. The nature and extent of contamination in areas where access was previously limited or unavailable will be immediately and thoroughly investigated pursuant to a plan approved by the Department. Based on the investigation results and the Department determination of the need for a remedy, a Remedial Action Work Plan (RAWP) will be developed for the final remedy for the site, including removal and/or treatment of any source areas to the extent feasible. Citizen Participation Plan (CPP) activities will continue through this process. Any necessary remediation will be completed prior to, or in association with, redevelopment.

o descriptions of the provisions of the environmental easement including any land use or groundwater use restrictions;

o a provision for evaluation of the potential for soil vapor intrusion in the existing on-site facility building and future buildings developed on the site, including provision for implementing actions recommended to address exposures related to soil vapor intrusion;

o provisions for the management and inspection of the identified engineering controls;

o maintaining site access controls and Department notification; and

o 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:

o monitoring of groundwater to assess the performance and effectiveness of the remedy;

o a schedule of monitoring and frequency of submittals to the Department; and

o monitoring for vapor intrusion for any occupied existing or future buildings developed on the site, as may be required by the Institutional and Engineering Control Plan discussed above.

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, 2016

Date

Robert W. Schick, P.E., Director
Division of Environmental Remediation

RECORD OF DECISION

Monroe Electronics
Lyndonville, Orleans County
Site No. 837013
March 2016

SECTION 1: <u>SUMMARY AND PURPOSE</u>

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. The remedy is intended to attain the remedial action objectives identified for this site for the protection of public health and the environment. This Record of Decision (ROD) identifies the selected remedy, summarizes the other alternatives considered, and discusses the reasons for selecting the remedy.

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: <u>CITIZEN PARTICIPATION</u>

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:

> Yates Community Library
> Attn: Emily Cebula
> 15 North Main Street
> PO Box 485
> Lyndonville, NY 14098
> Phone: 585-765-9041

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, Voluntary 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: The Monroe Electronics site is located at 100 Housel Avenue in Lyndonville, a small village along Route 63 in rural Orleans County approximately 4 miles south of Lake Ontario. The site is situated on a 10.1-acre parcel (Orleans County Tax Map ID 24.16-1-2) at the end of Housel Avenue.

Site Features: The developed portion of the property contains two structures, a one-story manufacturing building (occupied by Monroe Electronics) and a one-story residential building (occupied by a tenant) to the south of the manufacturing building. Gravel parking areas surround these structures and a gravel access driveway extends south to Housel Avenue. The on-site area along either side of the driveway is vacant, cleared land. Along the northern property boundary (between Monroe Electronics and the Bowman Apple facility) there is a drainage swale, oriented east-west.

Current Zoning and Land Use: The site is currently zoned Light Industrial. Current use of the property is primarily for manufacturing (light machining, component assembly, and testing). The small residential structure on the property is leased and is currently occupied.

Land use surrounding the site consists of commercial apple processing and storage operations to the north (Bowman Apple and H.H. Dobbins, Inc.), L.A. Webber Middle-High School to the south, and agricultural land abutting the site to the east and west.

Past Use of the Site: Monroe Electronics has been at this location since 1972 involved in the manufacture of electrostatic measuring instruments and other electronic devices. Before Monroe Electronics operated here, the property was the site of the former DuPont/Barre Lime and Sulfur Company where various pesticide sprays and dust mixtures were formulated. Based on historic photographs, a significant portion of the property and surrounding land was used for apple orchards.

In September 1986, Monroe Electronics submitted a Hazardous Waste Disposal Questionnaire as a requirement of the Community Right-to-Know survey. In the survey, Monroe Electronics indicated that they dumped 1 to 4 tons of 1,1,1-trichloroethane (TCA) at their Housel Avenue facility. TCA is a volatile organic compound (VOC) and industrial solvent used for cleaning and degreasing components in the manufacturing process. The dumping area and resulting contamination source were not indicated on the survey form, however, conversations with the owner/plant manager during the RI indicate that dumping occurred outside a former exterior door at the west end of the original building in the early 1970s. A metal-sided addition to the building was constructed after the material was disposed. The owner also indicated that TCA and waste oil was spread along the driveway on the east side of the building.

Another Registry site located nearby is the Lyndonville-West Avenue site (Site No. 837002). This site originally included the Monroe Electronics property before its boundaries were modified and Monroe Electronics became a separate site. The contaminants of concern at the Lyndonville-West Avenue site were pesticides and arsenic originating from the former DuPont/Barre plant. Pesticide and arsenic contamination was confirmed in a nearby landfill and drainage ditch during the Lyndonville-West Avenue RI (completed by Dupont), however, these investigations did not show consequential amounts of pesticide and/or arsenic on the Monroe Electronics property and it was subsequently removed from the Lyndonville-West Avenue site. Subsequent investigations by the NYSDEC did confirm the presence of chlorinated solvents on the Monroe Electronics property (unrelated to Lyndonville-West Avenue), which led to its listing on the Registry in 2002.

Site Geology and Hydrogeology: The site is located in the gently sloping plains of the Central Lowland Physiographic Province between the Lockport Escarpment and Lake Ontario. Overburden deposits beneath the study area from the surface down to bedrock include a medium-fine sand (5 to 15 ft thick), lacustrine clay (8 to 9 ft thick), glacial till (3 to 4 ft thick), and weathered red shale (5 ft thick). Bedrock was encountered 22 to 32 feet below ground surface (bgs) and is described as brown to red siltstone overlying a gray shale. In general, bedrock was largely competent with relatively few fractures and consists of Queenston Shale, a highly impermeable formation.

Three distinct water-bearing units were observed. A perched water-bearing zone was encountered above the clay unit. Water was also encountered within the weathered shale and bedrock units. Depth to groundwater ranges from 3 to 6 ft bgs in shallow wells and from 3 to 11 ft bgs in bedrock wells. Based on water level measurements the predominant groundwater flow direction in the shallow overburden and bedrock is toward the north.

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 (or an alternative) that restrict(s) the use of the site to commercial use (which allows for industrial use) as described in Part 375-1.8(g) were/was 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.

The PRPs for the site, documented to date, include:

Monroe Electronics

Robert E. Vosteen

100 Housel Avenue LLC

Barre Lime and Sulfur Company

E.I. Du Pont De Nemours and Company

Robert T. Vosteen and William E. Vosteen

The present owners and operators at the site declined to implement a remedial program when requested by the Department. After the remedy is selected, the PRPs for the site will be contacted to assume responsibility for completing the remedial program. If an agreement cannot be reached with the PRPs, the Department will evaluate the site for further action under the State Superfund. The PRPs are subject to legal actions by the state for recovery of all response costs the state has incurred.

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
- drinking water
- soil
- indoor air
- sub-slab vapor

6.1.1: Standards, Criteria, and Guidance (SCGs)

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: RI Results

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)	1,1 dichloroethene
1,1,1-trichloroethane	1,1,2-TCA
chloroethane	1,2-dichloroethane
arsenic	cis-1,2-dichloroethene
1,1-dichloroethane	trans-1,2-dichloroethene

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

- groundwater
- soil
- soil vapor intrusion

6.2: Interim Remedial Measures

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.

There were no IRMs performed at this site during the RI.

6.3: Summary of Environmental Assessment

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: The RI included testing of surface soil and subsurface soil samples for VOCs, semi-volatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), and metals. Groundwater and air/vapor samples were analyzed for VOCs. Based upon investigations conducted to date, the primary contaminants and media of concern at the site are chlorinated VOCs (CVOCs) in groundwater and arsenic in surface soil.

Groundwater:
Based on the results of groundwater sampling conducted to date, the overburden and bedrock aquifers beneath the site are contaminated by CVOCs (most notably TCA, TCE, and their degradation products). CVOCs were detected in several monitoring wells outside the manufacturing building at levels exceeding NYSDEC Ambient Water Quality Standards and Guidance Values for Class GA water (Class GA values), in some cases by two orders of magnitude. The highest concentrations of volatile contaminants were measured in bedrock wells nearest the western and southeastern portions of the building where historic disposal occurred and which are suspected to be primary contaminant source areas. The dissolved contaminants in bedrock, though widespread, are undergoing reductive dechlorination and, as a result, the extent of CVOC contamination in bedrock groundwater is not expected to extend off-site far beyond West Avenue. The same group of CVOCs were detected in a limited number of shallow overburden wells above groundwater standards but appear to be localized and, with the exception of a sample of standing water collected from the drainage ditch (subject to groundwater recharge), were not detected off-site in shallow groundwater.

In bedrock wells, the highest concentrations of total CVOCs in groundwater were detected west of the manufacturing building in MW-3B (1,055 ppb), north of the manufacturing building in MW-5B (1,130 ppb), and northeast of the manufacturing building in MW-105B (1,185 ppb). The concentrations of total CVOCs detected in wells located downgradient of the site (along West Avenue) are approximately an order of magnitude less than the concentrations of CVOCs in bedrock monitoring wells near the northern site boundary.

Soil:
In surface soil, the only metal detected at concentrations above the commercial use SCO of 16 ppm was arsenic, which was exceeded in 9 of the 16 samples. Concentrations of arsenic in surface soil ranged from 2.7 ppm to 124 ppm. The analytical results suggest that the highest concentrations of arsenic in surface soil are localized on the eastern side of the property around soil sample SS-7. No VOCs, PCBs, or pesticides were detected above commercial use SCOs in surface soil. In subsurface soil, the VOC 1,2-dichloroethane (a degradation product of TCA) was detected above the protection of groundwater SCO in 2 of the 38 subsurface soil samples collected during the RI. No metals, PCBs, or pesticides were measured in subsurface soil above SCOs for commercial use or for the protection of groundwater.

Sub-Slab Vapor and Indoor Air:
Soil vapor intrusion (SVI) samples, consisting of sub-slab vapor and ambient indoor and outdoor air, were collected at the Monroe Electronics facility and the on-site residence in 2011 and 2012. Site-related VOCs were detected at levels of concern in sub-slab vapor samples from the facility building. The maximum concentrations of TCE and TCA were 600 ug/m3 and 2,000 ug/m3, respectively. The highest TCE concentrations were detected near the southeastern corner of the building while the highest concentrations of TCA was measured in a soil vapor sample at the western end of the building. TCA and TCE degradation products were also detected. The findings indicate that soil vapor beneath the building has been impacted. While concentrations of VOCs in indoor air are within background concentration ranges and do not exceed NYSDOH guidelines, SVI is a potential concern in the on-site facility building due to elevated sub-slab concentrations. VOCs were not detected at levels of concern in either sub-slab or indoor air samples from the on-site residential structure.

In 2014, SVI samples were collected at two structures located off-site to the north. The sampling results indicate that SVI is not a concern for the two off-site buildings.

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 drinking the contaminated groundwater because the area is served by a public water supply that obtains water from a different source not affected by this contamination. People who enter the site may come into contact with contaminants in the soil by walking on the site, digging, or otherwise disturbing the soil. Volatile organic compounds in the groundwater may move into the soil vapor (air spaces within the soil), which in turn may move into overlying buildings and affect the indoor air quality. This 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. The potential exists for people to inhale site contaminants in indoor air due to soil vapor intrusion in the on-site manufacturing building. Environmental sampling indicates that soil vapor intrusion is not a concern for the on-site residence or off-site buildings.

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.

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: <u>SUMMARY OF THE SELECTED REMEDY</u>

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 Enhanced In-Situ Bioremediation/Chemical Reduction and Soil Cover remedy.

The estimated present worth cost to implement the remedy is $1,720,000. The cost to construct the remedy is estimated to be $670,000 and the estimated average annual cost is $42,700.

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. Enhanced Bioremediation

Enhanced in-situ bioremediation (EISB) will be employed to treat CVOCs (primarily TCA, TCE, and associated daughter compounds) in overburden and bedrock groundwater in the area downgradient of the suspected source area located beneath the manufacturing building. Groundwater exhibiting concentrations of total CVOCs greater than 1,000 ug/L will be targeted. The treatment area will be confirmed during the remedial design investigation. The biological breakdown of contaminants through anaerobic reductive dechlorination, which is already occurring naturally, will be enhanced by the injection of a controlled-release carbon source (e.g. lactate or emulsified vegetable oil), electron donor (sulfate), and pH buffer to stimulate microbial growth. In addition to these bioamendments, bacterial cultures (bioaugments) will be injected into the subsurface via injection wells to "seed" the aquifer with appropriate microbes necessary for complete metabolization of CVOCs. The method and depth of injection will be determined during the remedial design. Multiple injections of bioamendments and bioaugments may be required to achieve RAOs.

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In-situ chemical reduction (ISCR) will be implemented to supplement the bioremediation groundwater remedy to further treat CVOCs in overburden and bedrock groundwater. A chemical reducing agent (e.g., zero-valent iron particles in solution) will be injected into the subsurface following or concurrent with the introduction of bioamendments and bioaugments (described in remedy element 2) to boost the rate of abiotic dechlorination of CVOCs in groundwater. The method and depth of injection will be determined during the remedial design.

4. Cover System

A cover system will be required to allow for commercial use of the site. The cover will consist either of the structures such as buildings, pavement, and sidewalks comprising the site development or a soil cover in areas where the upper one foot of exposed surface soil will exceed the applicable soil cleanup objectives (SCOs). The extent of impacted soil as well as the areas to be covered will be determined during the remedial design. Where the soil cover is required 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. As an option to the placement of a cover, blending of impacted surface soil in the upper 1 foot (above commercial SCOs) with clean soil from lower soil horizons to produce a cover material will be considered. Soil cover material, including any fill material brought to the site or soil produced using the blending option, will meet the SCOs for cover material as set forth in 6 NYCRR Part 375-6.7(d). Any site redevelopment will maintain the site cover, which consists either of the structures such as buildings, pavement, sidewalks or the soil cover.

5. 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 use as defined by Part 375-1.8(g), although land use is subject to local zoning laws;

- Prohibit use of the on-site house for residential purposes;
- 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. 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 discussed in Paragraph 6 above; and
- Engineering Controls: The soil cover discussed in Paragraph 5 above.

This plan includes, but may not be limited to:

o an Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination;

o a provision for further investigation and remediation should large scale redevelopment occur, if any of the existing structures are demolished, or if the subsurface is otherwise made accessible. The nature and extent of contamination in areas where access was previously limited or unavailable will be immediately and thoroughly investigated pursuant to a plan approved by the Department. Based on the investigation results and the Department determination of the need for a remedy, a Remedial Action Work Plan (RAWP) will be developed for the final remedy for the site, including removal and/or treatment of any source areas to the extent feasible. Citizen Participation Plan (CPP) activities will continue through this process. Any necessary remediation will be completed prior to, or in association with, redevelopment.

o descriptions of the provisions of the environmental easement including any land use or groundwater use restrictions;

o a provision for evaluation of the potential for soil vapor intrusion in the existing on-site facility building and future buildings developed on the site, including provision for implementing actions recommended to address exposures related to soil vapor intrusion;

o provisions for the management and inspection of the identified engineering controls;

o maintaining site access controls and Department notification; and

o 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:

o monitoring of groundwater to assess the performance and effectiveness of the remedy;

o a schedule of monitoring and frequency of submittals to the Department; and

o monitoring for vapor intrusion for any occupied existing or future buildings developed on the site, as may be required by the Institutional and Engineering Control Plan discussed above.

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. Figure 2 is a site plan that shows the sample locations in relation to the site features.

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 four categories: volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, and metals. 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.

Groundwater

Over the course of several years and multiple sampling events, groundwater was sampled from more than 30 shallow overburden, deep overburden, and bedrock monitoring wells. Based on the results of groundwater sampling conducted to date, the overburden and bedrock aquifers beneath the site are contaminated by chlorinated VOCs (most notably 1,1,1-trichloroethane [TCA], trichloroethene [TCE], and their degradation products). As shown on Table 1, VOCs were detected in several monitoring wells at levels exceeding NYSDEC Ambient Water Quality Standards and Guidance Values for Class GA water (Class GA values), in some cases by two orders of magnitude. No SVOCs, PCBs, pesticides, or metals were detected in groundwater at concentrations exceeding Class GA values.

