PROPOSED REMEDIAL ACTION PLAN

Bram Manufacturing
State Superfund Project
Congers, Rockland County
Site No. 344055
July 2012

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

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SECTION 1: SUMMARY AND PURPOSE OF THE PROPOSED PLAN

The New York State Department of Environmental Conservation (the Department), in consultation with the New York State Department of Health (NYSDOH), is proposing 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 proposed by this Proposed Remedial Action Plan (PRAP). The disposal of hazardous wastes at this site, as more fully described in Section 6 of this document, has contaminated various environmental media. The proposed remedy is intended to attain the remedial action objectives identified for this site for the protection of public health and the environment. This PRAP identifies the preferred remedy, summarizes the other alternatives considered, and discusses the reasons for the preferred 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 Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York; (6 NYCRR) Part 375. This document is a summary of the information that can be found in the site-related reports and documents in the document repository identified below.

SECTION 2: CITIZEN PARTICIPATION

The Department seeks input from the community on all PRAPs. This is an opportunity for public participation in the remedy selection process. The public is encouraged to review the reports and documents, which are available at the following repository:

Valley Cottage Library
110 Route 303
Valley Cottage, NY 10989
Phone: 845-268-7700

A public comment period has been set from:

8/20/2012 to 9/19/2012

A public meeting is scheduled for the following date:

9/06/2012 at 7:00 PM

Public meeting location:

Clarkstown Town Hall

At the meeting, the findings of the remedial investigation (RI) and the feasibility study (FS) will be presented along with a summary of the proposed remedy. After the presentation, a question-and-answer period will be held, during which verbal or written comments may be submitted on the PRAP.

Written comments may also be sent through 9/2/2012 to:

Randy Whitcher
NYS Department of Environmental Conservation
Division of Environmental Remediation
625 Broadway
Albany, NY 12233
rjwhitch@gw.dec.state.ny.us

The Department may modify the proposed remedy or select another of the alternatives presented in this PRAP based on new information or public comments. Therefore, the public is encouraged to review and comment on the proposed remedy identified herein. Comments will be summarized and addressed in the responsiveness summary section of the Record of Decision (ROD). The ROD is the Department's final selection of the remedy for this site.

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 Description: The Bram Manufacturing site is located in a suburban portion of Rockland County, NY. The site is located on Route 9W near the intersection with Old Lake

Road, and is within 200 feet of the Kill Von Beaste which connects Swartwout Lake with Rockland Lake. It is identified on the Town of Clarkstown tax map as Section 141, Block A, Lot 8.

Site Features: The property consists of an open lot and contains a one story 12,300 square foot block construction building.

Current Zoning/Use: The site is currently zoned for commercial use. The site has been used as both office space and storage. The office space in the western portion of the building is currently unoccupied, while there is a small office in the eastern portion that is still occupied. The property is bordered to the north by residential properties. To the east the zoning is designated commercial and is occupied by a warehouse, a stream, and wetland. To the south the zoning is designated commercial and is occupied by undeveloped property. Route 9W is located to the west of the site.

Historic Use and Source of Contamination: The prior uses that appear to have led to contamination include the manufacturing of lighting fixtures and possible disposal of waste products.

Site Geology and Hydrogeology: Overburden materials on-site consist of medium sand and gravel with some silty clay. A glacial till unit is located below the overburden material and is made of red shale and sandstone. Bedrock is approximately 8 to 12 feet below ground surface and is made up of conglomerates, sandstone and red shale. Groundwater on site is located 4 to 6 feet below ground surface. Overburden groundwater flows to the northeast toward the Kill Von Beaste Brook. Bedrock groundwater flows toward the northwest and there is an upward gradient of flow as groundwater trends northwest. The majority of bedrock groundwater appears to discharge into the Kill Von Beaste.

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) are/is being evaluated in addition to an alternative which would allow for unrestricted use of the site.

A comparison of the results of the investigation 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:

BRAM Manufacturing Corp.

The PRPs for the site declined to implement a remedial program when requested by the Department. After the remedy is selected, the PRPs will again be contacted to assume responsibility for 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:

- air
- groundwater
- surface water
- soil
- sediment
- soil vapor
- 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)	XYLENE (MIXED)
VINYL CHLORIDE	1,2,4-TMB
TETRACHLOROETHYLENE (PCE)	ETHYLBENZENE
DICHLOROETHYLENE	

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

- groundwater
- soil
- indoor air

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.

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

IRM Groundwater Irrigation Well Mitigation

An irrigation well situated north of the site in a condominium complex is drawing groundwater from bedrock. Sampling results from the irrigation well indicated that TCE concentrations as high as 5,300 parts per billion (ppb) were being drawn to the watering system. Based on the NYSDOH recommended that the irrigation system be treated to eliminate exposure from TCE volatilizing in the air a granulated activated carbon (GAC) filtration system was installed on the

irrigation system. Influent and effluent sample results confirmed that contaminants were being removed by the GAC system.

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: Based upon investigations conducted to date, the primary contaminants of concern at the site include trichloroethene (TCE), cis-1,2 dichloroethene (DCE), vinyl chloride (VC), 1,2,4 trimethylbenzene (TMB), tetrachloroethene (PCE) and xylenes.

The estimated area of on-site soil contaminated with chlorinated volatile organic compounds (VOCs) above SCGs is approximately 3,600 square feet and is estimated to be approximately 15 feet thick. On-site soil contamination was found in the southern parking lot, the alley on the east side of the building and under the Bram building. The highest detected concentrations of TCE were measured at 720 parts per million (ppm) at 6 feet below ground surface (bgs). The highest on-site soil concentration of total xylenes was 3,100 ppm at 2 feet bgs.

The highest concentration of TCE detected in overburden groundwater was 78,000 parts per billion (ppb) located within five feet of the former on-site production well at a depth between 8 and 16 feet bgs. The highest on-site concentration of cis-1,2-DCE was detected near the former storage shed at 210,000 ppb. The highest on-site concentration of VC was detected approximately 20 feet east of the former production well at 23,000 ppb.

The analytical results from on-site bedrock groundwater samples indicate the highest concentrations of VOCs are present in the source area at the former production well and immediately down gradient from the source area. TCE was detected on-site at a maximum concentration of 170,000 ppb at 61 feet bgs. Maximum concentrations of 1,2-DCE and VC were detected at 3,600 ppb and 1,000 ppb, respectively, at 51 feet bgs. The chlorinated VOC plume in bedrock groundwater extends to the north and up-wells into overburden groundwater and discharges to the Kill VonBeaste and then Swartwout Lake.

In soil vapor collected from below the Bram manufacturing building, TCE was detected at a concentration as high as 5,500 micrograms per cubic meter (ug/m3) and PCE was detected as high as 1,800 ug/m3. TCE was also detected in one of the indoor air samples collected from the Bram manufacturing building (IA-1) at a concentration of 6.2 ug/m3, which slightly exceeds the NYSDOH air guideline value for TCE of 5 ug/m3.

Special Resources Impacted/Threatened: Investigations indicate that the contaminants of concern (COC) are not adversely impacting the Kill VonBeaste or Swartwout Lake. Surface water and sediment samples show none of the COCs are above applicable SCGs.

6.4: Summary of Human Exposure Pathways

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.*

Access to the site is unrestricted. However, direct contact with contaminated soil or groundwater is unlikely because a majority of the site is covered with buildings and pavement. Contaminated groundwater at the site is not used for drinking or other purposes and the site is served by a public water supply that obtains water from a different source not affected by this contamination. Volatile organic compounds in the groundwater or soil 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 should the on-site building be reoccupied. Sampling indicates that the potential exists for soil vapor intrusion to occur at one off-site building located adjacent to the site.

6.5: Summary of the Remediation Objectives

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

The remedial action objectives for this site are:

Groundwater

RAOs for Public Health Protection

- Prevent 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.
- Remove the source of ground or surface water contamination.

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: SUMMARY OF THE PROPOSED REMEDY

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

The proposed remedy is referred to as the Excavation, Cover System, Chemical Oxidation, Off-Site Bioremediation remedy.

The estimated present worth cost to implement the remedy is $5,346,014. The cost to construct the remedy is estimated to be $5,046,000 and the estimated average annual cost is $27,000.

The elements of the proposed remedy are as follows:

1. A remedial design program would be implemented to provide the details necessary for the construction, operation, 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 gas 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. Protection of groundwater soil cleanup objectives (SCOs) will be used to guide excavation of VOC contaminated soils. Commercial SCOs will be used to guide excavation of any non-VOC contaminated soils. Accessible on-site soils which exceed site-specific SCOs will be excavated and transported off-site for disposal. The site-specific SCOs are: protection of groundwater SCOs (as defined by 6 NYCRR Part 375-6.8) for all VOC contaminants, and commercial SCOs for all non-VOC contaminants.

