PROPOSED REMEDIAL ACTION PLAN
DEFENSE NATIONAL STOCKPILE CENTER SCOTIA DEPOT

Town of Glenville, Schenectady County, New York
Site No. 447023

February 2010

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 waste 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 5 of this document, have contaminated various environmental media. The proposed remedy, discussed in detail in Section 8, is intended to attain the remedial action objectives identified for this site in Section 6 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 Department will select a final remedy for the site only after careful consideration of all comments received during the public comment period.

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 PRAP 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 which are available for review at the document repositories. The public is encouraged to review the reports and documents, which are available at the following repositories:

Scotia Branch Schenectady County Public Library
14 Mohawk Ave.
Scotia, NY 12302-2507
(518) 386-2247
Hours: Monday, Tuesday, Thursday, & Friday 10:30 am - 5:30 pm
Wednesday Closed
Saturday 10:00 am - 4:00 pm
Sunday Closed

By appointment only:
Jason Pelton, Project Manager
NYSDEC Central Office
625 Broadway
Albany, New York 12233-7013
(518) 402-9814
(888) 459-8667

Toni Galluzzo, FOIL Coordinator
NYSDEC Region 4 Office
1130 North Westcott Road
Schenectady, New York 12306
(518) 357-2046
Hours: Monday – Friday 9:00 am – 4:30 pm

The Department seeks input from the community on all PRAPs. A public comment period has been set from February 23, 2010 to March 24, 2010 to provide an opportunity for public participation in the remedy selection process. A public meeting is scheduled for March 15, 2010 at the Town of Glenville Senior Center, 32 Worden Road, Glenville, NY beginning at 7:00 PM.

At the meeting, the results of the RI/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 to Mr. Jason Pelton at the above address through March 24, 2010.

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 all of the alternatives identified here.

Comments will be summarized and addressed in the responsiveness summary section of the Record of Decision (ROD). The ROD is the Departments final selection of the remedy for this site.

SECTION 2: <u>SITE LOCATION AND DESCRIPTION</u>

The Defense National Stockpile Center Scotia Depot (site) is adjacent to the north side of New York State (NYS) Route 5 (Amsterdam Road) in the Town of Glenville, Schenectady County, New York (Figure 1). The site and adjacent properties are zoned for commercial use. The Mohawk River is located approximately 1,500 feet west-southwest of the site and represents the major drainage feature in Schenectady County. The water table beneath the site is approximately 65 to 70 feet below ground surface (bgs) and groundwater beneath the site flows from northeast to southwest toward the Mohawk River.

The site overlies a United States Environmental Protection Agency (EPA) designated Sole Source Aquifer referred to as the Schenectady or Great Flats Aquifer system, which is adjacent to and extends beneath the Mohawk River over a distance of approximately 12 miles in Schenectady County. Relative to a series of four aquifer protection zones established to protect five (5) municipal water supplies relying on the aquifer system, the site lies in Zone III, or the General Aquifer Recharge Area (Figure 1). The Defense National

Stockpile Center Scotia Depot site is located approximately 1,500 feet southwest of the Village of Scotia well field and approximately 1.25 miles north of the Town of Rotterdam and City of Schenectady well fields (Figure 1). On an average day, these three well fields withdraw greater than 20 million gallons of water from the Great Flats Aquifer system.

Portions of the original Scotia Naval Depot have been subdivided and sold since 1972 by the United States Government. The site now consists of several large privately held parcels in addition to a portion of land still administered by the United States General Services Administration (GSA). The private parcels contain a variety of industrial tenants; while the GSA leases its remaining portion to the Defense Logistics Agency/Defense National Stockpile Center (DLA/DNSC) and the Navy. The disposition of land at the Depot, is as follows:

- In early 1972, approximately 77 acres were transferred to Schenectady Industrial Development; now known as Corporations Park (a.k.a. Galesi Corporation);
- Approximately 126 acres were sold to the Schenectady County Development Agency - Scotia Glenville Industrial Park, in June 1985. Additionally, in June 1985, approximately 27 acres were sold to the Galesi Corporation and was added to Corporations Park;
- In mid-1988, approximately 36 acres were separated to the Navy and the Depot retained the remainder of the GSA administered land as the DLA;
- GSA sold approximately 11.5 acres of the Depot to the Schenectady County Development Agency in July 1997; and
- The Navy currently occupies approximately 14.2 acres and the DLA/DNSC occupies approximately 59.7 acres.

Figures 1 and 2 show the approximate boundaries of the Scotia Naval Depot site when established in 1942 and the approximate current property boundaries. The site is currently owned by the GSA and operated by the DNSC.

SECTION 3: SITE HISTORY

3.1: Operational/Disposal History

The Scotia Depot was built in 1942-43 and was commissioned as a United States Navy facility on March 30, 1943. It served as a storage and supply depot for naval forces along the Atlantic coast and Europe, and as a storage and distribution point for National Stockpile materials. The parcel originally consisted of approximately 337 acres. The facility mostly stored large items such as boilers, turbines and reduction gears and was the home of the Navy's Landing Craft Maintenance and Battle Damage Program and the Navy's Automotive and Handling Equipment Spare Parts Program. Employment peaked in 1945 at 2,342 personnel. On January 1, 1960 the Navy turned the facility over to the General Services Administration.