The highest concentrations of VOCs were measured in bedrock wells nearest the western and southeastern portions of the building where historic disposal occurred and which are suspected to be primary contaminant source areas. VOCs detected in the shallow overburden above groundwater standards appear localized and are not detected site wide. Figure 3 is a cross-section showing the geology beneath the Site and total VOC concentrations measured in representative wells.

Based on the inferred groundwater flow direction, the groundwater contamination present in the off-site bedrock monitoring wells (located approximately 400 feet to the north) can be attributed to migration of contamination from the Monroe Electronics site. Additionally, there is a downward vertical gradient in the wells in the vicinity of the manufacturing building, supporting the concept that shallow groundwater contamination likely migrated downward into the bedrock aquifer. Fortunately these dissolved contaminant plumes are undergoing reductive dechlorination and as a result, the extent of chlorinated VOC (CVOC) contamination in bedrock groundwater appears to be limited and likely does not extend off-site far beyond West Avenue.

Among the shallow wells (generally screened across the water table at 5 to 15 ft below grade), the highest concentrations of total CVOCs (the sum total of all individual CVOCs detected in a groundwater sample) east of the manufacturing building were observed in MW-6 (86.9 ppb) and MW-9 (183.7 ppb). West of the building, the highest total CVOC concentrations in shallow wells were measured in MW-2 (53.5 ppb) and in MW-101 (59.6 ppb). TCA was detected at concentrations above the Class GA values in those two wells (MW-2 and MW-101) and in a sample of standing water collected from the drainage ditch (subject to groundwater recharge), while TCE was detected above the Class GA value in the two shallow wells closest to the east end of the building (MW-6 and

MW-9). The remaining CVOCs detected at concentrations above the Class GA values in the groundwater samples collected from the shallow wells and drainage ditch are primarily degradation products of TCE and TCA. There were no CVOCs detected at concentrations above the Class GA Values in the three shallow monitoring wells located north of the Site along West Avenue.

In the two deep overburden monitoring wells (MW-2D and MW-10D) located east and west of the manufacturing building respectively, TCA and TCE were either not detected or were detected at concentrations below the Class GA values. Degradation products of TCA (most notably 1,1-dichloroethane [1,1-DCA] and chloroethane) were detected in MW-2D at concentrations above the Class GA values and higher than the concentrations detected in the associated bedrock or shallow well (MW-2 and MW-2B). These degradation products were also detected in MW-10D at concentrations above the Class GA values but generally consistent with or lower than the concentrations detected in the associated bedrock or shallow well (MW-10 and MW-10B).

In bedrock wells, the highest concentrations of total CVOCs in groundwater were detected west of the manufacturing building in MW-3B (1,055 ppb), north of the manufacturing building in MW-5B (1,130 ppb), and northeast of the manufacturing building in MW-105B (1,185 ppb). Individual CVOCs were detected at concentrations above Class GA values in two of the three bedrock monitoring wells (MW-103B and MW-104B) downgradient of the site along West Avenue. However, the concentrations of total CVOCs detected in MW-103B and MW-104B are approximately an order of magnitude less than the concentrations of CVOCs in bedrock monitoring wells near the northern site boundary. TCA was detected at a concentration above the Class GA value in one bedrock well (MW-3B) located west of the manufacturing building. The remaining CVOCs detected at concentrations above the Class GA values in the groundwater samples collected from the bedrock wells are degradation products of TCE and TCA.

Groundwater grab samples were also collected at various depths beneath the slab during the direct-push boring investigation inside the manufacturing building. Total CVOC concentrations in these grab samples were consistent with levels observed in the nearby bedrock wells (greater than 1,000 ppb). TCA, identified as the primary compound historically disposed at the site, was detected in groundwater collected from SB-102 and SB-105 at concentrations well above the Class GA value. TCE was detected in only one groundwater sample at a concentration above the Class GA value. The remaining CVOCs detected at concentrations above the Class GA values in the direct-push groundwater samples are degradation products.

A well receptor survey completed in 2013 resulted in the identification of one private water supply well located approximately a quarter mile northwest of the site. The well water was tested by the NYSDOH in April 2013. No contaminants of concern related to the Monroe Electronics site were detected in the drinking water sample.

Table 1 - Groundwater

Detected Constituents	Concentration Range Detected (ppb)[a]	SCG[b] (ppb)	Frequency Exceeding SCG
VOCs			
1,1,1-Trichloroethane (TCA)	0.63 - 530	5	16/139
1,1,2-Trichloroethane	0.28 - 1.3	1	2/139
1,1-Dichloroethane	0.15 - 2000	5	87/139
1,1-Dichloroethene	0.31 - 160	5	41/139
1,2-Dichloroethane	0.28 - 150	0.6	78/139
Chloroethane	0.58 - 490	5	57/139
Chloroform	0.29 - 16	7	5/139

Detected Constituents	Concentration Range Detected (ppb)[a]	SCG[b] (ppb)	Frequency Exceeding SCG
cis-1,2-Dichloroethylene	0.72 - 69	5	13/139
Methylene Chloride	0.23 - 28	5	4/139
Toluene	0.5 - 11	5	1/139
Trans-1,2-Dichloroethene	1.3 - 100	5	10/139
Trichloroethylene (TCE)	0.16 - 270	5	13/139
Inorganics			
Arsenic	0.0059 - 0.087	25	0/49

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).

Based on the findings of the RI, the past disposal of hazardous waste has resulted in the contamination of groundwater. Figures 4 and 5 depict the distribution of CVOCs in the shallow and bedrock aquifers, respectively, based on data collected in 2014. 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: TCA, 1,1-DCA, chloroethane, and TCE.

Soil

As part of NYSDEC's preliminary site investigation conducted in May 2000 (prior to the Site being listed), surface soil samples were collected at 4 locations in the vicinity of the drainage ditch behind the main facility building and analyzed for the full Target Compound List (VOCs, SVOCs, metals, PCBs, and pesticides). Surface soil samples were collected from a depth of 0 to 2 inches below the vegetated layer to assess direct human exposure. Two of the four sample locations (SS-03 and SS-04) contained concentrations above unrestricted and commercial SCOs for a number of compounds. A few SVOCs were detected but only one compound slightly exceeded the unrestricted and commercial SCOs in a single sample (SS-04). Two pesticides were detected in one sample (SS-03) at levels exceeding the unrestricted SCOs. Arsenic was detected in both samples (24.8 and 419 ppm) above unrestricted and commercial SCOs. Lead was also detected above unrestricted and commercial SCOs in one sample (SS-04). It should be noted that samples SS-03 and SS-04 were within an area associated with the drainage ditch that was excavated and backfilled with clean soil as part of the remediation of the Lyndonville West Avenue site in 2005.

During the RI at Monroe Electronics (2001 to 2014), 16 surface samples were collected across the Site and analyzed for pesticides and metals. Two metals (arsenic and lead) were detected in surface soil at concentrations above unrestricted SCOs. The only metal detected above the commercial use SCO of 16 ppm was arsenic, which was exceeded in 9 of the 16 samples collected during the RI and ranged from 2.7 ppm to 124 ppm. The analytical results suggest that the highest concentrations of arsenic remaining in surface soil are localized on the eastern side of the property around soil sample SS-7. Figure 6 shows the soil sampling locations and concentrations of arsenic. In addition, six pesticides were detected at levels above unrestricted SCOs in surface soil. No pesticides were detected above commercial use SCOs in surface soil.

Table 2 summarizes the surface soil sampling results from 2000 to 2014.

Table 2 - Surface Soil

Detected Constituents	Concentration Range Detected (ppm)[a]	Unrestricted SCG[b] (ppm)	Frequency Exceeding Unrestricted SCG	Restricted Use SCG[c] (ppm)	Frequency Exceeding Restricted SCG
VOCs					
None detected					
SVOCs					
Benzo(a)pyrene	0.498 – 1.470	1	1/4	1	1/4
Inorganics					
Arsenic	2.7 - 419	13	13/20	16	11/20
Lead	10.8 - 864	63	5/15	1000	0/15
Pesticides/PCBs					
Beta BHC	0 – 0.038	0.036	1/15	3	0/15
Dieldrin	0.0055 – 0.089	0.005	4/15	1.4	0/15
Endosulfan Sulfate	0.0081 - 0.030	2.4	3/15	200	0/15
Endrin	0.020 – 0.088	0.014	2/15	89	0/15
P,P'-DDD	0.0026 - 0.520	0.0033	7/15	92	0/15
P,P'-DDE	0.010 – 32	0.0033	11/15	62	0/15
P,P'-DDT	0.010 – 48	0.0033	6/6	47	1/15

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.

In May 2000, 14 subsurface soil samples were obtained from soil borings installed at 7 direct push boring locations (B-1 to B-7) across the Site and analyzed for VOCs, SVOCs, metals, PCBs, and pesticides. Continuous macro core sleeve samples were collected from approximately 1 to 12 feet below ground surface (near the top of the clay layer). During the RI, an additional 38 subsurface soil samples were collected and analyzed for VOCs, metals, and pesticides (no samples were analyzed for SVOCs during the RI). Subsurface soil samples were collected from 35 soil borings installed at various depths (from 4 feet to a maximum of 24 feet below ground surface) to assess soil contamination impacts to groundwater and the nature and extent of subsurface soil contamination. Four borings were also installed inside the manufacturing building through the foundation slab. Among the 52 subsurface soil samples collected by the NYSDEC, only two VOCs, two metals, and two pesticides were detected at concentrations above unrestricted SCOs. No VOCs, SVOCs, metals, or pesticides were measured in subsurface soil above commercial SCOs.

Table 3 summarizes the subsurface soil sampling results from 2000 to 2014.

Table 3 - Subsurface Soil

Detected Constituents	Concentration Range Detected (ppm)[a]	Unrestricted SCG[b] (ppm)	Frequency Exceeding Unrestricted SCG	Restricted Use SCG[c] (ppm)	Frequency Exceeding Restricted SCG
VOCs					
1,1,1-Trichloroethane (TCA)	0.0064 - 0.022	0.68	0/52	0.68[d]	0/52
1,1-Dichloroethane	0.0029 - 0.072	0.27	0/52	0.27[d]	0/52
1,1-Dichloroethene	0.0013 - 0.025	0.33	0/52	0.33[d]	0/52
1,2-Dichloroethane	0.0051 - 0.057	0.02	2/52	0.02[d]	2/52
Trichloroethylene (TCE)	0.0017 - 0.32	0.47	0/52	0.47[d]	0/52
Acetone	0.0051 - 0.32	0.05	6/52	0.05[d]	6/52
SVOCs					
None detected					
Inorganics					
Arsenic	2.2 - 14.4	13	1/19	16	0/19
Copper	7 - 150	50	1/19	270	0/19
Pesticides/PCBs					
P,P'-DDE	0.0066 – 0.16	0.0033	3/17	17[d]	0/17
P,P'-DDD	0.0018 – 0.013	0.0033	2/17	14	0/17
P,P'-DDT	0.00078 – 0.12	0.0033	4/17	47[d]	0/17

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.

The primary soil contaminants are metals in surface soil associated with the historical manufacture of dust mixtures containing inorganic pesticides and the application of pesticides in apple orchards which formerly existed in the immediate vicinity of the site. Based on the findings of the RI, the presence of these heavy metals has resulted in the contamination primarily of surface soil. The site contaminant identified in soil which is considered to be the primary contaminant of concern to be addressed by the remedy selection process is arsenic.

Soil Vapor

The evaluation of the potential for soil vapor intrusion (SVI) 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, indoor air inside structures, and outdoor air. At this site, due to the presence of occupied buildings in the impacted area, a full suite of samples was collected to evaluate whether actions are needed to address exposures related to soil vapor intrusion.

SVI samples were collected at the Monroe Electronics facility and on-site residence in 2011 and again in 2012. Site-related VOCs were detected at levels of concern in sub-slab vapor samples from the main building. The maximum concentrations of TCE and TCA were 600 ug/m3 and 2,000 ug/m3, respectively. The highest TCE concentrations were detected in sub-slab vapor near the southeastern corner of the building while the highest concentrations of TCA were measured in sub-slab vapor near the western end of the building. TCA and TCE degradation products were also detected. The findings indicate the soil vapor beneath the building has been impacted and that SVI is a potential concern in the on-site manufacturing building. VOCs were not detected at levels of concern in samples from the on-site residential structure.

In 2014, SVI samples were collected at two structures located off-site to the north. The sampling results indicate that SVI is not a concern for the two off-site buildings.

Based on the concentrations detected, and in comparison with the NYSDOH Soil Vapor Intrusion Guidance, the site contaminants that are considered to be the primary contaminants of concern and which will drive the remediation of soil vapor are TCA and TCE. These contaminants were found in soil vapor beneath the manufacturing building. A soil vapor intrusion investigation in the on-site residence did not detect site-related contamination in indoor air or in the crawlspace air beneath the house. Likewise, the SVI investigation of the two off-site properties did not indicate site-related contaminants. Therefore, appropriate action(s) are recommended for the on-site manufacturing building. No further action is needed to address exposures related to soil vapor intrusion at the on-site residential structure or the two off-site properties.

Exhibit B

Description of Remedial Alternatives

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 Action

The No Action Alternative is evaluated as a procedural requirement and as a basis for comparison. This alternative leaves the site in its present condition and does not provide any additional protection to public health and the environment.

Present Worth: *$15,000*
Capital Cost: *$0*
Annual Costs: *$400*

Common Element

As a common element to each of the remedial action alternatives described below, implementation of an indoor air monitoring program as part of the Site Management Plan (SMP) is proposed to address soil vapor intrusion into the on-site manufacturing building. Indoor air and/or sub-slab vapor samples would be collected on an annual basis during the heating season and the analytical results evaluated in accordance with NYSDOH guidance. If necessary, additional actions to address exposures related to soil vapor intrusion will be implemented. An Institutional Control (IC) in the form of an environmental easement will be placed on the property that will require the party responsible for completing the remedy to implement provisions of the SMP including the SVI monitoring program for the manufacturing building and evaluation of the potential for vapor intrusion for any new buildings developed on the site (and implementation of additional actions, as required). The environmental easement will also prohibit use of the on-site residential building for purposes other than commercial or industrial and prohibit on-site groundwater extraction and use.

Present Worth: *$62,000*
Capital Cost: *$0*
Annual Costs: .... *$5,000 (avg. years 1-30)*

Action Alternatives

Alternative 2: Soil Cover

This alternative would include placement of a soil cover above all surface soil exceeding the commercial use SCO for arsenic. Arsenic-impacted soil will be contained by placing a one-foot thick layer of clean fill and topsoil cover. After placement, the topsoil would be seeded, and fertilizer and mulch would be added to promote growth of a uniform stand of perennial grasses. A geotextile demarcation layer would be installed between the clean fill layer and the arsenic-impacted soil to indicate underlying residual contaminated soil. The horizontal and vertical extents of contamination, and area to be covered, would be verified as part of a pre-design investigation.

Currently, the area of concern is estimated to be approximately 80,000 square feet; the estimated volume of soil to be imported to the Site is 3,000 cubic yards (refer to Figure 6).

Additionally, this alternative would include a groundwater monitoring component to monitor changes in contaminant distribution and attenuation over time. Refer to Figures 4 and 5 for estimated extents of total CVOC concentrations in the shallow and bedrock aquifers. Groundwater monitoring at the Site will involve long-term groundwater monitoring performed on a periodic basis.

Present Worth: *$590,000*
Capital Cost: *$190,000*
Annual Costs: .... *$19,300 (avg. years 1-30)*

Alternative 3: EISB/ISCR and Soil Cover

This alternative includes Enhanced Is-Situ Bioremediation (EISB) and In-Situ Chemical Reduction (ISCR) technologies for treating CVOCs in the bedrock aquifer beneath the manufacturing building. Alternative 3 also includes placement of a one-foot thick soil cover to address surface soil (described in Alternative 2). EISB involves the injection of bio-stimulating and chemical reduction amendments and bio-augmentation cultures into the aquifer to enhance the biological and abiotic reductive dechlorination of CVOCs in groundwater. Existing data indicate that the CVOCs in the groundwater are being naturally degraded under existing Site conditions, but at limited rates. These data suggest the existing aquifer conditions alone would not support complete reductive dechlorination of TCE. Therefore, amendments would be selected and employed to change these limiting conditions and promote a vigorous population of appropriate degrading bacteria.