Approximately 252 cubic yards of accessible soil will be removed. Clean fill meeting the requirements of 6 NYCRR Part 375-6.7(d) will be brought in to replace the excavated soil and establish the designed grades at the site.

3. Because soil containing contaminants will remain, a site cover will be required to allow for commercial use of the site. The cover will consist either of the structures such as buildings, pavement, 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). Where the soil cover is required it will be a minimum of one foot of soil meeting the SCOs for cover material as set forth in 6 NYCRR Part 375-6.7(d) for commercial use. The soil cover will be placed over a demarcation layer, with the upper six inches of the soil of sufficient quality to maintain a vegetation layer. Any fill material brought to the site will meet the requirements for the identified site use as set forth in 6 NYCRR Part 375-6.7(d).

4. Source area overburden soils and groundwater on-site and immediately off-site will be treated with in-situ chemical oxidation. In-situ chemical oxidation is a technology used to treat chlorinated ethene compounds (a type of volatile organic compound) in the soil and groundwater. The process injects a chemical oxidant into the subsurface via injection wells or an infiltration gallery. The method of injection and depth of injection is determined by location of the contamination. As the chemical oxidant comes into contact with the contaminant, an oxidation reaction occurs that breaks down the contaminant into relatively benign compounds such as carbon dioxide and water. Several chemical oxidants are commercially available. It is estimated that 15 shallow and 14 deeper injection points would be installed. It is estimated that the chemical oxidant would be injected during 2 or more separate events over several months.

Prior to the full implementation of these technologies, laboratory and on-site pilot scale studies would be conducted to more clearly define design parameters.

5. Source area bedrock groundwater on-site and immediately off-site will be treated through in-situ chemical reduction. The in-situ chemical reduction will be implemented through placement of a reactive media, such as zero-valent iron (ZVI), into bedrock fractures beneath the site to dechlorinate the chlorinated solvent contamination in the bedrock and bedrock groundwater. The ZVI would be applied through injection wells and to target bedrock fractures contaminated with site-related contaminants.

Prior to the full implementation of these technologies, laboratory and on-site pilot scale studies would be conducted to more clearly define design parameters.

6. Bioremediation is a treatment process whereby contaminants are metabolized into less toxic or nontoxic compounds by naturally occurring organisms. The organisms utilize the contaminants as a source of carbon and energy. The by-products are mainly carbon dioxide and water. Bioremediation may rely on either indigenous organisms (those that are native to the site) or exogenous microorganisms (those that are imported from other locations). In either case, bioremediation technologies seek to optimize the environmental conditions so the appropriate organisms will flourish and destroy the maximum amount of contaminants.

Off-site overburden and bedrock groundwater will be remediated with enhanced bioremediation. Implementation consists of the injection of amendments into the target overburden and bedrock to accelerate biological degradation of site-related VOC contamination.

Subsequent to oxidation treatment and subsequent performance monitoring, enhanced bioremediation may be implemented to address residual overburden and bedrock contamination on-site and off-site. Implementation would consist of the injection of amendments into the target saturated zone soils and/or bedrock to accelerate biological degradation of residual contamination.

7. Imposition of an institutional control in the form of an Environmental Easement for the controlled property that:

requires 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);

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

restricts 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

requires compliance with the Department approved Site Management Plan.

8. 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 Item 6

Engineering Controls: The soil cover discussed in Item 2.

This plan includes, but may not be limited to:

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

descriptions of the provisions of the environmental easement including any land use, and/or groundwater and/or surface water use restrictions;

a provision for evaluation of the potential for soil vapor intrusion for the on-site building and the hotel building should they become occupied and for any buildings developed on the site or at the hotel parcel, including provision for implementing actions recommended to address exposures related to soil vapor intrusion;

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

maintaining site access controls and Department notification; and

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

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

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

a schedule of monitoring and frequency of submittal to the Department;

monitoring for vapor intrusion for any buildings occupied or developed on the site or at the hotel parcel to the north, as may be required by the Institutional and Engineering Control Plan discussed in item 6 above.

9. An operation and maintenance (O&M) plan will be developed to continue treatment and monitoring of the ISCO and ICSR remedies described above. The O&M plan will also continue the treatment and monitoring of the off-site irrigation well. Influent and effluent samples will be collected periodically and analyzed for VOCs to determine if the carbon filtration system requires change out.

Exhibit A

Nature and Extent of Contamination

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

For each medium, 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/ polychlorinated biphenyls (PCBs), and inorganics (metals and cyanide). For comparison purposes, the SCGs are provided for each medium that allows for unrestricted use. For soil, if applicable, the Restricted Use SCGs identified in Section 6.1.1 are also presented.

Groundwater

Groundwater samples were collected from overburden and bedrock monitoring wells. The samples were collected to assess groundwater conditions on and off-site. The results indicate that contamination in shallow groundwater at the site exceeds the SCGs for volatile organic compounds. Contaminant levels in bedrock groundwater both on-site and off-site also exceeded the SCGs for VOCs. A private bedrock irrigation well down gradient of the site was sampled and was found to contain site-related VOC contamination exceeding SCGs.

Table #1 – Overburden Groundwater

Detected Constituents	Concentration Range Detected (ppb)[a]	SCG[b] (ppb)	Frequency Exceeding SCG
VOCs			
1,1,1-Trichloroethane	1.2 - 110	5	6 / 56
1,1,2-Trichloro-1,2,2-Trifluoroethane	2.1 - 5.3	5	1 / 56
1,1,2-Trichloroethane	7 – 27	1	4 / 56
1,1-Dichloroethene	1.3 – 290	5	6 / 56
1,1-Dichloroethane	1.3 – 490	5	7 / 56
1,2,4-Trimethylbenzene	3.5 – 12,000	5	15 / 56
1,2-Dichlorobenzene	1.1 – 81	3	2 / 56
1,2-Dichloroethane	2.1 – 490	0.6	4 / 56
1,3,5-Trimethylbenzene	1.3 – 2,700	5	10 / 56
1,4-Dichlorobenzene	6.6 – 7	3	2 / 56
4-iso-Propyltoluene	6.2 – 6.2	5	1 / 56

Detected Constituents	Concentration Range Detected (ppb)[a]	SCG[b] (ppb)	Frequency Exceeding SCG
Acetone	5.6 – 510	50	2 / 56
Benzene	2.2 – 29	1	7 / 56
Chlorobenzene	8.2 – 8.7	5	2 / 56
Cis-1,2-Dichloroethene	1.2 – 210,000	5	27 / 56
Ethlybenzene	7.5 – 9,700	5	19 / 56
Isopropylbenzene	1.2 – 290	5	12 / 56
Methylene Chloride	1.8 – 9.6	5	2 / 56
Naphthalene	3.5 – 960	10	9 / 56
n-Butylbenzene	1.5 - 120	5	6 / 56
Propylbenzene	1.9 – 980	5	11 / 56
Sec-Butylbenzene	1.7 – 9.9	5	1 / 56
Tetrachloroethene	1.3 – 2,600	5	12 / 56
Toluene	1 – 14,000	5	12 / 56
Trans-1,2-Dichloroethene	1.7 – 360	5	6 / 56
Trichloroethene	1.5 – 78,000	5	29 / 56
Vinyl Chloride	2.9 – 23,000	2	21 / 56
Xylenes, o	3 – 15,000	5	17 / 56
Xylenes (m & p)	1.5 – 51,000	5	18 / 56
Xylenes, total	3 – 62,000	5	19 / 56
SVOCs			
1,2-Dichlorobenzene	1.1 – 22	3	2 / 15
2,4-Dimethylphenol	21 – 430	1	2 / 15
Phenol	35 – 140	1	3 / 15
Inorganics			
Iron	51.1 – 44,200	300	8 / 13
Magnesium	5960 – 36,000	35,000	1 / 7
Manganese	297 – 20,200	300	12 / 13

Detected Constituents	Concentration Range Detected (ppb)[a]	SCG[b] (ppb)	Frequency Exceeding SCG
Selenium	7.2 – 13.8	10	1 / 7
Sodium	10,100 – 69,100	20,000	5 / 7
Thallium	15.6 – 66.9	0.5	3 / 7

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).

Table #2 – Bedrock Groundwater

Detected Constituents	Concentration Range Detected (ppb)[a]	SCG[b] (ppb)	Frequency Exceeding SCG
VOCs			
1,1,1-Trichloroethane	1 – 1,400	5	29 / 99
1,1,2,2-Tetrachloroethane	2.8 – 7.7	5	1 / 99
1,1,2-Trichloro-1,2,2-Trifluoroethane	1.3 – 90	5	8 / 99
1,1,2-Trichloroethane	1.3 – 97	1	25 / 99
1,1-Dichloroethane	1.2 – 160	5	23 / 99
1,2,4-Trimethylbenzene	1 – 21	5	1 / 99
1,2-Dichlorobenzene	1.8 – 14	3	3 / 99
1,2-Dichloroethane	1.8 – 59	0.6	21 / 99
Acetone	2.5 – 61	50	1 / 81
Carbon Tetrachloride	1.1 – 37	5	3 / 99
Chloroform	1 – 63	7	11 / 99
Cis-1,2-Dichloroethene	1.2 – 3,600	5	50 / 99
Ethlybenzene	1.3 – 53	5	7 / 99
Methyl Tertiary Butyl Ether	2.5 – 27	10	5 / 99
Methylene Chloride	4.2 – 12	5	8 / 99
Naphthalene	1.4 – 37	10	2 / 99

Detected Constituents	Concentration Range Detected (ppb)[a]	SCG[b] (ppb)	Frequency Exceeding SCG
Tetrachloroethene	1.1 – 5,000	5	47 / 99
Toluene	0.76 – 15	5	6 / 99
Trans-1,2-Dichloroethene	1.1 – 15	5	3 / 99
Trichloroethene	1.1 – 170,000	5	73 / 99
Vinyl Chloride	1.1 – 1,000	2	32 / 99
Xylenes, o	1.4 – 17	5	5 / 99
Xylenes (m & p)	1.2 – 55	5	11 / 99
Xylenes, total	1.2 – 66	5	14 / 99
Inorganics			
Antimony	4.9 – 4.9	3	1 / 19
Iron	65.1 – 714	300	1 / 24
Magnesium	17,400 – 52,400	35,000	10 / 19
Manganese	22.1 – 902	300	6 / 24
Mercury	0.18 – 1.3	07	1 / 20
Selenium	7.4 – 21.2	10	7 / 19
Sodium	13,400 – 95700	20,000	16/ 19

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).

The primary groundwater contaminants are trichloroethene (TCE), cis-1,2-dichloroethene, vinyl chloride, tetrachloroethene (PCE), ethylbenzene, 1,2,4 Trimethylbenzene and xylenes associated with operation of the former electrical assembly plant and petroleum spills. As noted on Figures 1 and 2, the primary groundwater contamination is associated with VOC disposal within the site building and outside the site building to the south and east.

Based on the findings of the RI, the past disposal of hazardous waste has resulted in the contamination of groundwater. The site contaminants that are considered to be the primary contaminants of concern which will drive the remediation of groundwater to be addressed by the remedy selection process are: TCE, cis-1,2-dichloroethene, vinyl chloride, PCE, ethylbenzene, and xylenes.

Soil

Because the site is entirely covered with pavement or buildings, surface soil samples were not taken during the remedial investigation. Subsurface soil samples were collected from a depth of 2 - 16 feet to assess soil

contamination impacts to groundwater. The results indicate that soils at the site exceed the unrestricted SCG for volatile organic compounds. No soil samples analyzed during the RI exceeded SCGs for SVOCs and inorganics.

Table #3 - Soil

Detected Constituents	Concentration Range Detected (ppm)[a]	Unrestricted SCG[b] (ppm)	Frequency Exceeding Unrestricted SCG	Restricted Use SCG[d] (ppm)	Frequency Exceeding Restricted SCG
VOCs					
Acetone	0.0081 – 12	0.05	8 / 30	0.05	8 / 30
Cis-1,2-Dichloroethene	0.00067 – 56	0.25	13 / 64	0.25	13 / 64
Ethylbenzene	0.0011 – 540	1	25 / 64	1	25 / 64
Methylene Chloride	0.00097 – 0.19	0.05	6 / 64	0.05	6 / 64
Naphthalene	0.0063 – 320	12	10 /64	12	10 / 64
n-Butylbenzene	0.00073 – 110	12	7 / 64	12	7 / 64
Propylbenzene	0.0011 – 100	3.9	8 / 64	3.9	8 / 64
Tetrachloroethene	0.0008 – 39	1.3	2 / 64	1.3	2 /64
Toluene	0.00095 – 1000	0.7	9 / 30	0.7	9 / 30
Trichloroethene	0.00056 – 720	0.47	7 / 64	0.47	7 / 64
Vinyl Chloride	0.0006 – 5.4	0.02	8 / 64	0.02	8 / 64
Xylene, o	0.0007 – 820	0.26	30 / 64	1.6	28 / 64
Xylenes (m & p)	0.0022 – 2700	0.26	32 / 64	1.6	32 / 64
Xylenes, total	0.0029 – 3000	0.26	32 / 64	1.6	32 / 64
Pesticides/PCBs					
4,4’-DDD	0.034 – 0.034	0.0033	1 / 5	14	0 / 5
4,4’-DDE	0.019 – 0.019	0.0033	1 / 5	17	0 /5
4,4’-DDT	0.061 – 0.061	0.0033	1 /5	136	0 / 5
Dieldrin	0.021 – 0.021	0.005	1 / 5	0.1	0 / 5
Aroclor-1254	0.3 – 0.5	0.1	2 / 5	3.2	0 /5
Aroclor-1260	0.094 – 0.16	0.1	1 / 5	3.2	0 / 5

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 Unrestricted 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 VOCs and petroleum from the operation of the former electrical assembly plant and several petroleum spills. As noted on Figures 4.1 and 4.2, soil contamination associated with the former electrical assembly plant and spills exists beneath the Bram building, in the Bram building parking lot to the south, and in the alley to the east of the Bram building. VOCs and petroleum contaminants were found above soil cleanup objectives for the protection of groundwater.

Based on the findings of the Remedial Investigation, the past disposal of hazardous waste has resulted in the contamination of soil. The site contaminants identified in soil which are considered to be the primary contaminants of concern, to be addressed by the remedy selection process are, TCE, cis-1,2-dichloroethene, vinyl chloride, PCE, ethylbenzene, toluene, and xylenes.

Surface Water

Pore water samples from surface water sediments were collected at depths of 1 to 2 feet into sediments east and north of the site and analyzed for VOCs (see Figure 4.3). These samples were collected east of the Bram building to evaluate the discharge of overburden groundwater to the Kill Von Beaste. Samples collected north of the Bram building represent bedrock groundwater that has up welled to overburden and is discharging to the Kill Von Beaste and Swartwout Lake. Because these pore water samples are interpreted to represent groundwater prior to its discharge to surface water, the analytical results are compared to groundwater SCGs.

Table 4 – Sediment Pore Water

Detected Constituents	Concentration Range Detected (ppb)[a]	SCG[b] (ppb)	Frequency Exceeding SCG
VOCs			
Tetrachloroethene	5.4 – 7.9	5	2 – 34
Trichloroethene	1.4 -380	5	6 – 34
Cis-1,2 Dichloroethene	1.2 – 1600	5	19 – 34
Trans-1,2-Dichloroethene	1 -20	5	2 – 34
Vinyl Chloride	3.7 – 440	2	20 – 34
1,1,2-Trichloroethene	1.1 – 3.7	1	3 – 34
1,1-Dichloroethene	1.5 – 9.2	5	1 – 34
1,2-Dichloroethane	1.9 – 2.4	0.6	2 – 34

a - ppb: parts per billion, which is equivalent to micrograms per liter, ug/L, in water.
b-SCG: Ambient Water Quality Standards and Guidance Values (TOGs 1.1.1) and 6 NYCRR Part 703: Surface Water and Groundwater Quality Standards.

Surface water samples were collected from the Kill Von Beaste and Swartwout Lake during the site investigation contained no contaminants of concern.

The primary sediment pore water contaminants are associated with historical electrical assembly plant and historical spills at the Bram Manufacturing building. As noted on Figure 4.3, the primary surface water contamination is associated with overburden and bedrock groundwater discharging to the east and north of the site.

Based on the findings of the Remedial Investigation, the disposal of hazardous waste has resulted in the contamination of groundwater which is discharging to surface water. However, no surface water contamination of concern was identified during the Remedial Investigation.

Sediments

Sediment samples were collected at depths of 0 to 3 inches during the RI from the Kill Von Beaste and a wetland that feeds the Kill Von Beaste. The samples were collected to assess the potential for impacts to wetland and river sediment from the site. The results indicate that sediments contained no concentrations of contaminants of concern.

No site-related sediment contamination of concern was identified during the RI. Therefore, no remedial alternatives need to be evaluated for sediment.

Soil Vapor

The evaluation of the potential for soil vapor intrusion resulting from the presence of site related soil or groundwater contamination was evaluated by the sampling of sub-slab soil vapor under structures and indoor air inside structures. At this site, due to the presence of buildings in the impacted area, a full suite of samples were collected to evaluate whether soil vapor intrusion was occurring.

Soil vapor samples were collected from beneath the foundation slabs of structures located on the Bram Manufacturing property and beneath several adjacent commercial and residential properties. Indoor air and outdoor air samples were also collected at this time. The samples were collected to assess the potential for soil vapor intrusion. TCE was detected in the on-site sub-slab vapor and the indoor air of the Bram Manufacturing building.