EISB/ISCR injections would be limited to outside the existing manufacturing building along its northern and western perimeter and around monitoring well MW-105B, as shown on Figure 7. This focused EISB and ISCR remedy will be implemented by injecting a liquid phase reducing agent (e.g., zero-valent iron) mixed with a controlled-release carbon source for EISB. EISB/ISCR injection wells will be used to inject the reducing agent/carbon source mixture to the targeted remediation areas and depths. Zero-valent iron (or similar) abiotically dechlorinates CVOCs, and the controlled-release carbon acts as a bioamendment to enhance the biological reductive dechlorination concurrently with chemical reduction. Bioaugmentation cultures will be injected subsequently or concurrently. Commercially-available EISB/ISCR mixtures typically have an effective longevity of up to four to five years. It is anticipated that four rounds of EISB/ISCR injections would be required.

Groundwater sampling and analysis would be performed during the first year as part of the injection program. Data generated as a result of the sampling would be used to evaluate the effectiveness of injection, and enhancements to the remedial approach may be considered as conditions warrant.

Long-term groundwater monitoring would also be performed on a periodic basis to monitor changes in contaminant distribution and attenuation in overburden groundwater downgradient of the Site.

Present Worth: *$1,720,000*
Capital Cost: *$670,000*
Annual Costs: .... *$42,700 (avg. years 1-30)*

Alternative 4: Expanded EISB and ISCR, and Shallow Soil Excavation

This alternative includes expansion of the EISB/ISCR injection area to target the bedrock aquifer directly beneath the western portion of the building. It should be noted that implementation of Alternative 4 would require either the demolition of a portion of the manufacturing building or use of specialty drilling techniques for installation of injection wells inside the building. Similar to Alternative 3, groundwater sampling and analysis would be performed during the first year as part of the injection program. Data generated as a result of the sampling would be used to evaluate the effectiveness of injection, and enhancements to the remedial approach may be considered as conditions warrant. Long-term groundwater monitoring would be performed to monitor ISCR and EISB performance as described for Alternative 3.

Another element of Alternative 4 is excavation and off-Site disposal of arsenic-impacted surface soil. The soil remediation elements of Alternative 4 would target arsenic concentrations exceeding the commercial use SCO in the upper 1 foot of soil. It is anticipated that the average excavation depth would be 0.5 feet. The area of concern is estimated to be approximately 80,000 square feet, and, applying a depth of 0.5 feet, the estimated volume of soil to be removed is 1,500 cubic yards. The horizontal and vertical extents of contamination will be verified as part of a pre-design investigation.

Present Worth:..*$2,570,000*
Capital Cost:..*$1,000,000*
Annual Costs:...*$62,800 (avg. years 1-30)*

Alternative 5: In-Situ Thermal Remediation and Soil Excavation

This alternative includes In-Situ Thermal Remediation (ISTR) to destroy or volatilize CVOCs dissolved in groundwater and adsorbed to the formation. The vaporized CVOCs are removed from the overlying unsaturated soil using a soil vapor extraction (SVE) system. It is assumed that collected vapors will require treatment prior to being discharged to the atmosphere using granular activated carbon (GAC) treatment or other technology. It is expected that implementation of Alternative 5 would require either the demolition of a portion of the manufacturing building or use of specialty drilling techniques for installation of electrodes inside the building.

Electrical resistance heating (ERH) is the thermal remediation technology proposed for the geologic conditions encountered at the Site (clays and sedimentary bedrock). ERH uses arrays of electrodes to create a concentrated flow of current toward a central neutral electrode. Resistance to this electric current in the formation generates heat and increases the temperature up to the boiling point of water (approximately 100ºC), producing steam and vaporizing contaminants. Other thermal technologies (e.g., thermal conductive heating) may be considered during remedial design if implementation of ERH is determined to not be viable because of physical properties of the soil or rock.

Following the heating phase, periodic groundwater monitoring will be performed to monitor ISTR performance.

Another element of Alternative 5 is excavation and off-Site disposal of contaminated soil to achieve NYSDEC unrestricted use SCOs. The horizontal and vertical extents of contamination will be verified as part of a pre-design investigation. The RI Report indicates that metals other than arsenic and pesticides were detected in surface soil at concentrations above the unrestricted use SCOs. As part of this alternative, pre-design investigation and post-excavation samples would be analyzed for constituents detected above the unrestricted use SCOs. It is expected that excavation to depths of 2 or 3 feet may be required to achieve these levels. Based on existing data, the area of concern is estimated to be approximately 232,000 square feet, and the estimated volume of soil which would be removed is 21,500 cubic yards.

This alternative achieves all of the SCGs discussed in Section 6.1.1 and Exhibit A and soil meets the unrestricted soil clean objectives listed in Part 375-6.8 (a).

Present Worth: *$13,500,000*
Capital Cost: *$8,240,000*
Annual Costs: .... *$22,200 (avg. years 1-5)*

Exhibit C

Remedial Alternative Costs

Remedial Alternative	Capital Cost ($)	Annual Costs ($)	Total Present Worth ($)
1. No Action	0	0	0
2. Soil Cover	190,000	19,300	590,000
3. EISB and ISCR, Soil Cover	670,000	42,700	1,720,000
4. Expanded EISB and ISCR, and Shallow Soil Excavation	1,000,000	62,800	2,570,000
5. In-Situ Thermal Remediation and Soil Excavation	8,240,000	22,200	13,500,000

Exhibit D

SUMMARY OF THE SELECTED REMEDY

The Department has selected Alternative 3, Enhanced In-Situ Bioremediation/Chemical Reduction with Soil Cover, as the remedy for this site. Alternative 3 achieves the remediation goals for the site by injecting an engineered suite of bioamendments /bioaugments and chemical reducing agents into the subsurface designed to enhance the rate of biological and abiotic dechlorination of CVOCs in groundwater. The remaining remediation goals will be achieved by restricting groundwater use until SCGs are achieved, covering contaminated surface soils with one foot of soil that meets commercial SCOs to prevent exposure, managing residual contamination, and implementing a long-term groundwater and SVI monitoring program, as well as actions recommended to address exposures related to soil vapor intrusion. 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 3, EISB/ISCR and Soil Cover) would satisfy this criterion by enhancing the degradation and ultimate destruction of contaminants in groundwater and preventing direct contact with contaminated surface soil. Alternative 1 (No Action) does not provide any additional protection to public health and the environment and will not be evaluated further. Alternative 2 meets the threshold criteria with respect to soil, soil vapor, and groundwater exposure, but does not include active groundwater remediation. Alternative 3 does include active groundwater remediation and provides greater protectiveness of the environment than Alternative 2. Alternative 4 provides greater protectiveness than Alternative 3 due to the increased area targeted for active groundwater treatment and the removal of arsenic-impacted soil from the Site. However, given the limitations of Alternatives 3 and 4 with respect to achieving RAOs, their overall protectiveness of the environment is only nominally greater than Alternative 2. Alternative 5 provides the highest level of protectiveness of the public health and the environment since it includes all the elements of Alternative 2 and represents the most rigorous approach to soil and groundwater remediation and restores the site to unrestricted use.

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 3 complies with SCGs to the extent practicable. It addresses groundwater contamination and creates the conditions necessary to restore groundwater quality within a reasonable timeframe. Alternative 2 will generally result in compliance with SCGs with respect to vapor intrusion and surface soil, but would rely on natural attenuation with respect to achieving groundwater SCGs and entail an extended remedial timeframe. Alternatives 3 and 4 may result in compliance with groundwater SCGs in a shorter period of time, within the targeted treatment zones. Alternatives 4 and 5 result in greater compliance with soil SCGs due to the removal of arsenic-impacted surface soil from the Site. Alternative 5 is most likely to result in compliance with groundwater SCGs in the quickest timeframe but at a significantly higher cost.

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.

The soil cover and soil vapor intrusion components of Alternative 2, while not considered permanent remedies, would address potential exposure to contaminants in soil and soil vapor in the long-term. Alternative 3 would result in the permanent degradation of contaminants in groundwater and would be equally effective as Alternative 2 in the long-term with respect to addressing soil vapor intrusion and soil contamination. Alternative 4 would be somewhat more effective than Alternative 3 with respect to soil and groundwater contamination. Alternative 5 would be the most effective in the long-term and would permanently address COCs in soil, soil vapor, and groundwater, to the greatest extent.

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.

The soil cover component of Alternatives 2 and 3 provides reduction in the potential mobility of contaminants in soil by erosion alone, but provides no reduction in toxicity or volume. The excavation and disposal component of Alternatives 4 and 5 reduces the potential mobility of contaminants in soil by transfer to a controlled disposal site. Alternative 2 provides no reduction of toxicity, mobility, or volume of groundwater contaminants other than through naturally occurring attenuation processes. Alternatives 3 and 4 would reduce the toxicity, mobility, and volume of contaminants in groundwater via degradation to less toxic substances. Alternative 5 would reduce the mobility and volume of contaminants in groundwater at the Site via extraction and treatment, and transport off-Site for disposal.

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.

Alternatives 2 through 5 all have short-term impacts which could easily be controlled. Soil cover and soil vapor intrusion components of Alternative 2 would be effective in the short-term and would have limited short-term impacts. Alternative 2 would not be effective in the short-term with respect to groundwater contamination (although ICs would minimize potential for exposure). Alternative 3 would be equal to Alternative 2 with respect to soil vapor intrusion and soil contamination. Alternative 4 would be somewhat more effective in the short-term with respect to groundwater contamination and surface soil than Alternative 3, but would cause greater impacts (soil excavation, CAMP, and interference with manufacturing operations to install wells indoors or demolish the building). Alternative 5 would be the most effective in the short-term but would result in the greatest short-term impacts. Short-term impacts include air emissions associated the ISTR system and increased soil excavation.

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.

Alternatives 2 and 3 are equally implementable as neither would require any specialized procedures or significantly impact active manufacturing operations. Implementation of either Alternative 4 or 5 would be challenging considering the requirements for installation of active remediation system components within the building footprint. Additionally, although ISTR technology (Alternative 5) is readily available from vendors and the technology has been successfully implemented at other similar sites, there is a limited number of vendors capable of implementing ISTR and due to high demand, procurement of a qualified ISTR vendor can be challenging.

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.

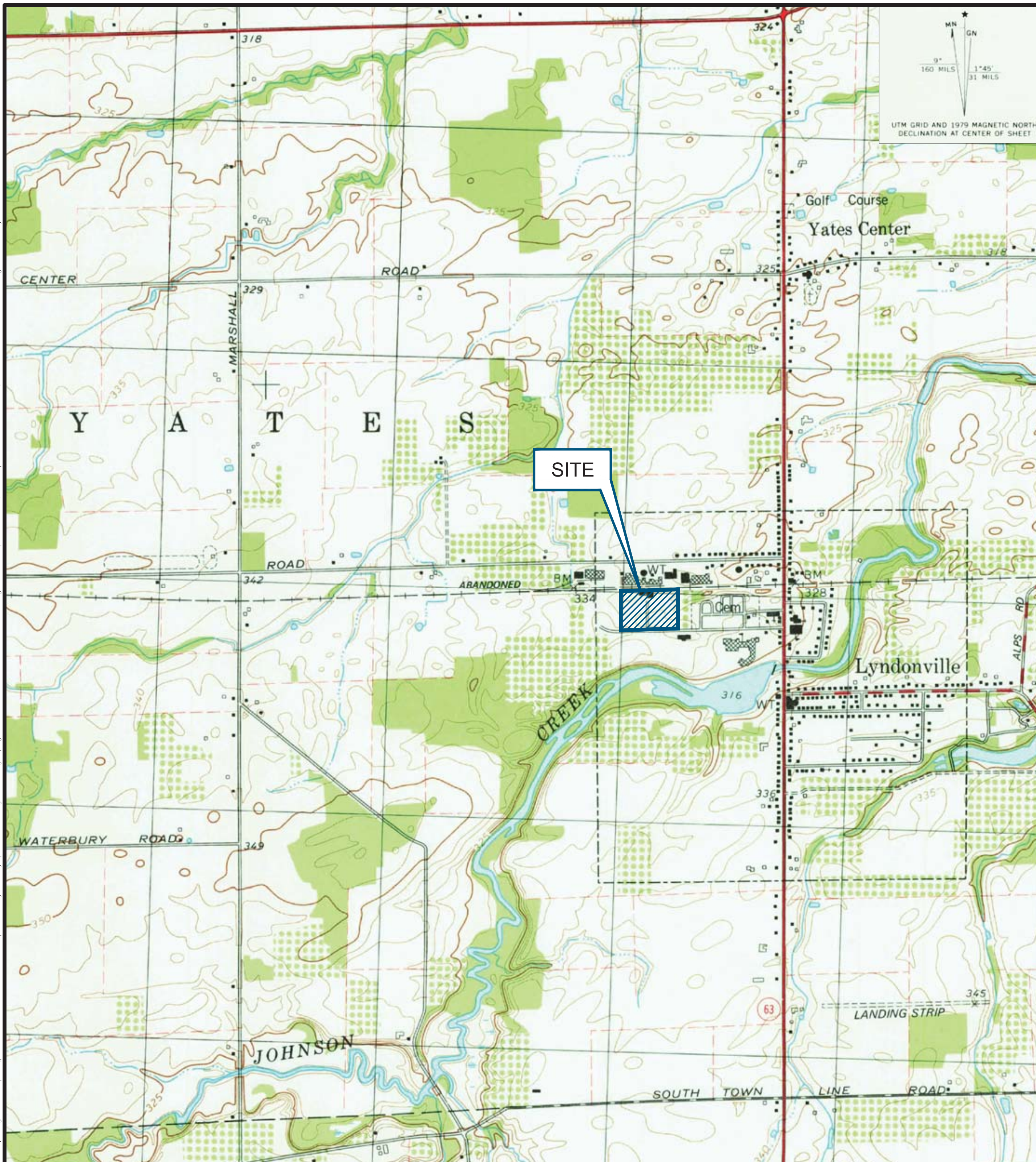
The costs of the alternatives vary significantly. Alternatives 2, 3, 4, and 5 are progressively more expensive. The estimated total present value cost of Alternative 5 is over two times greater than the estimated total present value cost of Alternative 4. A summary comparison of the remedial alternative costs is presented in *Table x*.

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. The current and anticipated future land use of the Site is Manufacturing which is consistent with the local zoning (Light Industrial). Alternatives 2, 3, and 4 would remediate (either by covering or removing) arsenic-impacted soil exceeding commercial SCOs, resulting in some residual contamination that would be controllable with implementation of a Site Management Plan and an environmental easement. With Alternative 5, all of the impacted soil exceeding unrestricted use SCOs would be removed, groundwater contamination would be treated to SCGs, and restrictions on the Site use would not be necessary.

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 are received.

9. Community Acceptance. Concerns of the community regarding the investigation, the evaluation of alternatives, and the PRAP are evaluated. A responsiveness summary has been prepared that describes public comments received and the manner in which the Department will address the concerns raised.

Alternative 3 has been selected because, as described above, it satisfies the threshold criteria and provides the best balance of the balancing criterion.