Based on the concentration detected, and in comparison with the NYSDOH Soil Vapor Intrusion Guidance, the primary soil vapor contaminants are TCE, cis-1,2-dichloroethene and vinyl chloride; which are associated with the degreasing operation at the Bram Manufacturing facility. As noted on Figure 2, the primary soil vapor contamination is found under the Bram Manufacturing building and under the southern basement of the hotel to the north of the Bram building. Soil vapor testing in the adjacent apartment complex to the north found contaminated soil vapor beneath the slab, but no contamination in indoor air. Therefore, mitigation will be necessary for the on-site buildings should the current use change, and additional soil vapor monitoring is needed for the off-site commercial property. All other commercial and residential properties sampled during the RI do not require further action.

Based on the findings of the Remedial Investigation, the disposal of hazardous waste has resulted in the contamination of soil vapor. The site contaminants that are considered to be the primary contaminants of concern which will drive the remediation of soil vapor to be addressed by the remedy selection process are, TCE, cis-1,2-dichloroethene, vinyl chloride.

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.

Alternative 2: Site Management

The Site Management Alternative requires only institutional controls for the site. This alternative includes institutional controls, in the form of an environmental easement and a site management plan, necessary to protect public health and the environment from any contamination identified at the site.

Operation, monitoring and maintenance of the off-site irrigation well treatment system IRM will continue until data indicates that the system can be shut down.

Present Worth: *$124,000*
Capital Cost: *$424,000*
Annual Costs: *$27,000*

Alternative 3: Excavation, Cover System, ISCO

This alternative relies upon excavation of contaminated soils and in-situ chemical oxidation (ISCO) of overburden and bedrock groundwater and associated saturated soils and rock matrices. Initially, ISCO will target the source area of chlorinated solvent and petroleum related contamination.

Soil cleanup objectives (SCOs) for the protection of groundwater (as defined by 6NYCRR Part 375-6.8) for VOC contaminants will be used to guide excavation of contaminated soils. Commercial SCOs will be used to guide excavation of any non-VOC contaminated soils. On-site soils which exceed site-specific SCOs will be excavated and transported off-site for disposal.

Approximately 252 cubic yards of soil will be removed. Clean fill meeting the requirements of 6 NYCRR Part 375-6.7(d) will be brought in to replace the excavated soil and restore the grades at the site.

Because soil containing contaminants will remain beneath site structures, a site cover will be required to allow for commercial use of the site. The cover will consist either of the structures such as buildings, pavement, sidewalks comprising the site development or a soil cover in areas where the upper one foot of exposed surface soil will exceed the applicable SCOs. Where the soil cover is required it will be a minimum of one foot of soil meeting the SCOs for cover material as set forth in 6 NYCRR Part 375-6.7(d) for commercial use. The soil cover will be placed over a demarcation layer, with the upper six inches of the soil of sufficient quality to maintain a vegetation layer. Any fill material brought to the site will meet the

requirements for the identified site use as set forth in 6 NYCRR Part 375-6.7(d).

Chemical oxidant reagents will be injected into the on-site area of groundwater contamination to degrade VOCs in saturated soil, bedrock, and groundwater. Injection could occur via temporary injection points and/or permanent injection wells. Implementation of ISCO to address bedrock source area contamination will include injection of chemical reagents and extraction of bedrock groundwater. Extracted bedrock groundwater will be treated ex-situ on site and the treated groundwater will be used for reagent mixing and then re-injected.

Enhanced bioremediation will be implemented for the off-site bedrock and overburden groundwater plume. Implementation consists of the injection of amendments into the target overburden and bedrock to accelerate biological degradation of site-related VOC contamination.

This alternative includes institutional controls, in the form of an environmental easement and a site management plan, necessary to protect public health and the environment from any contamination identified at the site.

An Operation and Maintenance (O&M) Plan is required to ensure continued operation, maintenance, monitoring, inspection, and reporting of the groundwater extraction, treatment, and reinjection components of the remedy.

Prior to the full implementation of this technology, laboratory and on-site pilot scale studies will be conducted to more clearly define design parameters. Between the pilot and the full scale implementations, it is estimated that 15 shallow and 14 deep injection points will be installed. It is estimated that the chemical oxidant will be injected during a number of events over several months.

Operation, monitoring and maintenance of the off-site irrigation well treatment system IRM will continue until data indicates that the system can be shut down.

Present Worth: *$4,016,000*
Capital Cost: *$6,338,000*
Annual Costs: *$95,000*

Alternative 4: Excavation, ISCO of Overburden and ISCR of Bedrock Source Areas, and Enhanced Bioremediation

This alternative relies upon implementation of ISCO for overburden groundwater and saturated zone soil source areas and in-situ chemical reduction (ISCR) for bedrock and bedrock groundwater source areas. The ISCO will target the source area for chlorinated solvent and petroleum-related contamination. In bedrock, ISCR will be implemented through placement of a reactive media, such as zero-valent iron (ZVI), into bedrock fractures beneath the site to dechlorinate the chlorinated solvents that contaminate the bedrock and bedrock groundwater.

Soil cleanup objectives (SCOs) for the protection of groundwater (as defined by 6NYCRR Part 375-6.8) for VOC contaminants will be used to guide excavation of contaminated soils. Commercial SCOs will be used to guide excavation of any non-VOC contaminated soils. On-site soils which exceed site-specific SCOs will be excavated and transported off-site for disposal.

Approximately 252 cubic yards of soil will be removed. Clean fill meeting the requirements of 6 NYCRR Part 375-6.7(d) will be brought in to replace the excavated soil and establish the designed grades at the site.

Because soil containing contaminants will remain beneath site structures, a site cover will be required to allow for commercial use of the site. The cover will consist either of the structures such as buildings, pavement, 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). Where the soil cover is required it will be a minimum of one foot of soil meeting the SCOs for cover material as set forth in 6 NYCRR Part 375-6.7(d) for commercial use. The soil cover will be placed over a demarcation layer, with the upper six inches of the soil of sufficient quality to maintain a vegetation layer. Any fill material brought to the site will meet the requirements for the identified site use as set forth in 6 NYCRR Part 375-6.7(d).

Enhanced bioremediation will be implemented within the off-site bedrock plume and overburden. Implementation consists of the injection of amendments into the target overburden and bedrock to accelerate biological degradation of site-related VOC contamination. Subsequent to oxidation treatment and subsequent performance monitoring, enhanced bioremediation may be implemented to address residual contamination. Implementation will consist of the injection of amendments into the target saturated zone soils and/or bedrock to accelerate biological degradation of residual contamination.

This alternative includes institutional controls, in the form of an environmental easement and a site management plan, necessary to protect public health and the environment from any contamination identified at the site.

Prior to the full implementation of this technology, laboratory and on-site pilot scale studies will be conducted to more clearly define design parameters.

Management of the off-site irrigation well treatment system IRM will continue until data indicates that the system can be shut down

Present Worth:.....*$5,046,000*
Capital Cost: *$5,346,000*
Annual Costs: *$27,000*

Alternative 5: Excavation, On-site Hydraulic Control and Monitored Natural Attenuation

This alternative consists of the extraction of overburden and bedrock groundwater to provide hydraulic control of contaminated groundwater at the site. Three extraction wells will be installed to hydraulically contain the source of contamination by intercepting contaminated groundwater migrating off-site toward Kill von Beaste and Swartwout Lake. An ex-situ treatment technology, such as air stripping and carbon adsorption, will be implemented to treat extracted groundwater prior to groundwater discharge a storm water system and vapor discharge.

Off-site overburden and bedrock groundwater not captured by the extraction wells will be monitored for natural attenuation.

Soil cleanup objectives (SCOs) for the protection of groundwater (as defined by 6NYCRR Part 375-6.8) for VOC contaminants will be used to guide excavation of contaminated soils. Commercial SCOs will be used to guide excavation of any non-VOC contaminated soils. On-site soils which exceed site-specific SCOs will

be excavated and transported off-site for disposal..

Approximately 252 cubic yards of soil will be removed. Clean fill meeting the requirements of 6 NYCRR Part 375-6.7(d) will be brought in to replace the excavated soil and establish the designed grades at the site.

Because soil containing contaminants will remain beneath site structures, a site cover will be required to allow for commercial use of the site. The cover will consist either of the structures such as buildings, pavement, 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). Where the soil cover is required it will be a minimum of one foot of soil meeting the SCOs for cover material as set forth in 6 NYCRR Part 375-6.7(d) for commercial use. The soil cover will be placed over a demarcation layer, with the upper six inches of the soil of sufficient quality to maintain a vegetation layer. Any fill material brought to the site will meet the requirements for the identified site use as set forth in 6 NYCRR Part 375-6.7(d).

An Operation and Maintenance (O&M) Plan is required to ensure continued operation, maintenance, monitoring, inspection, and reporting of the groundwater extraction and treatment components of the remedy.

This alternative includes institutional controls, in the form of an environmental easement and a site management plan, necessary to protect public health and the environment from any contamination identified at the site.

Management of the off-site irrigation well treatment system IRM will continue until data indicates that the system can be shut down.

Present Worth:.....*$1,742,000*
Capital Cost: *$3,696,000*
Annual Costs: *$82,000*

Alternative 6: In-Situ Thermal Treatment, Enhanced Bioremediation

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). This alternative will include:

In-situ thermal treatment, consisting of implementation of electrical resistance heating (ERH) will be implemented to provide treatment of soil, bedrock, and groundwater contamination at the site. ERH is the process of introducing heat to contaminated media to degrade and/or volatilize target contaminants while capturing any resulting off-gas for treatment. This alternative will involve the installation of an estimated 219 electrode/vapor extraction wells spaced 14 feet apart, treating to a depth of 80 feet (an estimated 55 feet below the soil/bedrock interface). The electrodes will be installed to an estimated depth of 90 feet.

Enhanced bioremediation will be implemented within the off-site bedrock plume and overburden. Implementation consists of the injection of amendments into the target overburden and bedrock to accelerate biological degradation of site-related VOC contamination. Subsequent to thermal treatment and subsequent performance monitoring, enhanced bioremediation may be implemented to address residual contamination. Implementation will consist of the injection of amendments into the target saturated zone soils and/or bedrock to accelerate biological degradation of residual contamination.

An off-site monitoring plan will be required to assess the enhanced biodegradation of off-site groundwater.

Management of the off-site irrigation well treatment system IRM will continue until data indicates that the system can be shut down.

Present Worth:.....*$27,587,000*
Capital Cost: *$27,887,000*
Annual Costs: *$27,000*

Exhibit C

Remedial Alternative Costs

Remedial Alternative	Capital Cost ($)	Annual Costs ($)	Total Present Worth ($)
Alt 1 - No Action	0	0	0
Alt 2 – Site Management	124,000	27,000	424,000
Alt 3 - Excavation, Cover System, ISCO	4,016,000	95,000	6,338,000
Alt 4 – Excavation, Cover System, Overburden ISCO, Bedrock ISCR, Enhanced Bioremediation	5,046,000	27,000	5,346,000
Alt 5 - Hydraulic Control and MNA	1,742,000	82,000	3,696,000
Alt 6 - In-Situ Thermal Treatment, Enhanced Bioremediation	27,587,000	27,000	27,887,000

Exhibit D

SUMMARY OF THE PROPOSED REMEDY

The Department is proposing Alternative 4, Excavation, Cover System, Chemical Oxidation of Overburden, ISCR of Bedrock, and Enhanced Bioremediation as the remedy for this site. Alternative 4 will achieve the remediation goals for the site by excavating the accessible source of contamination (soils above the water table) and treating soils below the water table, overburden groundwater, and bedrock groundwater with a combination of ISCO, ISCR and bioremediation. The elements of this remedy are described in Section 7. The proposed excavation portion of the remedy is depicted in Figure 5.

Basis for Selection

The proposed 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.

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 proposed remedy (Alternative 4) will satisfy this criterion by reducing and controlling existing or potential exposure pathways. The remedial goals will be achieved through the excavation and disposal of unsaturated zone soil contamination; groundwater and saturated soil in-situ treatment; and institutional controls. This alternative relies upon enhanced bioremediation to address off-site groundwater contamination and continued operation of the irrigation well treatment system to prevent public exposure to contaminants. Institutional controls will remain in place until groundwater contaminant levels meet SCGs. Alternative 1 (No Action) does not provide any protection to public health and the environment and will not be evaluated further. Alternative 6, by removing and treating all soil contaminated above the “unrestricted” soil cleanup objective and treating all contaminated groundwater, meets the threshold criteria. Alternative 2 manages on-site contamination with institutional controls and site management to protect human health. Alternatives 3 and 5 also comply with this criterion but to a lesser degree or with lower certainty.

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 6 would achieve SCGs to the greatest extent by treating all soil and groundwater contamination. Alternative 4 complies with SCGs to the extent practicable. It addresses source areas of contamination and complies with the protection of groundwater soil cleanup objectives at the surface through excavation of accessible soils, chemical oxidation and the construction of a cover system for soils that cannot be excavated. It also creates the conditions necessary to restore on-site and off-site groundwater quality to the extent practicable. Alternative 2 does not remediate on-site soils above the vadose zone, and would not meet the soils SCGs. Alternatives 2 and Alternative 5 do not remediate soils below the vadose zone, and would not meet the soils SCGs. Alternative 5 relies on monitored natural attenuation to remediate off-site groundwater outside of the hydraulic capture zone, which would be less effective than enhanced bioremediation in achieving ambient water quality standards.

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

Long-term effectiveness is best accomplished by those alternatives that address impacted media both on-site and off-site. Alternative 6 will have the best long-term effectiveness for on-site impacts. Monitored natural attenuation is the main off-site groundwater component for Alternatives 2 and 5, which would be less effective in achieving remedial goals than the other alternatives that include enhanced bioremediation. Alternative 5 does not address soil below the water table on-site. Alternative 3 and Alternative 4 address all on-site and off-site impacted media and will have a high degree of long-term effectiveness.

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.

Alternative 2 will rely on institutional controls and will not reduce the toxicity, mobility or volume of contaminants. Alternative 6 reduces the volume of on-site waste by volatilizing the contaminants through thermal treatment. Alternative 5 reduces the volume of contamination through the excavation of vadose zone soils and extraction of a portion of the contaminant plume, and reduces the mobility of groundwater contamination by hydraulic control of the on-site and off-site groundwater plumes through pump and treat. Alternative 5 does not address contaminated on-site soil and bedrock which is creating contaminated groundwater. Alternatives 3 and 4 reduce the volume of on-site and off-site contaminated media to a high degree through excavation, chemical treatment, and off-site bioremediation.

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 3, 5 and 6 all have treatment equipment staged on-site which will impact the site use. Alternative 4 would have no on-site treatment equipment to be staged and would have moderate short-term impacts during excavation and ISCO injections. Alternative 2 would have minimal short term impacts due to its reliance on institutional controls and site management but, it has no effectiveness in the short-term. Alternative 2 would have the longest time to achieve the remedial goals. The time needed to achieve the remediation goals is the shortest for Alternative 6 as all on-site COCs will be volatilized by the ERH. Alternatives 3 and 4 will take a shorter time period to achieve the remediation goals than Alternative 5 or Alternative 2. Alternative 5 uses a moderate amount of electricity yearly to operate the remedial systems, but over the full duration of remediation the electrical usage by the remedial systems will be significant. Alternative 6 uses a large amount of electricity in a short amount of time to thermally desorb the contaminants. The electric usage of Alternative 5 and Alternative 6 results in lower sustainability for these alternatives under the Department's green remediation policy because of the large carbon footprint that is left through the electric usage these remedies require. Alternatives 2, 3, and 4 have higher sustainability levels for green remediation due to the emphasis on in-place treatment of contaminants.

6. Implementability. The technical and administrative feasibility of implementing each alternative are evaluated. Technical feasibility includes the difficulties associated with the construction of the remedy and the ability to monitor its effectiveness. For administrative feasibility, the availability of the necessary

personnel and materials is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, institutional controls, and so forth.

Alternative 2 is the easiest alternative to implement, as it only requires a SMP and institutional controls. Alternative 5 is also readily implementable, but lacks remediation of on-site soil and bedrock impacts. Alternative 3 and Alternative 5 will require the housing of on-site mechanical systems for groundwater pump and treat/ISCO recirculation; space is limited near the proposed treatment zone. Alternative 3 and Alternative 4 are more difficult to implement due to the nature and extent of bedrock contamination and the fact that the source area contamination is largely situated beneath the Bram Manufacturing facility. Alternative 6 is anticipated to be the most difficult to implement given the number of ERH probes and installation within the Bram building.

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 and 5 have low costs, but the contaminated soil will not be addressed other than by institutional controls and site management. Alternative 6 (in-situ thermal treatment) has the highest present worth cost because of the depth the ERH probes must reach and the number of probes. Alternative 4 will be much less expensive than Alternative 6, yet it will provide equal protection of the groundwater resource. The present worth costs of Alternatives 3 and 4 are similar to each other, although the long-term maintenance costs for Alternative 3 will be higher than that of Alternative 4, because of the O & M of the extraction, treatment, and reinjection equipment.

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.

Since the anticipated use of the site is commercial, Alternatives 2 and 5 will be less desirable because some contaminated soil will remain on the property whereas Alternatives 3, 4, and 6 will remove and/or treat the contaminated soil. All alternatives, except Alternative 6, will require a SMP and institutional controls on the site.

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

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

Alternative 4 is being proposed because, as described above, it satisfies the threshold criteria and provides the best balance of the balancing criterion.