SCALE: 1:2400

1 ½ 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

CONTOUR INTERVAL 5 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

NEW YORK
QUADRANGLE LOCATION

LYNDONVILLE, N. Y.
SW/4 RIDGEWAY 15' QUADRANGLE
N4315—W7822.5/7.5
1979
DMA 5370 IV SW—SERIES V821

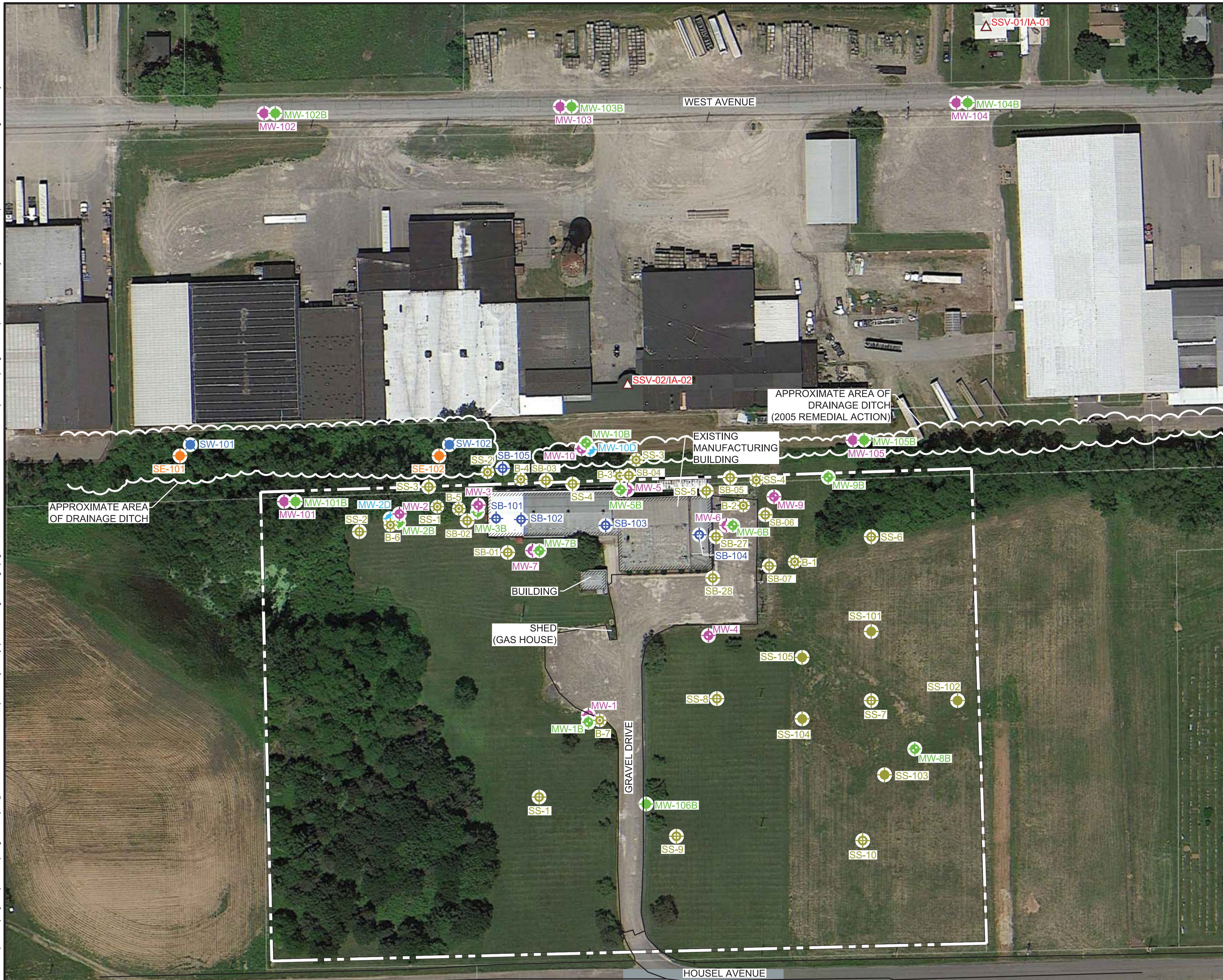
MAP OBTAINED THROUGH USE OF THE NATIONAL MAP ONLINE VIEWER FROM USGS

TRC
1430 BROADWAY, 10TH FLOOR
NEW YORK, NEW YORK 10018
212-221-7822

DESIGNED BY: JM	PROJECT NAME: NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION FEASIBILITY STUDY MONROE ELECTRONICS - SITE NO. 837013 100 HOUSEL AVENUE LYNDONVILLE, NEW YORK 14098
DRAWN BY: HD	
CHECKED BY: DSG/LM	
DATE: MAY 2015	DRAWING TITLE: SITE LOCATION MAP
SCALE: AS SHOWN	
PROJECT NUMBER: 219075.0000.0000	

FIGURE 1

Path\Name: \\NTAPA-NYC\environmental\Shared\Projects\NYSDEC\Assignments\WA #19 – Monroe Electronics\Feasibility Study\TRC Working Drawings\Figure 1 – Site Location Map.dwg – Date\Time: Mon, 27 Apr 2015 – 10:08pm – User Name: HDelgado – Layout Tab: 8.5X11



LEGEND (SYMBOLS NOT TO SCALE):

	SITE BOUNDARY
	BUILDING FOOTPRINT
MW-XXXB	BEDROCK MONITORING WELL LOCATION AND IDENTIFICATION NUMBER (AUGUST 2014)
MW-XXX	SHALLOW MONITORING WELL LOCATION AND IDENTIFICATION NUMBER (AUGUST 2014)
SB-XXX	DIRECT PUSH SOIL BORING / GROUNDWATER GRAB SAMPLE LOCATION AND IDENTIFICATION NUMBER (AUGUST 2014)
SSV-X/IA-X	SUB-SLAB VAPOR / INDOOR AIR SAMPLING LOCATION AND IDENTIFICATION NUMBER (DECEMBER 2014)
SS-XXX	SURFACE SOIL SAMPLING LOCATION AND IDENTIFICATION NUMBER (AUGUST 2014)
SE-XXX	SEDIMENT SAMPLING LOCATION AND IDENTIFICATION NUMBER (AUGUST 2014)
SW-XXX	SURFACE WATER SAMPLING LOCATION AND IDENTIFICATION NUMBER (AUGUST 2014)
MW-XXB	BEDROCK MONITORING WELL LOCATION AND IDENTIFICATION NUMBER (PRE-2014)
MW-XXD	DEEP MONITORING WELL LOCATION AND IDENTIFICATION NUMBER (PRE-2014)
MW-XX	SHALLOW MONITORING WELL LOCATION AND IDENTIFICATION NUMBER (PRE-2014)
SS-XX, SB-XX	HISTORIC SURFACE SOIL SAMPLING LOCATION AND IDENTIFICATION NUMBER (SS-XX = AUGUST 2011) (SB-XX = 1997)
B-X, SS-X	HISTORIC SURFACE SOIL SAMPLING LOCATION AND IDENTIFICATION NUMBER (2001)

NOTES:

1. NOT ALL HISTORIC SURFACE SOIL SAMPLING LOCATIONS ARE SHOWN.
2. BASE AERIAL PHOTOGRAPH FROM GOOGLE EARTH 2015.
3. SURFACE SOIL SAMPLE LOCATIONS OBTAINED FROM SCANNED IMAGES AND MAPS PREPARED BY PRIOR CONSULTANTS. LOCATIONS ARE APPROXIMATE.

REVISIONS			
NO.	DESCRIPTION	BY	DATE

0 120' 240'

APPROXIMATE SCALE: 1"=120'

PAPER SIZE: 11" x 17"

TRC
1430 BROADWAY, 10TH FLOOR
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DESIGNED BY: JM / LM
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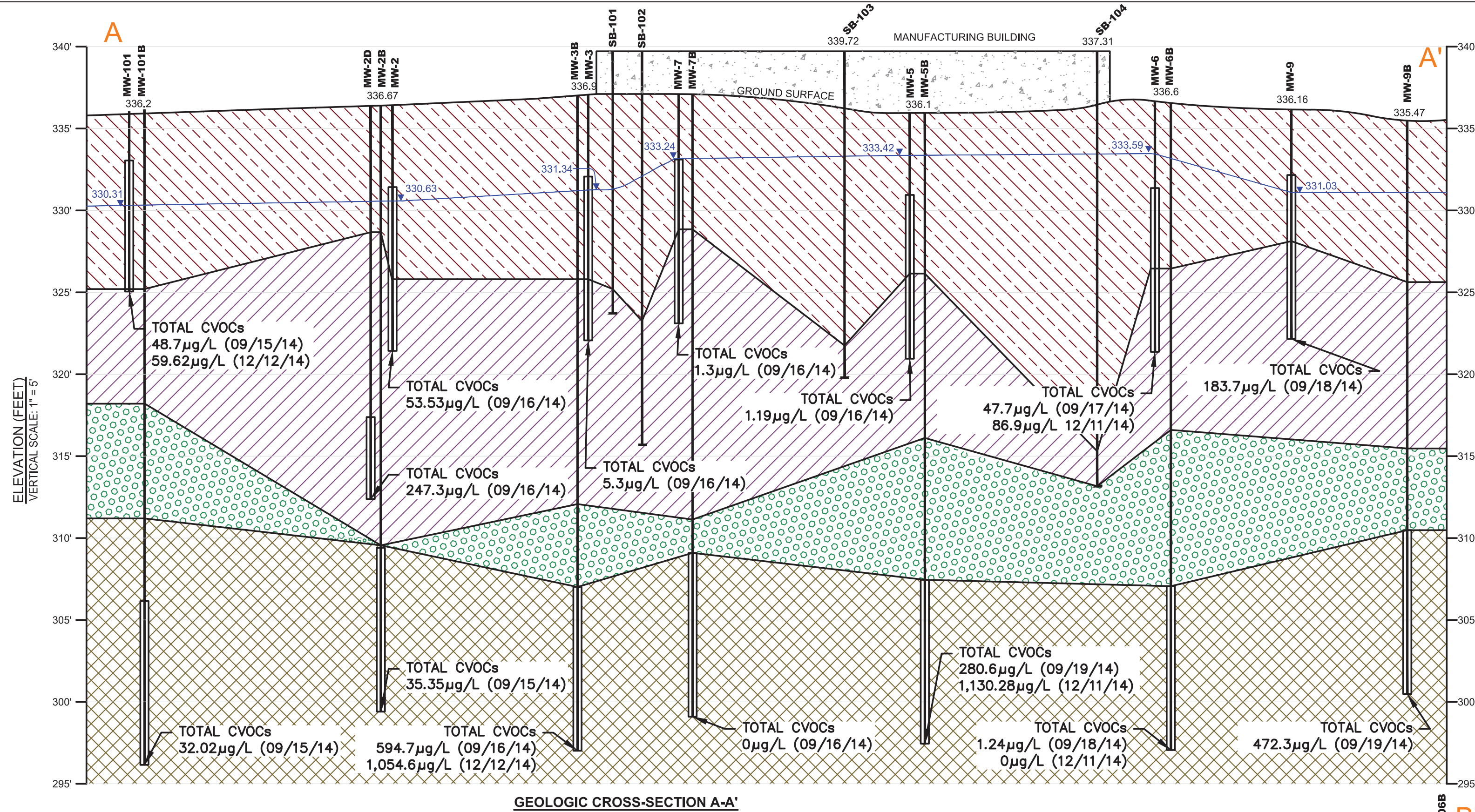
CHECKED BY: DSG
DATE: MAY 2015
SCALE: AS SHOWN
PROJECT NUMBER: 219075.0000.0000

PROJECT NAME:
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
FEASIBILITY STUDY
MONROE ELECTRONICS - SITE NO. 837013
100 HOUSEL AVENUE
LYNDONVILLE, NEW YORK 14098