USGS 1:24,000 scale digital topographic map obtained from Cornell University Geospatial Information Repository at: http://cugir.mannlib.cornell.edu

Prepared/Date: BRP 03/25/08
Checked/Date: JWP 03/25/08

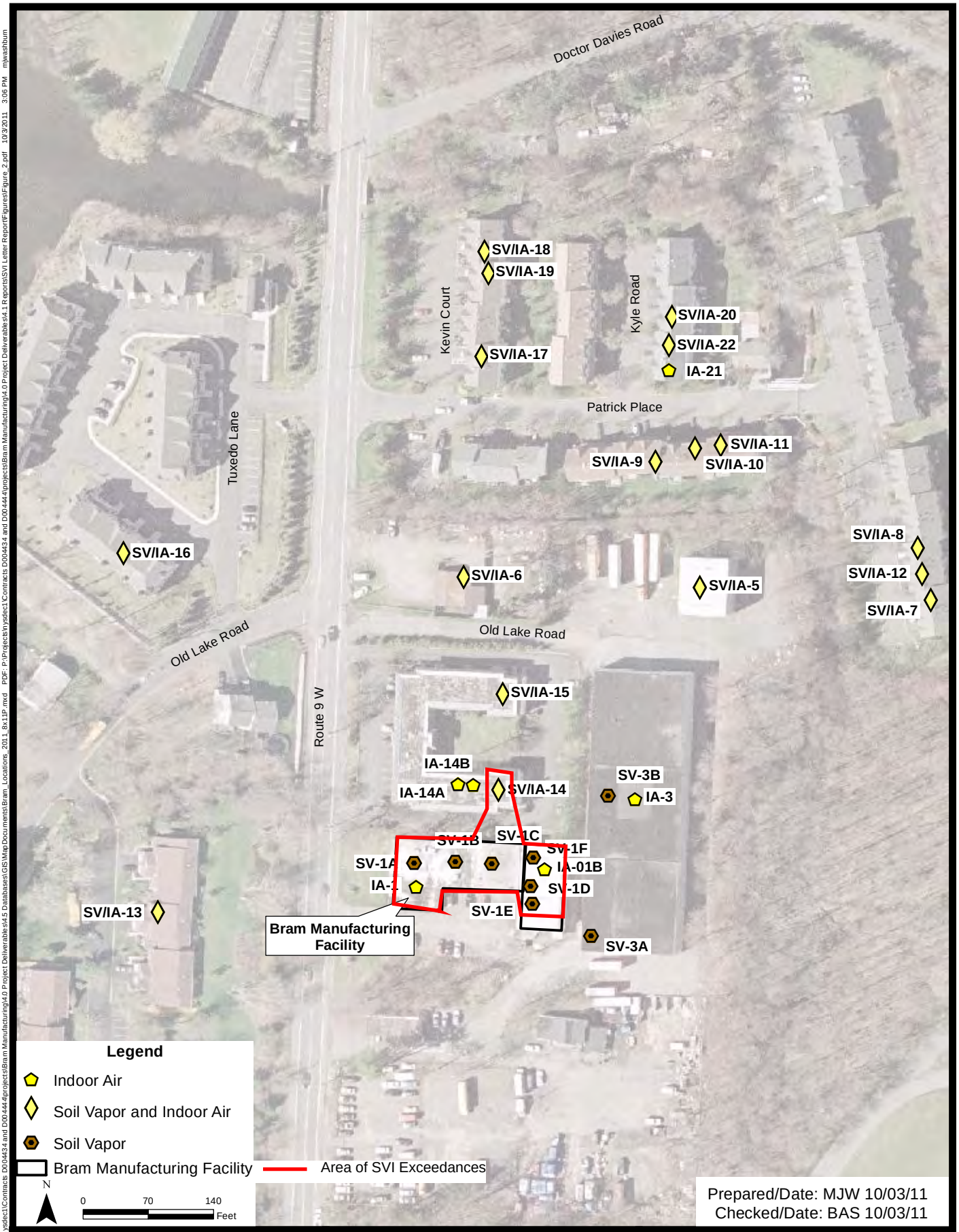
RI/FS WORK PLAN
BRAM MANUFACTURING
CONGERS, NEW YORK

MACTEC

SITE LOCATION

Project 3612-08-2098
Figure 1.1

Document: P:\Projects\nysdec1\projects\Bram Manufacturing\4.0 Project Deliverables\4.5 Databases\GIS\MapDocuments\Bram_SiteLocationMap.mxd PDF: P:\Projects\nysdec1\projects\Bram Manufacturing\4.0 Project Deliverables\4.2 Work Plans\RI Work Plan\Figures\Figure1.1.pdf 03/25/2008 9:08 AM brpeters



Prepared/Date: MJW 10/03/11
Checked/Date: BAS 10/03/11

SVIE LETTER REPORT
BRAM MANUFACTURING
CONGERS, NEW YORK

MACTEC

Sample Location
Project 3612-0802098
Figure 2

Swartwout Lake

Doctor Davies Road

MW-15
146.73

MW-19
146.91

Kill Von Beaste

Kevin Court

Kyle Road

MW-14
146.94

MW-13
147.73

MW-12
150.30

MW-18B
(Overburden)
149.03

Patrick Place

147

148

149

Tuxedo Lane

Route 9 W

MW-17
146.98

Old Lake Road

150

Old Lake Road

MW-7
150.20

151

MW-10
147.00

152

153

MW-5
152.86

MW-9
147.49

MW-6
153.89

MW-4
157.59

MW-1
152.76

MW-2
152.69

Bram Manufacturing Facility

MW-8
147.30

MW-3S
152.65

153

152

151

150

149

148

147

Legend

- Monitoring Well
- Interpreted Overburden Groundwater Contour (May 22, 2011)
- Interpreted Overburden Groundwater Flow Direction
- Bram Manufacturing Facility

N

0 55 110 Feet

1. Rockland County color digital orthoimagery (2004) obtained from New York State GIS Clearinghouse at: http://www.nysgis.state.ny.us
2. Monitoring wells surveyed by YEC, Inc.

Prepared/Date: BRP 10/20/11
Checked/Date: CRS 10/20/11

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Overburden Groundwater Contours - 2011

Project 3612-08-2098

Figure 3.1

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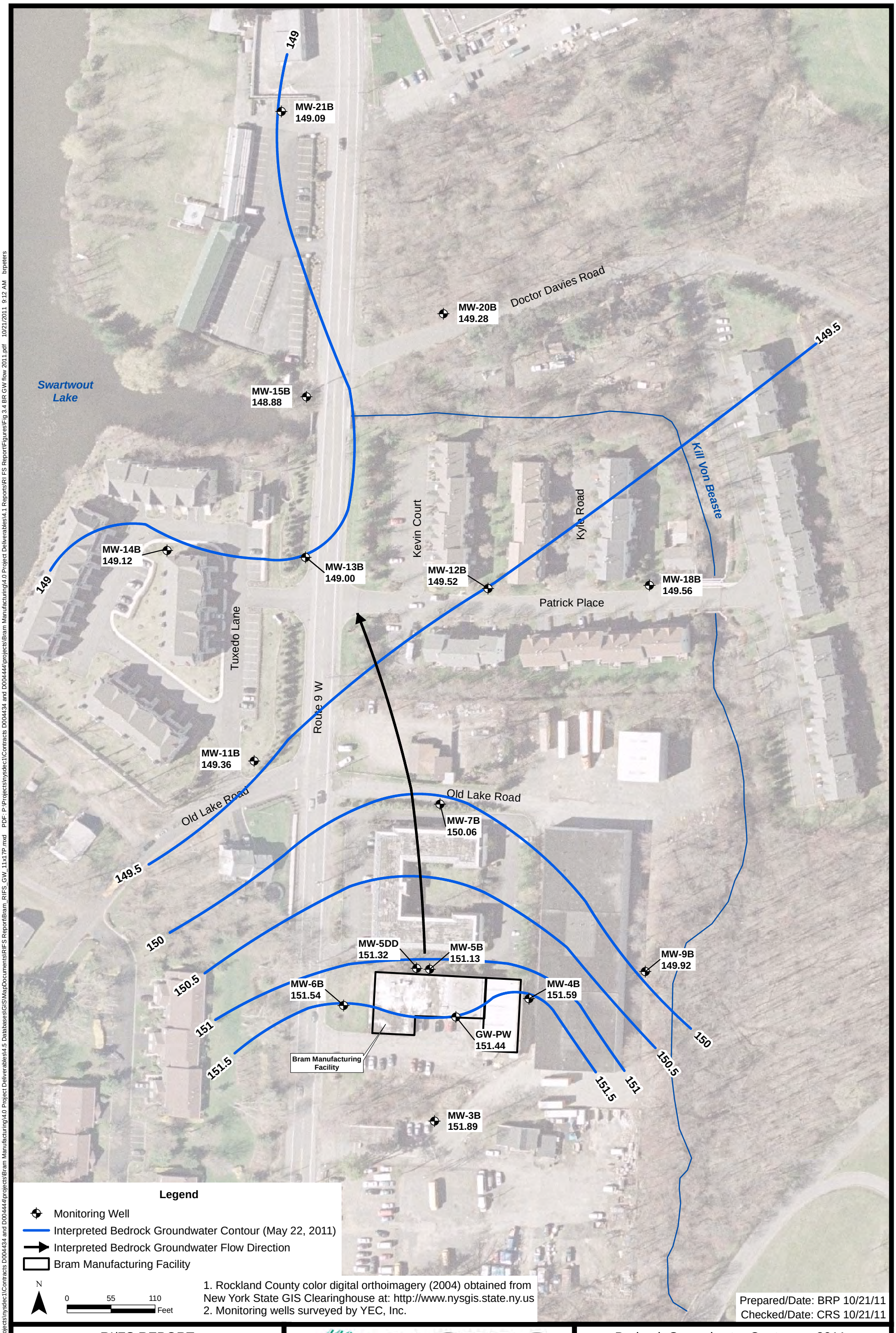

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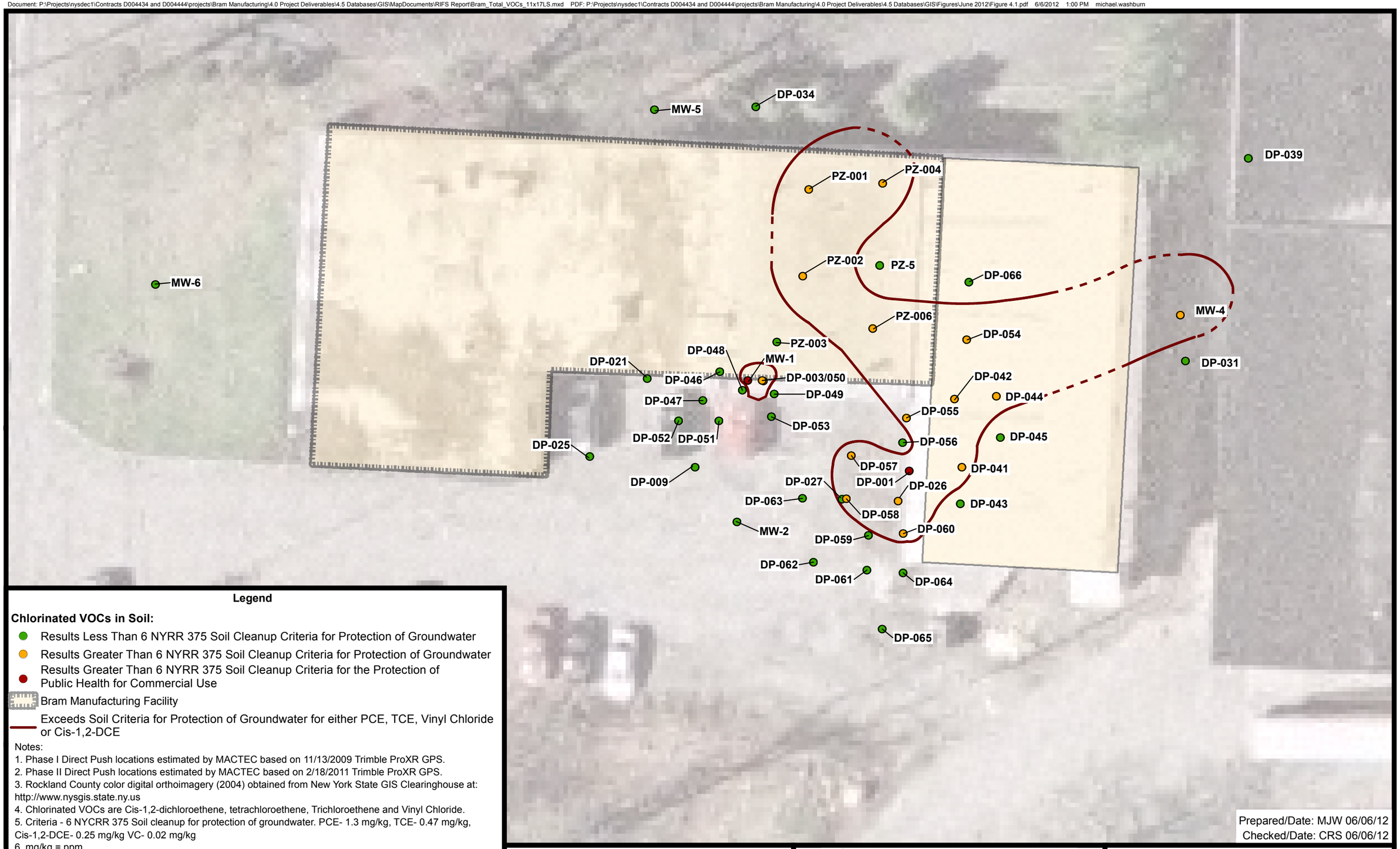
Bedrock Groundwater Contours - 2011

Project 3612-08-2098 Figure 3.2



Legend

Chlorinated VOCs in Soil:

- Results Less Than 6 NYRR 375 Soil Cleanup Criteria for Protection of Groundwater
- Results Greater Than 6 NYRR 375 Soil Cleanup Criteria for Protection of Groundwater
- Results Greater Than 6 NYRR 375 Soil Cleanup Criteria for the Protection of Public Health for Commercial Use
- Bram Manufacturing Facility
- Exceeds Soil Criteria for Protection of Groundwater for either PCE, TCE, Vinyl Chloride or Cis-1,2-DCE

Notes:
1. Phase I Direct Push locations estimated by MACTEC based on 11/13/2009 Trimble ProXR GPS.
2. Phase II Direct Push locations estimated by MACTEC based on 2/18/2011 Trimble ProXR GPS.
3. Rockland County color digital orthoimagery (2004) obtained from New York State GIS Clearinghouse at: http://www.nysgis.state.ny.us
4. Chlorinated VOCs are Cis-1,2-dichloroethene, tetrachloroethene, Trichloroethene and Vinyl Chloride.
5. Criteria - 6 NYCRR 375 Soil cleanup for protection of groundwater. PCE- 1.3 mg/kg, TCE- 0.47 mg/kg, Cis-1,2-DCE- 0.25 mg/kg VC- 0.02 mg/kg
6. mg/kg = ppm

N

0 10 20 Feet

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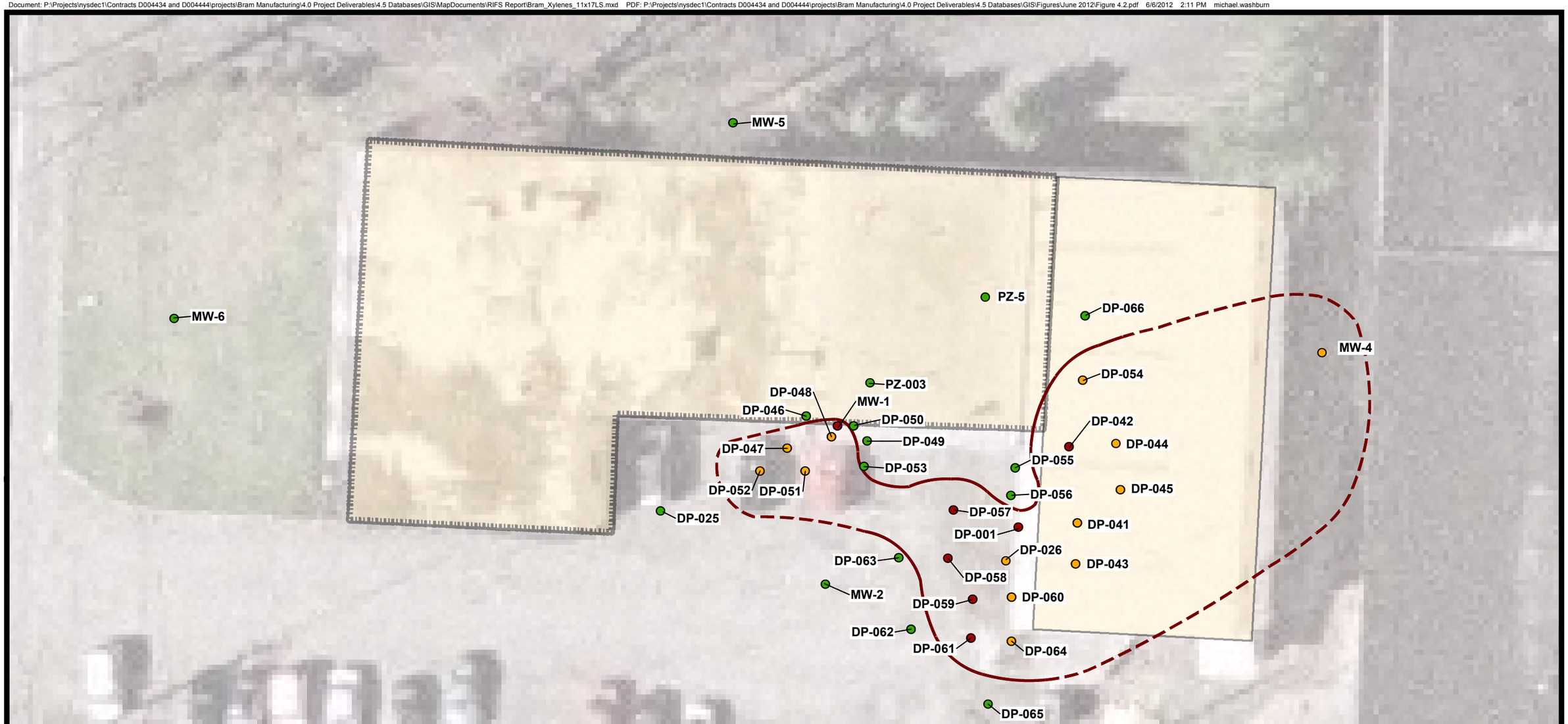
Source Area Soils
Chlorinated VOC Exceedences
Project 3612-08-2098 Figure 4.1