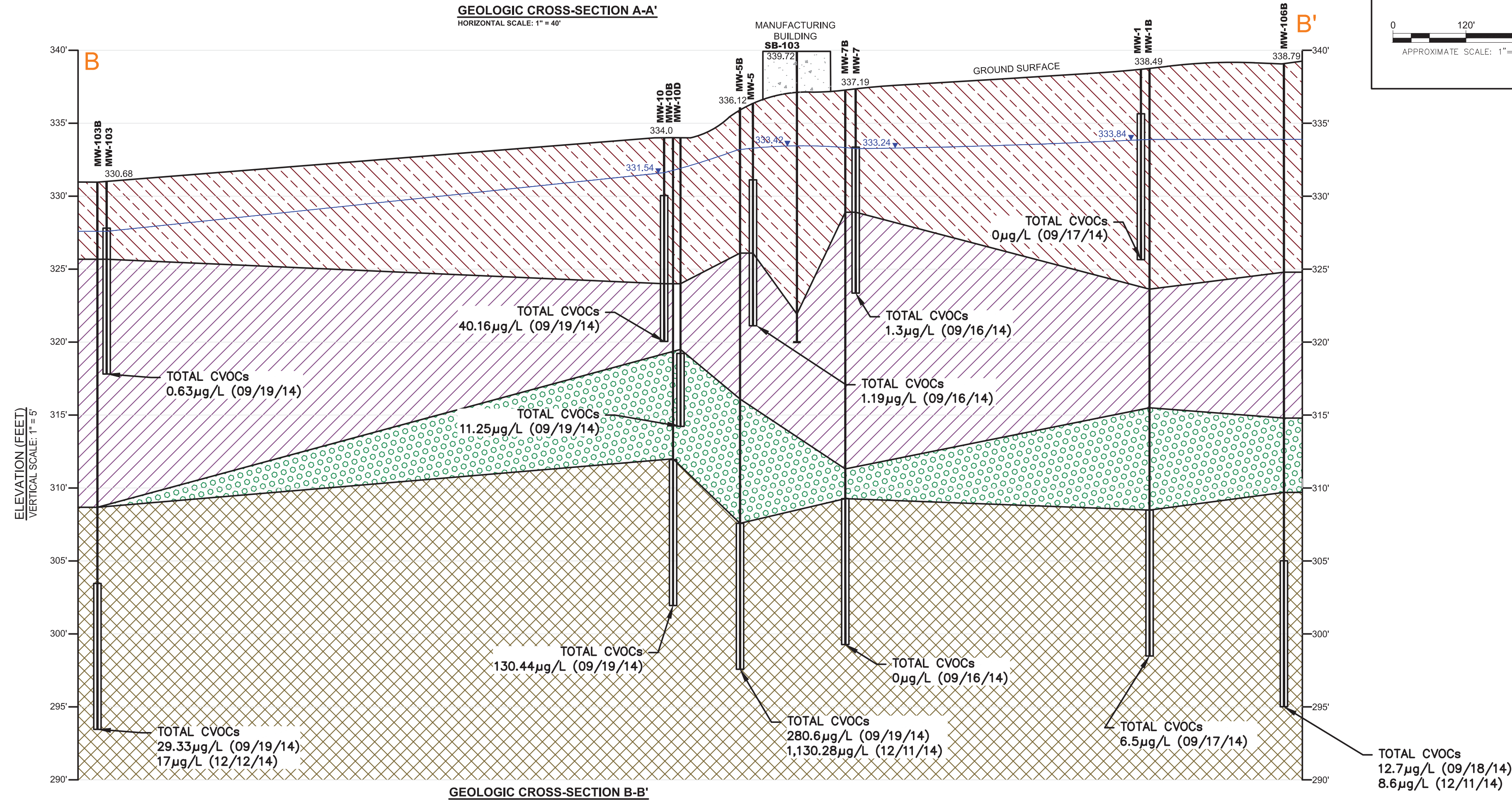
DRAWING TITLE:
SITE PLAN AND INVESTIGATION LOCATIONS

FIGURE 2

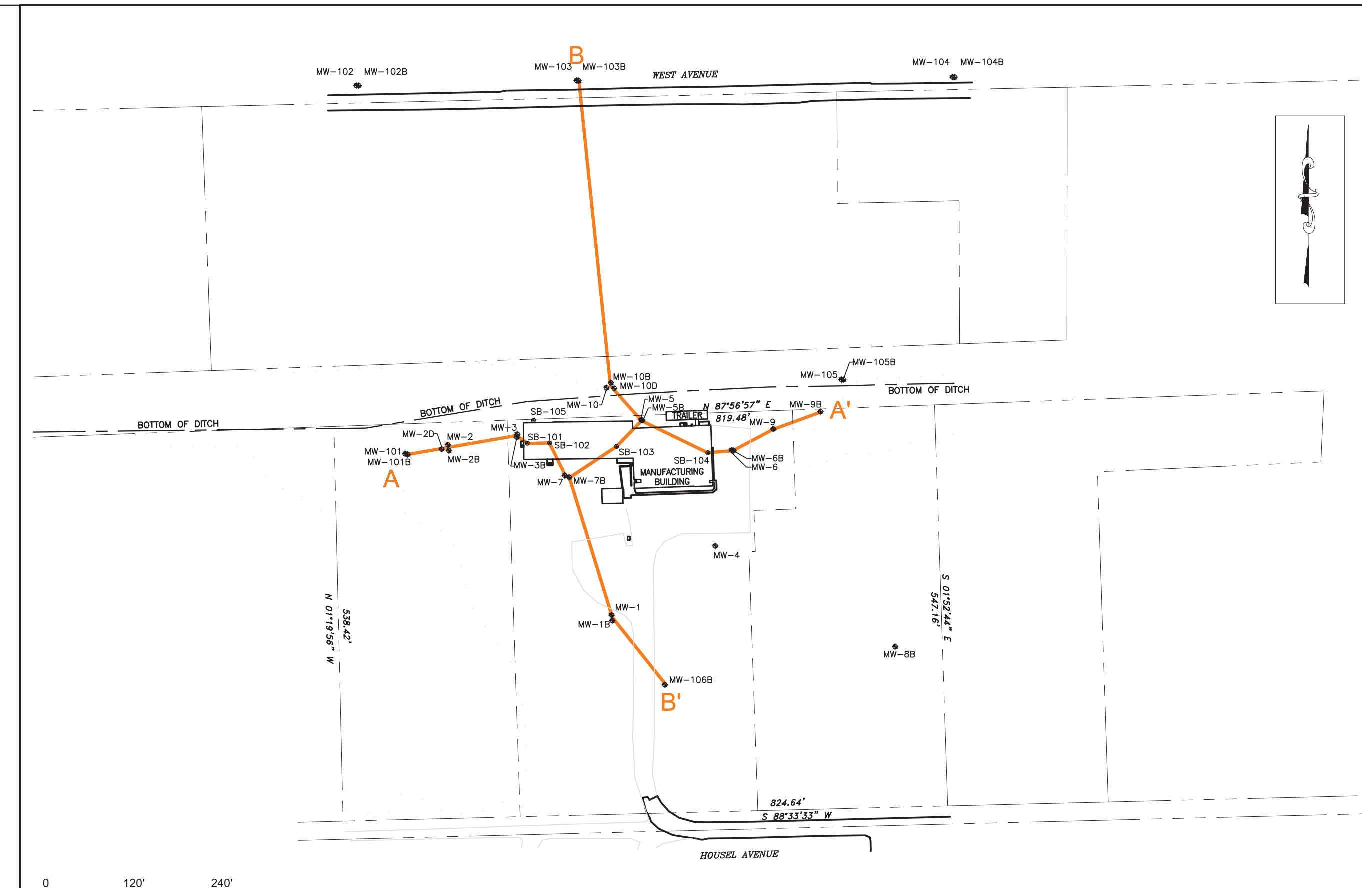
Path\Name: \\NTAPA-NYC\environmental\Shared\Projects\NYSDEC\Assignments\WA #19 - Monroe Electronics\Feasibility Study\TRC Working Drawings\Figure 2 - Site Plan and Invest. Locations (05.01.15).dwg - Date\Time: Fri, 01 May 2015 - 5:29pm - User Name: HDelgado - Layout Tab: 11X17



GEOLOGIC CROSS-SECTION A-A'
HORIZONTAL SCALE: 1" = 40'



GEOLOGIC CROSS-SECTION B-B'
HORIZONTAL SCALE: 1" = 50'



TRANSECT LOCATION MAP
SCALE: 1" = 120'

LEGEND:

- GEOLOGIC CROSS-SECTION TRANSECT
- 327.75 INFERRED GROUNDWATER SURFACE ELEVATION AND ELEVATION MEASUREMENT (SHALLOW WELLS – DECEMBER 2014)
- MONITORING WELL SCREEN
- CONCRETE BUILDING SLAB
- MOSTLY SAND
- MOSTLY CLAY
- WEATHERED SHALE
- BEDROCK

CVOCs = TOTAL CHLORINATED VOLATILE ORGANIC COMPOUINDS

µg/L = MICROGRAMS PER LITER

NOTES:

1. VERTICAL DATUM IS NAVD '88
2. GRID NORTH ESTABLISHED FROM THE NEW YORK STATE PLANE COORDINATE SYSTEM, WEST ZONE, NAD83, FEET

REVISIONS			
NO.	DESCRIPTION	BY	DATE

PAPER SIZE: 24" x 36"

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DESIGNED BY: MEF
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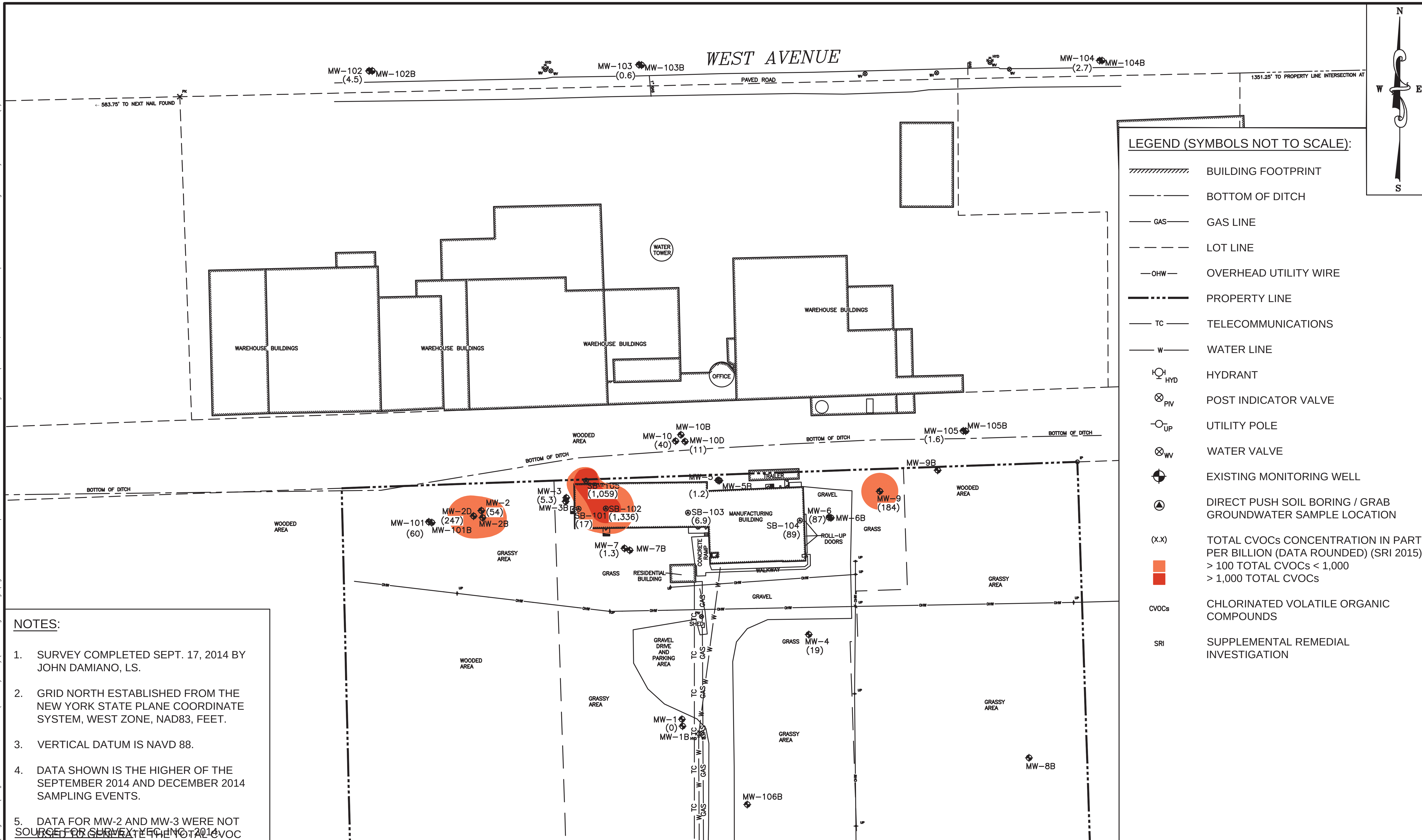
DATE: MAY 2015
SCALE: AS SHOWN
PROJECT NUMBER: 219075.0000.0000

PROJECT NAME:
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
FEASIBILITY STUDY- MONROE ELECTRONICS SITE - SITE NO. 837013
100 HOUSEL AVENUE
LYNDONVILLE, NEW YORK 14098

DRAWING TITLE:
GEOLOGIC CROSS-SECTIONS WITH TOTAL CHLORINATED VOLATILE ORGANIC COMPOUNDS (CVOCs) DETECTED IN SHALLOW AND BEDROCK MONITORING WELLS

FIGURE 3



NOTES:

1. SURVEY COMPLETED SEPT. 17, 2014 BY JOHN DAMIANO, LS.
2. GRID NORTH ESTABLISHED FROM THE NEW YORK STATE PLANE COORDINATE SYSTEM, WEST ZONE, NAD83, FEET.
3. VERTICAL DATUM IS NAVD 88.
4. DATA SHOWN IS THE HIGHER OF THE SEPTEMBER 2014 AND DECEMBER 2014 SAMPLING EVENTS.
5. DATA FOR MW-2 AND MW-3 WERE NOT USED TO GENERATE THE TOTAL CVOC CONTOURS SHOWN.

SOURCE FOR SURVEY: YEC, INC. 2014

LEGEND (SYMBOLS NOT TO SCALE):

- BUILDING FOOTPRINT
- BOTTOM OF DITCH
- GAS — GAS LINE
- LOT LINE
- OHW — OVERHEAD UTILITY WIRE
- PROPERTY LINE
- TC — TELECOMMUNICATIONS
- W — WATER LINE
- HYD — HYDRANT
- PIV — POST INDICATOR VALVE
- UP — UTILITY POLE
- WV — WATER VALVE
- EXISTING MONITORING WELL
- DIRECT PUSH SOIL BORING / GRAB GROUNDWATER SAMPLE LOCATION
- (X.X) TOTAL CVOCs CONCENTRATION IN PARTS PER BILLION (DATA ROUNDED) (SRI 2015):
  - > 100 TOTAL CVOCs < 1,000
  - > 1,000 TOTAL CVOCs
- CVOCs — CHLORINATED VOLATILE ORGANIC COMPOUNDS
- SRI — SUPPLEMENTAL REMEDIAL INVESTIGATION

REVISIONS NO.	DESCRIPTION	BY	DATE

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APPROXIMATE SCALE: 1"=100'
PAPER SIZE: 11" x 17"

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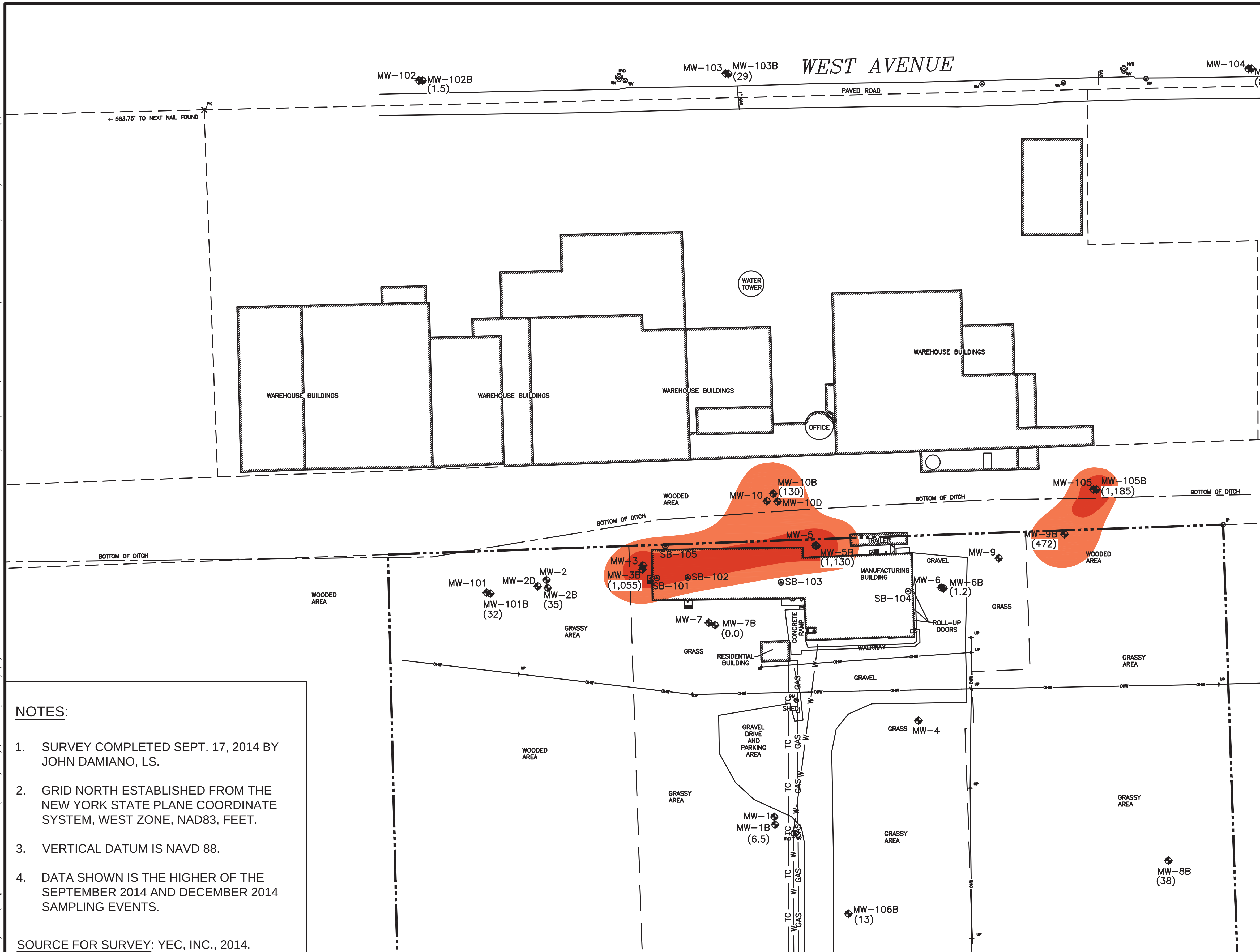
DATE: OCTOBER 2015
SCALE: AS SHOWN
PROJECT NUMBER: 219075.0000.0000

PROJECT NAME:
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
FEASIBILITY STUDY - MONROE ELECTRONICS - SITE NO. 837013
100 HOUSEL AVENUE
LYNDONVILLE, NEW YORK 14098

DRAWING TITLE:
SHALLOW AQUIFER: CONCENTRATIONS OF TOTAL CVOCs

FIGURE 4



NOTES:

1. SURVEY COMPLETED SEPT. 17, 2014 BY JOHN DAMIANO, LS.
2. GRID NORTH ESTABLISHED FROM THE NEW YORK STATE PLANE COORDINATE SYSTEM, WEST ZONE, NAD83, FEET.
3. VERTICAL DATUM IS NAVD 88.
4. DATA SHOWN IS THE HIGHER OF THE SEPTEMBER 2014 AND DECEMBER 2014 SAMPLING EVENTS.

SOURCE FOR SURVEY: YEC, INC., 2014.