Legend

Xylene Concentrations in Soil:

- <1.6 ppm
- >1.6 ppm
- >500 ppm
- Exceeds Xylene Soil Cleanup Criteria for the Protection of Groundwater
- Bram Manufacturing Facility

N

0 10 20 Feet

Notes:

1. Phase I Direct Push locations estimated by MACTEC based on 11/13/2009 Trimble ProXR GPS.
2. Phase II Direct Push locations estimated by MACTEC based on 2/18/2011 Trimble ProXR GPS.
3. Rockland County color digital orthoimagery (2004) obtained from New York State GIS Clearinghouse at: http://www.nysgis.state.ny.us
4. 1.6 mg/kg = 6 NYCRR 375 soil cleanup for the protection of groundwater.
5. 500 mg/kg = - 6 NYCRR 375 soil cleanup for the protection of public health for commercial use.
6. mg/kg = ppm

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Source Area Soil Results
Total Xylenes
Project 3612-08-2098 Figure 4.2

Swartwout Lake

Doctor Davies Road

MW-15

PS-19 PS-20 PS-03

PS-18

MW-19

PS-35

PS-04

PS-36

PS-01 PS-12 PS-13 PS-14 PS-15 PS-16 PS-17 PS-02

PS-33

PS-34

Kill Von Beaste

PS-05

Kevin Court

Kyle Road

Austin Douglas Way

MW-14

MW-13

MW-12

Patrick Place

MW-18B (Overburden)

Tuxedo Lane

Route 9 W

PS-06

MW-17

Old Lake Road

MW-7

Old Lake Road

PS-09

PS-07

PS-21

MW-10

PS-22

PS-23

PS-08

MW-5

PS-24

PZ-1

PZ-4

PZ-2

PZ-3

PZ-5

PZ-6

MW-4

MW-1

MW-6

MW-9

PS-25

PS-10

PS-26

PS-27

PS-28

MW-2

Bram Manufacturing Facility

MW-8

PS-11

PS-29

PS-30

PS-31

MW-3S

PS-32

Legend

Interpreted Selected VOC Concentration Contours

- Selected Chlorinated VOCs = 5 µg/L
- Selected Chlorinated VOCs = 5 µg/L (inferred)
- Selected Chlorinated VOCs = 500 µg/L
- Selected Chlorinated VOCs = 20,000 µg/L
- Total Xylenes = 5 µg/L
- Monitoring Well
- Stream Interface
- Microwell
- Bram Manufacturing Facility

Selected Chlorinated VOCs = Cis-1,2-Dichloroethene, Tetrachloroethene, Trichloroethene, and Vinyl Chloride.

Contours based on May 2011 overburden groundwater data and 2009 stream interface (PS) data.

N

0 55 110 Feet

1. Rockland County color digital orthoimagery (2004) obtained from New York State GIS Clearinghouse at: http://www.nysgis.state.ny.us
2. Monitoring wells surveyed by YEC, Inc.

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Selected VOCs in Overburden Groundwater

Project 3612-08-2098 Figure 4.3

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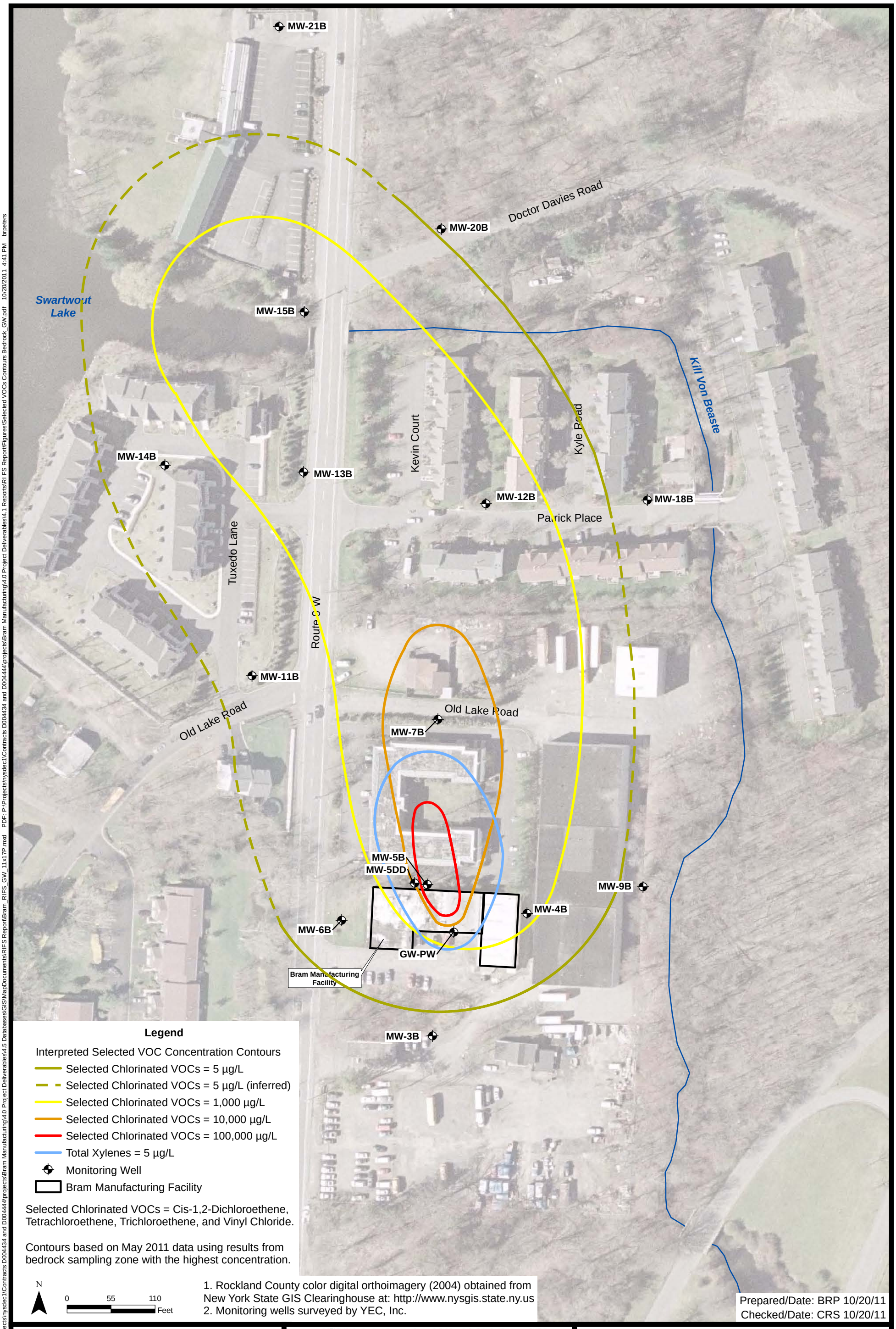

Legend

Interpreted Selected VOC Concentration Contours

- Selected Chlorinated VOCs = 5 µg/L
- Selected Chlorinated VOCs = 5 µg/L (inferred)
- Selected Chlorinated VOCs = 1,000 µg/L
- Selected Chlorinated VOCs = 10,000 µg/L
- Selected Chlorinated VOCs = 100,000 µg/L
- Total Xylenes = 5 µg/L
- Monitoring Well
- Bram Manufacturing Facility

Selected Chlorinated VOCs = Cis-1,2-Dichloroethene, Tetrachloroethene, Trichloroethene, and Vinyl Chloride.

Contours based on May 2011 data using results from bedrock sampling zone with the highest concentration.

N

0 55 110 Feet

1. Rockland County color digital orthoimagery (2004) obtained from New York State GIS Clearinghouse at: http://www.nysgis.state.ny.us
2. Monitoring wells surveyed by YEC, Inc.

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Selected VOCs in Bedrock Groundwater

Project 3612-08-2098 Figure 4.4

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