LEGEND (SYMBOLS NOT TO SCALE):

- BUILDING FOOTPRINT
- BOTTOM OF DITCH
- GAS LINE
- LOT LINE
- OVERHEAD UTILITY WIRE
- PROPERTY LINE
- TELECOMMUNICATIONS
- WATER LINE
- HYDRANT
- POST INDICATOR VALVE
- UTILITY POLE
- WATER VALVE
- EXISTING MONITORING WELL
- DIRECT PUSH SOIL BORING / GRAB GROUNDWATER SAMPLE LOCATION
- (X.X) TOTAL CVOCs CONCENTRATION IN PARTS PER BILLION (DATA ROUNDED) (SRI 2015):
  - > 100 TOTAL CVOCs < 1,000
  - > 1,000 TOTAL CVOCs
- CVOCs CHLORINATED VOLATILE ORGANIC COMPOUNDS
- SRI SUPPLEMENTAL REMEDIAL INVESTIGATION

REVISIONS NO.	DESCRIPTION	BY	DATE

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APPROXIMATE SCALE: 1"=100'
PAPER SIZE: 11" x 17"

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SCALE: AS SHOWN
PROJECT NUMBER: 219075.0000.0000

PROJECT NAME:
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
FEASIBILITY STUDY - MONROE ELECTRONICS - SITE NO. 837013
100 HOUSEL AVENUE
LYNDONVILLE, NEW YORK 14098

DRAWING TITLE:
BEDROCK AQUIFER: CONCENTRATIONS OF TOTAL CVOCs

FIGURE 5

LEGEND (SYMBOLS NOT TO SCALE):

- SITE BOUNDARY
- BUILDING FOOTPRINT
- GAS — GAS LINE
- OHW — OVERHEAD WIRES
- TC — TELECOMMUNICATIONS
- W — WATER LINE
- HYD — HYDRANT
- UP — UTILITY POLE
- SB-XXX — DIRECT PUSH SOIL BORING / GROUNDWATER GRAB SAMPLE LOCATION AND IDENTIFICATION NUMBER (AUGUST 2014)
- SS-XXX — SURFACE SOIL SAMPLING LOCATION AND IDENTIFICATION NUMBER (AUGUST 2014)
- SS-XX, SB-X — HISTORIC SURFACE SOIL SAMPLING LOCATION AND IDENTIFICATION NUMBER (SS-XX = AUGUST 2011) (SB-X = 1997)
- B-X, SS-X — HISTORIC SURFACE SOIL SAMPLING LOCATION AND IDENTIFICATION NUMBER (2001)
- AREA X — AREA TARGETED FOR SHALLOW SOIL EXCAVATION OR COVER (PRELIMINARY)
- AREA TARGETED FOR UNRESTRICTED SOIL REMEDIATION (PRELIMINARY)
- 0-2'(73 PPM) — DEPTH IN FEET OR INCHES; CONCENTRATION OF ARSENIC IN PARTS PER MILLION (PPM)
- CONCENTRATION LESS THAN OR EQUAL TO 16 PPM ARSENIC
- CONCENTRATION GREATER THAN 16 PPM ARSENIC

N
W E
S

NOTES:

1. BASE AERIAL PHOTOGRAPH FROM GOOGLE EARTH 2015.
2. 1997 TO 2011 SAMPLE LOCATIONS OBTAINED FROM SCANNED IMAGES AND MAPS PREPARED BY PRIOR CONSULTANTS. LOCATIONS ARE APPROXIMATE.
3. ONLY SAMPLING LOCATIONS WHERE ARSENIC ANALYSIS WAS PERFORMED ARE SHOWN.
4. AREAS TARGETED FOR SHALLOW SOIL REMEDIATION ARE PRELIMINARY. FINAL EXTENTS OF REMEDIATION WOULD BE DETERMINED BY PRE-DESIGN INVESTIGATION AND POST-EXCAVATION SAMPLING RESULTS.

REVISIONS			
NO.	DESCRIPTION	BY	DATE

0 80' 160'

APPROXIMATE SCALE: 1"=80'

PAPER SIZE: 11" x 17"

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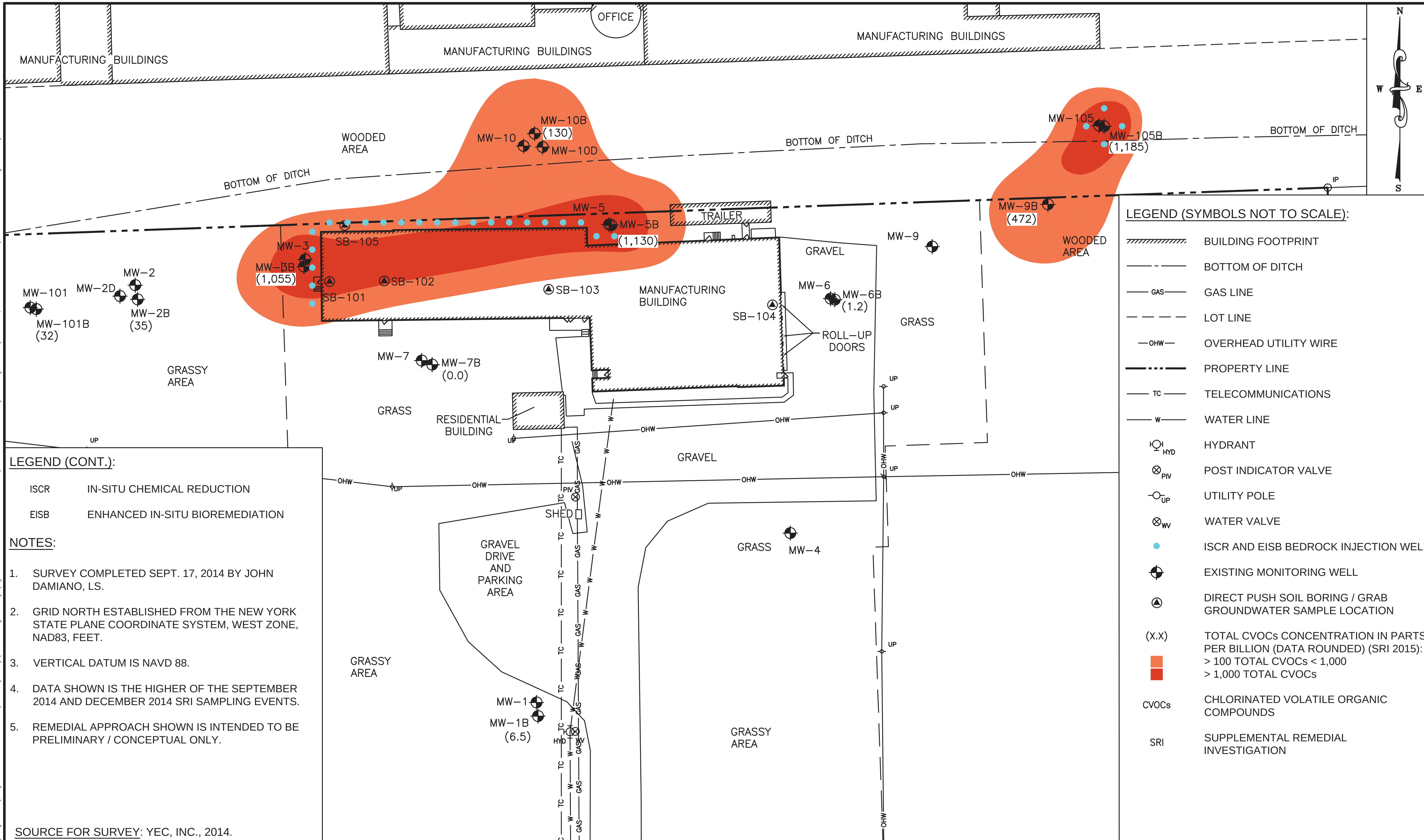
DATE: OCTOBER 2015
SCALE: AS SHOWN
PROJECT NUMBER: 219075.0000.0000

PROJECT NAME:
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
FEASIBILITY STUDY
MONROE ELECTRONICS - SITE NO. 837013
100 HOUSEL AVENUE
LYNDONVILLE, NEW YORK 14098

DRAWING TITLE:
AREAS TARGETED FOR SOIL REMEDIATION

FIGURE 6

Path\Name: I:\Projects\NYSDEC\Assignments\WA #19 - Monroe Electronics\Feasibility Study\TRC Working Drawings\Figure 4 - Areas Targeted for Soil Remediation.dwg - Date\Time: Fri, 30 Oct 2015 - 3:35pm - User Name: hdelgado - Layout Tab: 11X17



LEGEND (SYMBOLS NOT TO SCALE):

- BUILDING FOOTPRINT
- BOTTOM OF DITCH
- GAS LINE
- LOT LINE
- OVERHEAD UTILITY WIRE
- PROPERTY LINE
- TELECOMMUNICATIONS
- WATER LINE
- HYD — HYDRANT
- PIV — POST INDICATOR VALVE
- UP — UTILITY POLE
- WV — WATER VALVE
- ISCR AND EISB BEDROCK INJECTION WELL
- EXISTING MONITORING WELL
- DIRECT PUSH SOIL BORING / GRAB GROUNDWATER SAMPLE LOCATION
- (X.X) — TOTAL CVOCs CONCENTRATION IN PARTS PER BILLION (DATA ROUNDED) (SRI 2015):
  - > 100 TOTAL CVOCs < 1,000
  - > 1,000 TOTAL CVOCs
- CVOCs — CHLORINATED VOLATILE ORGANIC COMPOUNDS
- SRI — SUPPLEMENTAL REMEDIAL INVESTIGATION

LEGEND (CONT.):

- ISCR — IN-SITU CHEMICAL REDUCTION
- EISB — ENHANCED IN-SITU BIOREMEDIATION

NOTES:

1. SURVEY COMPLETED SEPT. 17, 2014 BY JOHN DAMIANO, LS.
2. GRID NORTH ESTABLISHED FROM THE NEW YORK STATE PLANE COORDINATE SYSTEM, WEST ZONE, NAD83, FEET.
3. VERTICAL DATUM IS NAVD 88.
4. DATA SHOWN IS THE HIGHER OF THE SEPTEMBER 2014 AND DECEMBER 2014 SRI SAMPLING EVENTS.
5. REMEDIAL APPROACH SHOWN IS INTENDED TO BE PRELIMINARY / CONCEPTUAL ONLY.

SOURCE FOR SURVEY: YEC, INC., 2014.

Path\Name: I:\Projects\NYSDEC\Assignments\WA #19 - Monroe Electronics\Feasibility Study\TRC Working Drawings\Figure 8 - Alt. 3 Focused Bedrock Aquifer EISB and ISCR Inj. Pts.dwg - Date\Time: Mon, 05 Oct 2015 - 3:47pm - User Name: hdelgado - Layout Tab: 11X17

REVISIONS			
NO.	DESCRIPTION	BY	DATE

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CHECKED BY: DSG
DATE: OCTOBER 2015
SCALE: AS SHOWN
PROJECT NUMBER: 219075.0000.0000

PROJECT NAME:
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
FEASIBILITY STUDY - MONROE ELECTRONICS - SITE NO. 837013
100 HOUSEL AVENUE
LYNDONVILLE, NEW YORK 14098

DRAWING TITLE:
ALTERNATIVE 3: FOCUSED BEDROCK AQUIFER
EISB AND ISCR INJECTION POINTS

FIGURE
7

APPENDIX A

Responsiveness Summary

RESPONSIVENESS SUMMARY

Monroe Electronics
State Superfund Project
Lyndonville, Orleans County, New York
Site No. 837013

The Proposed Remedial Action Plan (PRAP) for the Monroe Electronics 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 December 22, 2015. The PRAP outlined the remedial measure proposed for the contaminated soil, soil vapor, and groundwater at the Monroe Electronics 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 January 7, 2016, which included a presentation of the remedial investigation and feasibility study (RI/FS) 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 January 22, 2016.

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:

COMMENT 1: What year was the photo from slide #7 [of the presentation]?

RESPONSE 1: The precise date of the aerial photograph showing the former Barre Lime and Sulfur plant and surrounding land is unknown but was likely taken in the 1940s, according to the current owner (Robert Vosteen).

COMMENT 2: What portion of the DuPont properties (Lyndonville – West Avenue site) was cleaned up?

RESPONSE 2: Between 1999 and 2000, DuPont made modifications to the storm sewer system that ran beneath the landfill portion of the Lyndonville-West Avenue site. Modifications included installing a junction box for leachate from the landfill, diverting storm water flow upgradient of the landfill, and collecting leachate for off-site disposal. In 2003, asphalt pavement and a geosynthetic barrier layer were installed to cap the 2-acre landfill. In 2005, site-contaminated soil in the drainage swale from the landfill to the middle of the Monroe Electronics property (approx. 1,300 linear feet) was excavated and disposed off-site. The drainage swale was then restored with backfilled soil and reseeded.

COMMENT 3: If Electrical Resistive Heating (ERH) was done, would they have to evacuate the building?

RESPONSE 3: Implementation of ERH could involve drilling a substantial number of holes through the building slab in order to construct the network of interconnected electrodes in the subsurface. The drilling schedule and the layout of the electrodes and associated cabling would be designed to minimize disruptions to daily operations at the plant but temporary displacement of workers may be unavoidable. Increased ventilation and air monitoring would likely be necessary during the heating phases to prevent negative impacts to indoor air quality.

COMMENT 4: To address exposure at the arsenic contaminated area, why not put a fence around it?

RESPONSE 4: A fence can be an appropriate engineering control to limit public access to a site, however, a soil cover along with an excavation plan provides additional protection for current or future users that otherwise may come in contact with remaining soil contamination on the site by walking, digging or otherwise disturbing the soil. In addition, past experience has shown that fences can fall into disrepair and allow access.

COMMENT 5: Regarding arsenic, did you do any sampling out in the community?

RESPONSE 5: The extent of site related contamination was defined for all media during the remedial investigation. As a result, there is no indication that contamination extends beyond the site border, therefore sampling of off-site properties was not necessary. Further characterization of surface soil during the pre-design investigation for the limits of the soil cover, if warranted may include sampling from the adjacent property.

COMMENT 6: How long would treatment take to work? How long will costs be incurred?

RESPONSE 6: Treatment of contaminated groundwater is expected to occur over many years. For purposes of cost comparison, it was assumed that four rounds of injection events over a period of nine years would be required followed by several more years of monitoring.

COMMENT 7: Why was there no alternative review of soil mixing (dilution)?

RESPONSE 7: The DEC believes that the concept of soil mixing or blending has merit in this instance. Thus we have agreed to include, as an option, the blending of arsenic-impacted surface soil in the upper 1 foot (above commercial SCOs) with less contaminated soil from lower soil horizons to produce a cover material, subject to confirmation sampling, that meets commercial SCOs for arsenic. The ROD has been revised to reflect the concept of soil mixing or blending, as an option to the placement of a cover..

COMMENT 8: How much of the estimated remedial costs is associated with the arsenic contamination?

RESPONSE 8: The remedial costs associated with design and placement of a soil cover in areas exceeding the soil cleanup objective (SCO) for arsenic are estimated to be under $200,000.

COMMENT 9: After this comment period is over, how quickly will the remedial plan fall into place?

RESPONSE 9: After the comment period ended, the comments were reviewed by DOH and Department staff and responses generated. The Record of Decision (ROD) is then issued, after which the PRPs for the site will be contacted to assume responsibility for completing the remedial program. If an agreement cannot be reached with the PRPs, the Department will evaluate the site for further action under the State Superfund. This typically takes at least 120 days to resolve and then remedial design can begin.

COMMENT 10: Has a DEC attorney been assigned yet?

RESPONSE 10: Yes.

The following comment (Comment 11) was received January 23, 2016 in an email from Mr. Dave Balcer, Director of Facilities for Lyndonville Central School District:

COMMENT 11: Will the remediation have any impact on our school and/or bus garage which are both located on Housel Ave., close to Monroe Electronics?

RESPONSE 11: A site specific Community Air Monitoring Plan (CAMP) will be carried out as a measure of protection for the surrounding community during construction. The CAMP requires that specific actions and safeguards be followed to ensure that the community is protected from potential airborne contaminant releases as a direct result of remedial work activities. The air monitoring results from the CAMP should also confirm that work activities did not spread contamination off-site through the air. Based on the proximity of the school grounds and bus garage property to the site, additional measures (increased air sampling, additional dust suppression efforts, etc.) will be recommended to address any potential concerns that remediation activities might result in the off-site migration of contaminants to these properties. The nearby off-site community are more likely to be affected to some degree by the increased truck traffic and increased noise associated with construction activities and operation of heavy equipment. Efforts will be taken to minimize these potential impacts.

The following comments (Comments 12 through 18) were received January 20, 2016 in a letter from Mr. Mark A. Chertok, of Sive, Paget & Risel, P.C. (environmental counsel to Bowman Andros Products, LLC):

COMMENT 12: The groundwater flow at the bedrock aquifer has been measured as north-northwest and north-northeast, making Bowman's 6.8-acre property vulnerable to the possibility of the migration of contaminated groundwater from the Monroe Electronics site.

RESPONSE 12: The Department recognizes that contaminated groundwater has migrated off-site toward West Avenue and passes beneath the Bowman property. The contamination detected in the off-site monitoring wells, however, appears to be limited to the bedrock regime and is an order of magnitude less that observed on-site. The off-site groundwater will continue to be monitored after the implementation of the remedy.

COMMENT 13: Bowman believes that the benefits of in-situ thermal remediation override cost considerations, as this remedy would rank highest for long-term effectiveness and permanence, compliance with the SCGs and overall protectiveness of public health and the environment. Thus, Bowman believes that the Department should give further consideration to the implementability and acceptability of ISTD to reassess its overall feasibility.

RESPONSE 13: The Department does not believe thermal remediation is appropriate at this site based on implementability and cost. The disruption to operations caused by installation of bedrock electrodes inside the active manufacturing building is a complicating factor. For a more detailed presentation of the analysis of the various alternatives, please see the Feasibility Study, which is available for review at the document repositories.

COMMENT 14: We note that the FS indicates that the scarcity of qualified vendors is a reason that ISTR (Alternative 5) is "not considered a viable alternative." The PRAP notes this issue, but does not eliminate this alternative on that basis. Thus, it is not clear to us whether a scarcity of qualified vendors to implement Alternative 5 is a basis to reject this alternative.

RESPONSE 14: Implementability (disruption to operations and cost) was the primary consideration when rejecting this alternative.

COMMENT 15: If, upon reconsideration, ISTD is again ruled out as a feasible remedial element, Bowman believes that the aspect of Alternative 4 that expands EISB and ISCR injections to the area beneath the western portion of the Monroe Electronics building should be implemented. Per the PRAP, this remediation could be achieved through specialty drilling techniques that would avoid demolition of a part of the building. (PRAP Exhibit B at 9.) The incremental cost of this additional remediation, prior to the application of a 20% contingency, is approximately $436,000. This increment is not excessive given the increased area of remediation of bedrock groundwater.

RESPONSE 15: The locations of injection points presented in the PRAP are conceptual and the final locations will be determined during the design phase. We agree that angled drilling techniques have been successful in directing various remedial amendments to targeted areas below buildings. In light of this suggestion, the Department will include an evaluation of angled boring techniques as part of the pre-design effort to optimize the delivery of remedial fluids to the targeted treatment zone and minimize disruption to active manufacturing operations.

COMMENT 16: Bowman is concerned that the treatment proposed by Alternative 3 is too limited in area. There do not appear to have been any bedrock groundwater monitoring wells installed between the two areas delineated for remediation on Figure 7 of the PRAP north and northeast of the Monroe Electronics manufacturing building; these areas appear to be approximately 200+ feet apart. The only bedrock groundwater monitoring well in this vicinity is MW-6B, which is due east of the manufacturing building and south of the two proposed remedial areas. Thus, the bedrock groundwater may be elevated in this intervening area, in which no monitoring wells were placed. Accordingly, it is recommended that several additional monitoring wells be installed between the two areas slated for remediation and, if the levels are elevated, the remedial approach should be applied to those areas as well. In that regard, the 1,000 ppb trigger is too low and should be in the 400-500 ppb range to maximize effectiveness of the remediation. For that reason, Bowman requests that ISCR and EISB injections should be added in the vicinity of MW-9B, to assure that TVOCs present in the bedrock groundwater in that area are remediated.

RESPONSE 16: Further characterization of CVOC contamination in the bedrock will be completed as part of the remedial design phase. Such characterization may include the addition of new wells including the area between MW-10B and MW-105B.

COMMENT 17: The Comparative Analysis Ranking of Alternatives found in the FS appears inaccurate in several respects. For example, it is unclear why Alternative 4 ranks overall lower than Alternative 3 when the FS and PRAP indicate that special drilling techniques would allow the additional treatment proposed in Alternative 4 without building demolition; the difference in relative cost would not be material. Thus, implementability should not be a material issue. Given the enhanced treatment it offers (as described in the FS and PRAP), Alternative 4 should rank above Alternative 3 in several categories, including Overall Protectiveness of the Public Health and the Environment; Compliance with SCGs; Short-term Effectiveness; Long-term Effectiveness and Permanence; and Reduction of Toxicity, Mobility, and Volume. It is difficult to understand how Alternative 2, which provides for groundwater monitored natural attenuation, and no treatment, can yield the same overall protectiveness of public health and environment as Alternatives 3 and 4, both of which include treatment of TVOCs. This confusion is especially pronounced with respect to the metric of short-term effectiveness.

RESPONSE 17: According to DER-10, “short-term impact and effectiveness” includes potential adverse impacts during construction and implementation of a remedial alternative as well as the length of time needed to meet RAOs. The groundwater component of the selected remedy (Alternative 3) has been revised and will include the additional treatment proposed in Alternative 4.

COMMENT 18: The Department's consultants conducted soil vapor sampling in the warehouse on the Bowman property in March 2014. It has now been almost two years since that investigation, and it may be some time before implementation of the remedy. Accordingly, Bowman requests that another round of soil vapor sampling be conducted to confirm that, pending the implementation of the remedial program for bedrock groundwater, there continues to be no issue with respect to the subslab and/or indoor air levels.

RESPONSE 18: Based on the review of all the soil vapor intrusion sampling results for this building as well as sampling results from adjacent properties, we have determined that actions, including additional sampling, are not needed to address exposures related to soil vapor intrusion at the Bowman property. It is our expectation that the environmental conditions near the site will improve as a result of the remedial activities being implemented at the site. Therefore, we do not expect that soil vapor intrusion will be a concern at the property in the future. Monitoring of groundwater and air, in accordance with a Site Management Plan (SMP), will continue at the Monroe Electronics site to verify that this is the case.

The following comment (Comment 19) was received January 22, 2016 in an email from Mr. William E. Vosteen, President of Monroe Electronics:

COMMENT 19: I would like to challenge the request to vacate our rental house on the Monroe Electronics site in the PRAP. I question the true amount of exposure to contaminants any tenant would have while living there.

RESPONSE 19: Areas of arsenic-contaminated soil are within 100 feet of the house and exceed the levels which would be considered suitable for residential use. The remedy is based on commercial use of the site. In addition, a residential use allowance, even if achieved, is not compatible with the Light Industrial zoning assigned to the property by the Village of Lyndonville.

The following comments (Comments 20 through 42) were received January 22, 2016 in a letter from Mr. Peter von Schondorf, of Leader Professional Services (Monroe Electronics consultant):

COMMENT 20: The PRAP gave an excellent review of the conditions and the problems faced to remediate the Site. The most significant and important hurdles will be to address the groundwater contamination and soil cleanup. The groundwater cleanup will be difficult because of the low permeability of the natural materials (clay, weathered and fractured shale bedrock). Since the permeability of the natural materials have not adequately been evaluated, it remains unknown if an effective distribution of bioremediation products can made with the number of injection wells used in the cost analysis.

RESPONSE 20: Estimates of the number of injection wells required were based on professional judgment. The results of pre-design studies, including pilot injection testing, will determine the optimum number, depth, and spacing of wells.

COMMENT 21: The soil cleanup is a different type of problem. Technologically the problem is simple; covering, mixing, or removing the soil requires only conventional construction equipment. The difficultly arises in selecting a remediation which is most appropriate for the surface soil. In our view the NYSDEC and their consultants have ignored the existing Site conditions which are protective of both human health and the environment. Both of the problems should have been raised and discussed in the Feasibility Study ("FS") through a more detailed discussion of "Contaminant Fate and Transport" (Section 1.6) and the "Qualitative Human Health Risk Evaluation" (Section 1.7). Within these discussions the Site conditions should have been portrayed in a more accurate manner with respect to groundwater contamination and groundwater flow, and how the existing ground cover (grass and vegetation) covers the impacted soil.

RESPONSE 21: Existing ground cover conditions were taken into account. To assess potential human and ecological exposures to contaminated surface soil, samples were collected from the upper 6 inches of soil below the vegetative cover in accordance with DER-10. While the contamination detected is below a vegetative cover, it potentially poses a risk via direct contact, ingestion, and inhalation during intrusive activities such as gardening, use of recreational vehicles, or future development. For a commercial use scenario, a minimum of one foot of soil (placed over a demarcation layer) meeting the site SCOs for cover material, as set forth in 6 NYCRR Part 375-6.7(d), is required. Grass and vegetation alone is insufficient.

COMMENT 22: As written the Contaminant Fate and Transport discussion prepared by TRC describes how the overburden and bedrock have estimated average hydraulic conductivity ranging from 0.09 to 0.12 feet per day. These averages may be appropriate for the Site conditions; however we contend the method used (rising head method) to determine these values was not appropriate for the bedrock monitoring wells and possibly not appropriate for the overburden monitoring wells. The presence of fractures in the bedrock contradicts the basic premise of radial flow entering the well. Many times fractures cause non-radial flow patterns, so it is important to test these monitoring wells with several methods.

RESPONSE 22: Noted. Gaining a more detailed understanding of bedrock flow will be an objective of the future pre-design investigation with specific remedial technologies in mind.

COMMENT 23: We are also concerned with the Fate and Transport discussion in the third paragraph on page 12 of the FS, where TRC implies that contaminants are flowing at the same rate as the groundwater. This is not accurate, especially for chlorinated solvents which tend to be absorbed onto organic rich materials in the groundwater zone. Estimating or acknowledging the difference is extremely important because the difference between the two values can be significant, possibly by a factor of 10 or more. Knowing how contaminants are being transported in the groundwater (by identifying the estimated velocity of the groundwater and contaminants) can assist with the evaluation of the risks posed by the groundwater and how best to conduct the remediation.

RESPONSE 23: A variety of hydro-geochemical forces, including adsorption, act to retard contaminant migration relative to bulk groundwater flow. Gaining a more detailed understanding of bedrock flow will be an objective of the future pre-design investigation with specific injection technologies and delivery methods in mind.

COMMENT 24: The "Qualitative Human Health Risk Evaluation" (Section 1.7) does not present a rigorous evaluation of human risk; if it did, there would have been an analysis of contaminant flow in the exposure analysis. Given the cost of the proposed remedy, a quantitative risk analysis should have been prepared. There is not a sufficient scientific basis for the chosen remedy without it.

RESPONSE 24: Risk assessments (qualitative or quantitative) are only one tool by which health decisions are made regarding the current and future potential exposure pathways for contamination present in soil, soil vapor, groundwater, and air. The quantitative risk assessment by itself would not likely change site remedial decisions that have been made by comparing the available site data to the soil cleanup objectives set forth in 6 NYCRR Part 375. These SCOs are well-established and are protective of public health and the environment for the property's intended use.

COMMENT 25: The Qualitative Human Health Risk Evaluation in the FS was also lacking in discussion of the arsenic in soil. Ironically, the FS does identify the key factors when describing the shallow arsenic soil contamination: "[T]hese impacts at shallow depths (ground surface to 6 inches bgs) potentially poses a risk for the pathways of absorption via direct contact, ingestion and inhalation." "This risk can be considered minimal as the Site is stabilized with well-established vegetative cover." "However, potential exposure could occur, most likely during activities where the surface soil is disturbed (e.g. gardening, utility maintenance, or future redevelopment)."

RESPONSE 25: As stated in the PRAP, and now the ROD, the arsenic levels exceed SCOs for commercial and industrial use of the site indicating the potential for exposure. Section 6.4 (Summary of the Human Exposure Pathways) of the PRAP addresses scenarios in which people may come into contact with contamination at the site in its current condition. The current human exposure assessment for the site will reflect current conditions at the site until the site's remediation is complete.

COMMENT 26: We find it at least contradictory that NYSDEC agrees that the risk posed by the arsenic is minimal, but is planning to construct a soil cap. We view the plan to construct the cap a low risk alternative, but an unnecessary expenditure of resources because maintaining the existing soil surface (a grass lawn) achieves the same goal. While the FS identifies gardening, utility maintenance, and future redevelopment as the potential exposure, it admits that "[t]here are currently no vegetable gardens on-site." The presence of utilities in this area is another non-issue because utilities are all located outside the impacted area. Further, there are no plans for future Site development and in any event, future development can be restricted and controlled to keep the risk level low. The same risk will be presented by future work whether a grass surface is maintained or a cap is installed.

RESPONSE 26: A clean soil cover along with an excavation plan provides additional protection for any current or future users that otherwise may come in contact with remaining contamination present in the surface and near surface soil on the site by walking, digging, or otherwise disturbing the soil. See also the response to Comment 21.

COMMENT 27: Cost Estimate Tables. The cost tables indicate that a 7% discounted rate was used to calculate the present value, but this value is high compared to current market rates. Granted, the interest rates are based on many factors, but for investments which have been historically safe (bonds and treasury notes) interest rates are currently less than 3%, but over time their return on investment has averaged from 5.28% (1928-2014) to 5.31 % (2005-2014). Much riskier investments (stock market-S&P 500) have an average yield of 11.53% since 1928, but the average can be lower if an average is calculated for a narrower time period. From 2005 to 2014, for example, the average S&P 500 return was 9.37%. Based on these rates of return, the 7% rate used is very optimistic for a safe return on investment.

RESPONSE 27: A discount rate of 7% was used in accordance with the most recent USEPA guidance for cost estimating ("A Guide to Developing and Documenting Cost Estimates During the Feasibility Study." EPA, July 2000).

COMMENT 28: Alternative 2: Indoor Air Sampling. The description given for indoor air sampling in the alternatives does not indicate the number of samples to be collected and does not specify that the sampling will be done only during the heating season.

RESPONSE 28: The indoor air monitoring program will be implemented during the heating season and the number and locations of samples will be determined based on a current evaluation of the building layout and uses. Samples are expected to be collected from areas that are routinely occupied or likely to be occupied in the future and from areas where previous air samples were collected.

COMMENT 29: Alternative 2: Monitored Natural Attenuation Sampling. The description of Alternative 2 Monitored Natural Attenuation ("MNA") sampling indicates that a network of approximately 31 monitoring wells will be sampled on a quarterly basis for two years and then reduced to annual sampling for years 3 through 30. The description does not indicate if these are on-site and off-site wells or whether it involves the installation of new monitoring wells. It appears the alternative assumed sampling all of the projects monitoring wells. This approach does not require the sampling of every well, but only selected monitoring wells within the "source areas," several immediately up and down gradient of the source, and then selected wells further down gradient of the Site where groundwater quality is acceptable. The number of monitoring wells to be sampled can easily be cut in half.

RESPONSE 29: MNA is not included in the selected remedy. A groundwater monitoring plan will be developed to monitor the performance of the groundwater treatment remedy, details of which will be flushed out during the remedial design and implementation phase.

COMMENT 30: Alternative 2: Long Term Effectiveness of Covering Arsenic Contaminated Soil. While the idea of covering the arsenic contaminated soil is consistent with Part 375 requirements for limiting exposures; our concern is with the second paragraph of section 5.2.2.5 Long Term Effectiveness and Permanence, where it is stated "Covering the surface soil impacted with arsenic at concentrations greater than SCOs provides long term elimination of exposure risks." We disagree with this statement for all the same reasons NYSDEC rejects a no action alternative and leaving these areas covered with vegetation. Activities such as utility maintenance and development will disturb the existing surface soil, but also the soil present one foot below the ground surface. Maintenance of a grass cover will be equally effective, especially if the Site owner commits to no future development or gardening in this area.

RESPONSE 30: The excavation plan component is required and will be followed to ensure that any utility or other subsurface work such as you describe will ensure that human exposures to remaining contaminated soil are properly managed. Therefore, a "certified-clean" soil cover along with an excavation plan provides adequate protection for any current or future users that otherwise may come in contact with remaining soil contamination present in the surface and near surface soil on the site by walking, digging, or otherwise disturbing the soil.

COMMENT 31: Alternative 2: Long Term Effectiveness of Covering Arsenic Contaminated Soil. It was also unusual that the only permanent alternative considered for the arsenic issue was to remove the contaminated soil. Soil mixing, another potential long term solution, should have been evaluated in the FS. This is not a new or controversial technique. Soil mixing would lower the concentration of the arsenic in the surface soil by incorporating it with soil found lower in the soil profile, which is suspected to have a lower arsenic concentration. The cost for this type of remediation is estimated to be approximately $60,000.00.

RESPONSE 31: See response to Comment 7.

COMMENT 32: Alternative 3. Alternative 3 is different from Alternative 2 because the groundwater is going to be actively remediated using enhanced in-situ bioremediation ("EIBR") and in-situ chemical reduction ("ISCR") along with MNA. We do not disagree with this approach for the groundwater, but we have concerns that within the source areas the shallow groundwater is not being addressed, since this is the primary source of vapor intrusion. The cost table for Alternative 3 shows that the fee for the "Pre-design Investigation" is 51 % of the total direct costs of the "EISB and ISCR Injection" budget. We would like a better explanation for the $250,000 pre-design investigation fee in Section 5.2.3.1; for example, will new wells be installed, would bench top test be performed, or on-site pilot testing? One of the problems with the alternative was identified in the description is the injection of these proprietary fluids into the bedrock. No explanation of how this might be tested prior to full scale implementation. More detail is needed besides what attributes the aquifer does or does not have to maintain EIBR/ISCR and MNA.

RESPONSE 32: Because the highest concentrations of chlorinated solvents in groundwater were measured in the bedrock wells, the targeted zone for the treatment of dissolved contamination, for the purposes of the Feasibility Study, was the upper bedrock. Additional data will be generated and used during the remedial design phase and may involve the installation and sampling of additional wells (both bedrock and overburden) and pilot-scale testing. Details of the pre-design investigation will be described in the Remedial Design Work Plan.

COMMENT 33: Alternative 4. We have the same concerns for Alternative 4 as Alternative 3 with the added issue of the feasibility of placing injection points within the manufacturing building. This is especially troublesome because TRC rather boldly asserts that the injections can be done if selective demolition of the manufacturing building is conducted (cavalierly suggesting partial destruction of one of the largest local employers) or that access can be made for specialized drilling equipment for the placement of injection points. To address this TRC should evaluate how conventional drilling machines can drill high angle borings for the placement of wells, which can be used for injection purposes. These boreholes can be located on the north or south side of the manufacturing building and can easily access injection zones targeted by those wells proposed within the interior of the building. It is interesting that TRC would propose these interior borehole options, yet choose not to include additional, more easily attainable injection points west of the monitoring well cluster MW-3, north and east of the MW-5 cluster and in the vicinity of the monitoring well MW-10 cluster and MW-9B. Given the low permeability of the bedrock and overburden, they should not totally rely on groundwater flow to distribute proprietary solutions, consequently these easily accessible locations should not be overlooked.

RESPONSE 33: The impact on manufacturing operations of Alternative 4 is one of the primary reasons Alternative 3 was selected instead of Alternative 4. See response to Comment 15..

COMMENT 34: Alternative 4. Alternative 4 also introduces the task of removing the contaminated arsenic soil, which as NYSDEC recognizes would be unnecessary overkill. We noted in the description of the alternative, site restoration work beyond backfilling is not discussed. Are we correct in assuming that the presented fee includes the placement of topsoil, a geotextile demarcation layer and hydroseeding?

RESPONSE 34: The cost estimate includes placement of 12 inches of soil (6 inches of which is topsoil), geotextile demarcation layer, and hydroseeding.

COMMENT 35: Section 6.3: Summary of Environmental Assessment. The second paragraph of this section states "a Fish and Wildlife Resources Impact Analysis was deemed not necessary for OU 01." OU 01 is not defined in the PRAP and could lead to confusion by the readers.

RESPONSE 35: Noted. We have made the editorial change.

COMMENT 36: Section 6.3: Groundwater. The text identifies that overburden and bedrock aquifers exist beneath the Site. This is inaccurate; the RI Site characterization did not do enough investigation to determine if there is more than one aquifer beneath the site. TRC found multiple sediment layers beneath the Site and all are at least partially saturated. That they are saturated does not distinguish them as being aquifers. The hydraulic data developed to date shows the groundwater zones are interconnected and thus one aquifer.

RESPONSE 36: The differentiation between “overburden” and “bedrock” aquifers is intended to indicate the geological matrices of the aquifers and not to suggest that the two aquifers are hydraulically separate.

COMMENT 37: Section 6.4: Summary of Human Exposure Pathways. The second paragraph in this section states that people entering the Site may come into contact with contaminants in the soil. Unlike the single sentence description of the exposure pathway from groundwater to people (via drinking water) and the description of likely exposure pathway due to soil gas, the pathway from the soil to people entering the Site is not described and is unclear.

RESPONSE 37: Section 6.4 Summary of Human Exposure Pathways has been revised to read: "People who enter the site may come into contact with contaminants in soil by walking, recreating, working, or engaging in other invasive activities on the site."

COMMENT 38: Section 6.4: Summary of Human Exposure Pathways. If capping/remediation of the contaminated soil is proposed to abate a significant threat, the PRAP should describe which complete pathway results in this significant threat. It is also important to quantify the risks involved with all of the contaminated media, because without knowing what is at stake (the level of risk) the average person cannot make meaningful decision, draw conclusions or ask appropriate questions. Saying that something is significant or insignificant is meaningless without additional information.

RESPONSE 38: The designation of the site as a Class 2 site on the Registry of Inactive Hazardous Waste Disposal Sites site identifies the site as representing a significant threat to public health and/or the environment and requires remedial action. This significant threat determination can be made based on the current or future potential for exposures to occur based on existing or expected future uses or conditions.

COMMENT 39: Section 7: Summary of the Proposed Remedy. In the discussion of the proposed remedy, the discussion of the Remedial Design is rather generic. This discussion should include the requirement for bench studying proposed enhancements using samples of the Site's soil and groundwater to determine which enhancement(s) are needed (e.g. a carbon source, electron donor, etc.) and pilot testing of how to best deliver these amendments and how the contaminants and microbe respond to the injections. As we have pointed out, the permeability of geologic layers are expected to be variable, and at worst range widely in value. This may require different implementation and progress monitoring strategies to be used for the different targeted materials.

RESPONSE 39: The Remedial Design, including the scope of the pre-design investigation, will be described in the Remedial Design Work Plan.

COMMENT 40: Section 7: Summary of the Proposed Remedy. We have a concern there has been no quantitative assessment of the risks posed by the Site. Based on a more rigorous risk analysis the general public will have a better understanding that the risks that are present and how the remediation will address them.

RESPONSE 40: See response to Comment 24.

COMMENT 41: We believe that institutional controls can adequately manage the risks presented by the surface soil arsenic contamination and the risks posed by contaminated groundwater. The qualitative risk analysis and use of generic soil and groundwater cleanup values does not adequately evaluate or define the contaminant risks at the Site or justify the proposed remedial actions. Based on Site conditions, the contaminated surface soil is a potential risk, because there is the potential for weather to erode the existing ground surface removing the vegetative cover. There is no indication of any risk of erosion, but if it were to occur, there would be only a temporarily increase in the risks to the Site users. But this can also occur with a soil cap, especially if one considers a one foot thickness is the minimal level (thickness) of protection needed. Periodic monitoring of the Site conditions and a site management plan would be similarly adequate to conserve Site conditions and address any immediate problems as they reveal themselves as opposed to spending hundreds of thousands of dollars building a cap.

RESPONSE 41: The remedial action objectives (RAO) for soil are to prevent ingestion/direct contact with contaminated soil and prevent migration. Similarly, the RAOs for groundwater is to prevent ingestion or inhalation and to restore groundwater to pre-disposal conditions to the extent feasible. The selected remedy will eliminate potential exposures to contaminated soil by covering it with one foot of clean soil in addition to reestablishing and maintaining a grass cover. Groundwater treatment with performance monitoring is also a major element of the overall remedy. The Department believes that relying on institutional controls alone (without active remediation) will not adequately achieve the RAO for soil or groundwater.

COMMENT 42: Section 7: Summary of the Proposed Remedy. The RI found the contaminated groundwater is also a potential risk to the workers and residents of the Site because of the potential for sub-slab vapors to eventually impact the indoor air quality of the buildings. The deeper groundwater zones are identified as a concern because the State's water quality is lowered and in the future there may be a user for the groundwater. However, the deep groundwater is moving slowly and is being remediated intrinsically by the existing groundwater chemistry and microbes. Unless shown by risk assessment, monitoring the groundwater and indoor air quality would provide adequate warning of a change in the existing conditions, which might possibly increase the risk to workers and residents of the Site. Consequently MNA monitoring is a better solution for the Site. However, since all individuals have different sensitivities to the contaminants, a passive or mechanical vapor mitigation system to address the manufacturing building sub-slab contamination and removal of the residential tenants is an option that we recommend instead of groundwater remediation.

RESPONSE 42: The RI found that the rate at which dissolved contaminants are being degraded naturally is limited by the subsurface conditions (e.g., lack of sufficient carbon source and microbial population). By introducing an engineered mixture of nutrients, chemical reductants, and specific microbes, the Department believes that the rate of biodegradation can be significantly enhanced and the timeframe for aquifer restoration reduced.

The following comments (Comments 43 through 50) were received January 22, 2016 in a letter from Mr. Alan J. Knauf, of Knauf Shaw, LLP (attorneys for Monroe Electronics):

COMMENT 43: The proposed cover for the 80,000 sq. ft. of lawn areas with elevated arsenic levels (“Target Areas”) is unnecessary, and certainly not justified by the Feasibility Study (“FS”) or Proposed Remedial Action Plan (“PRAP”). Only a cursory “Qualitative Human Health Risk Evaluation” was provided in Section 1.7 of the FS, which apparently assumed that action must be taken based on the Soil Cleanup Objectives. However, a quantitative risk analysis should have been performed to justify the proposed $190,000 cost of a soil cover on the Target Areas.

RESPONSE 43: See response to Comment 24.

COMMENT 44: While the FS theorized potential exposure due to soil disturbances from gardening, utility maintenance and future redevelopment, none of these scenarios are at all likely. There are no plans for future gardening or development on the Target Areas, and Monroe is willing to impose an Environmental Easement to ensure a restriction to prevent future gardening or development in the Target Areas. There are no utilities running through the Target Areas, so that is not an issue. Furthermore, Monroe will agree to a Site Management Plan ("SMP"), enforced by an Environmental Easement, to restrict any excavations in the Target Areas. In addition, Monroe will agree to fence the Target Areas.

RESPONSE 44: Based on the RI, arsenic is present in soil at concentrations that exceed the commercial SCO of 16 parts per million (ppm). The remedial action objectives (RAO) for soil with respect to human health is to prevent ingestion/direct contact with contaminated soil. The selected remedy will eliminate potential exposures to arsenic-impacted soil by covering it with one foot of clean soil in addition to imposing institutional controls. Leaving contamination within the upper foot of soil horizon does not adequately achieve the RAO for soil or meet the criteria for commercial use.

COMMENT 45: We also note that arsenic contamination from historic orchards is a widespread problem in areas along the Lake Ontario shore from Niagara to Oswego County. If these levels of arsenic must be remediated, large areas of these counties may also need remediation.

RESPONSE 45: This site was listed as a class 2 site on the Registry of Inactive Hazardous Waste Disposal sites in NYS due to the presence of a consequential amount of hazardous waste confirmed on the site and remediation is required. The remedy selected for this site must be protective of public health and the environment notwithstanding the past use of the site as an apple orchard. In similar parts of the state, if orchards become redeveloped for purposes other than farming, the extent and potential impacts due to orchard-related chemicals, including arsenic, would most likely need to be characterized and possibly remediated depending on local, state or federal requirements in place.

COMMENT 46: No one drinks the groundwater near the Site, and the studies have concluded that humans are not being exposed to unsafe levels of vapors. Monroe is agreeable to giving an Environmental Easement that not only includes a SMP and restrictions to prohibit gardening and future development, but it is willing to include restrictions prohibiting use or extraction of groundwater and limiting future use of the Site to industrial use.

RESPONSE 46: The best use of groundwater in New York State is for drinking water and the goal for the Superfund is to return a site to predisposal conditions to the extent feasible. The selected remedy will achieve these requirements.

COMMENT 47: In light of the slow groundwater flow, and the natural processes at work, natural attenuation is taking care of the contamination. Accordingly, NYSDEC should adopt PRAP Alternative 1, namely monitored natural attenuation with vapor monitoring. If vapors become an issue, a vapor mitigation system can be installed. However, the large expense for chemical and biological treatment of the chlorinated solvents is not cost-justified or necessary.

RESPONSE 47: Alternative 1 (as presented in the PRAP) is No Action and does not include any monitoring. While Alternative 2 would eventually achieve RAOs for all impacted media, the length of time necessary for groundwater to achieve drinking water standards via natural attenuation processes would likely be very long. The Department believes that introducing biochemical amendments into the aquifer within the suspected source areas would enhance contaminant degradation rates and reduce the remedial timeframe significantly at a reasonable cost.

COMMENT 48: We will also address the listing of the alleged PRPs for the Site. Robert T. Vosteen and William E. Vosteen took over the operation of Monroe after their father's death in 1983, after the alleged solvent disposal between June 1972 and December 1981. Further, the Vosteen boys inherited their ownership of the Site from their mother (who inherited from their father, Robert E. Vosteen), and more recently transferred their Site ownership to a limited liability company they own, 100 Housel Avenue LLC ("100 Housel"). Neither Robert T. Vosteen, William E. Vosteen nor 100 Housel should be classified as PRPs, because they did not own or operate the Site at the time of disposal, and they qualify for the "third party defense" under CERCLA §107(b)(3), 42 U.S.C. §9607(b)(3), since they acquired the Site either "directly or indirectly" "by inheritance or bequest." CERCLA §101(35)(A), 42 U.S.C. §9601(35)(A). A similar defense applies under state law. ECL §27-1323(4)(a)(3), (b)(2)(iii).

RESPONSE 48: After the remedy is selected, the PRPs will again be contacted to assume responsibility for the remedial program. The legal status of any PRPs would be addressed at that time.

COMMENT 49: E.I. Du Pont De Nemours and Company, and its predecessor Barre Lime and Sulfur Company, should be held responsible for all costs related to arsenic which originated from their operations. The farmer that formerly operated the orchards should be held liable for arsenic originating from spraying pesticides on the Site.

RESPONSE 49: See response to comment 48. Note that pesticides applied in accordance with their intended use do not constitute the disposal of hazardous waste.

COMMENT 50: Monroe employs about 30 people, and is one of the area's largest employers. NYSDEC should work with them to ensure their continued viability and keep them in New York State in Lyndonville. Spending unnecessary costs, like covering the Target Areas, should not be incurred, especially without proper justification. Further, Monroe's owners cannot be held liable for their inheritance.

RESPONSE 50: The selected remedy takes into account impacts to on-going operations at the site to the extent practical and the allowable use is consistent with the anticipated future use and applicable zoning.

APPENDIX B

Administrative Record

Administrative Record

Monroe Electronics
State Superfund Project
Lyndonville, New York
Site No. 837013

1. Proposed Remedial Action Plan for the Monroe Electronics site, dated December 2015, prepared by the Department.

2. "Site Characterization Report", July 2001, prepared by the Department.

3. "Remedial Investigation Report", May 2014, prepared by HRP Associates.

4. "Supplemental Remedial Investigation Report", May 2015, prepared by TRC Solutions.

5. "Citizen Participation Plan", July 2015, prepared by the Department.

6. Fact Sheet, "Investigation Completed at State Superfund Site", July 2015, prepared by the Department.

7. "Feasibility Study Report", August 2015, prepared by TRC Solutions.

8. Fact Sheet, "Remedy Proposed for State Superfund Site", December 2015, prepared by the Department.

Letter dated January 20, 2016 from Mark A. Chertok, of Sive, Paget & Risel, P.C.

Letter dated January 22, 2016 from Peter von Schondorf, of Leader Professional Services.

Letter dated January 22, 2016 from Alan J. Knauf, of Knauf Shaw, LLP.