During the period between early 1966 and approximately 1973, the U.S. Army Corps of Engineers/Army Material Command (AMC) leased buildings from the Navy for the fabrication and storage of vehicles as well as other military equipment. GSA records indicate that these included the Larc V Amphibious Lighter. These operations were predominantly conducted in buildings 404, 405 and 406 (see Figure 2 for building numbers) by the AMC contractor, Consolidated Diesel Electric Company (CONDEC). In early 1968 through 1971 inspections at the CONDEC operation indicated the continuing presence of fire and safety hazards. These included the improper storage of flammables and paints, and the "dangerous air contaminants created or released by open surface dip tank operations."

Additionally, between 1967 and 1969, the GSA and the Navy leased to the United States Army/Defense Supply Agency, Buildings 202 and 203. The agreement indicates these buildings were used for the "preservation and rail loading of trucks; storage of trucks and ten 6x6 AIC vehicles."

3.2: Remedial History

In response to the detection of trichloroethene (TCE) at concentrations less than 1 part per billion (the New York State Drinking Water Standard is 5 parts per billion (ppb)) in the Town of Rotterdam and City of Schenectady well fields (shown on Figure 1), the NYSDOH performed private water supply sampling in 1991. The private water supply sampling included residences located on NYS Route 5 in the Town of Glenville and hydraulically downgradient of the Defense National Stockpile Center Scotia Depot site. Volatile organic compounds (VOCs), including TCE, 1,1,1-trichloroethane (1,1,1-TCA), and tetrachloroethene (PCE), were detected in groundwater collected in some of the residential wells. Consistent with the groundwater contamination at the Defense National Stockpile Center Scotia Depot site, TCE was the primary VOC detected in the residential well water samples (at concentrations up to 320 ppb). Following a recommendation by the NYSDOH to connect to public water, the homes on NYS Route 5 were subsequently connected to public water provided by the Town of Glenville. Although the drinking water standard was never exceeded in the City of Schenectady and the Town of Rotterdam municipal water supply wells, increased groundwater quality monitoring was initiated following the identification of the contamination.

Subsequent to the NYSDOH residential groundwater sampling, six subsurface investigations were completed to identify the possible source of TCE in the residential wells and possibly the Town of Rotterdam and City of Schenectady municipal well fields and to delineate the extent of the TCE groundwater plume. The investigations were completed between 1995 and 2007 and focused on the assemblage of properties comprising the former 337-acre Defense National Stockpile Center Scotia Depot. During the investigations, two areas thought to represent possible TCE source areas, including a former burn pit and the Sacandaga Road Landfill (Figure 2) were evaluated. Data suggested that although these areas may be contributing to minor amounts of groundwater contamination, they do not represent TCE source areas. Instead, investigation data indicated that TCE disposal occurred in the northeast corner of the 401 sub-block and the area near the north corner of the 403 sub-block (Figure 2).

In addition and unrelated to the investigations related to the TCE groundwater plume, a site assessment was completed by the Defense National Stockpile Center in advance of transferring unused portions of the site back to the GSA. Based on the site assessment, soil with metals present above background concentrations was excavated from two former metals and ore stockpile areas and two drywells were removed as part of interim remedial measures (IRMs) in 2005.

SECTION 4: 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 the United States Navy who operated the facility between 1943 and 1960 and the United State General Services Administration who currently owns the site.

After the remedy is selected, the PRPs will 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 5: SITE CONTAMINATION

A site investigation and feasibility study (FS) has been conducted to evaluate the alternatives for addressing the significant threats to human health and the environment.

5.1: Summary of the Expanded Site Investigation (ESI)

The purpose of the ESI was to define the nature and extent of any contamination resulting from previous activities at the site. The ESI was conducted between September 2004 and December 2005. The field activities and findings of the investigation are described in the August 3, 2007 ESI report.

The ESI included the following activities:

- Environmental samples were collected from the following media and submitted for laboratory analysis: soil vapor, indoor air, outdoor air, subsurface soil, and groundwater;
- Direct push/Geoprobe® drilling program where 49 active soil gas probes were advanced;
- Installation of seven (7) groundwater monitoring wells;
- Excavation of thirteen (13) test pits/trenches;
- Review of aerial photographs; and
- Site survey.

5.1.1: Standards, Criteria, and Guidance (SCGs)

To determine whether the soil vapor, indoor air, surface soil, subsurface soil, surface water, and groundwater contain contamination at levels of concern, data from the investigation were compared to the following SCGs:

- Groundwater, drinking water, and surface water SCGs are based on the Department's Ambient Water Quality Standards and Guidance Values and Part 5 of the New York State Sanitary Code.

- Soil SCGs are based on the Department's Cleanup Objectives included in 6 NYCRR Subpart 375-6 - Remedial Program Soil Cleanup Objectives.

- Concentrations of VOCs in air were evaluated using the air guidelines provided in the NYSDOH guidance document titled "Guidance for Evaluating Soil Vapor Intrusion in the State of New York," dated October 2006. Specifically, the subslab and indoor air data were compared to Soil Vapor/Indoor Air Matrix 1 for TCE and carbon tetrachloride and Soil Vapor/Indoor Air Matrix 2 for tetrachloroethene and 1,1,1-trichloroethane.

- Concentrations of VOCs in air were compared to typical background levels of VOCs in indoor and outdoor air using the background levels provided in the NYSDOH guidance document titled "Guidance for Evaluating Soil Vapor Intrusion in the State of New York," dated October 2006. The background levels are not SCGs and are used only as a general tool to assist in data evaluation.

Based on the ESI results, in comparison to the SCGs and potential public health and environmental exposure routes, certain media and areas of the site require remediation. These are summarized in Section 5.1.2. More complete information can be found in the ESI report.

5.1.2: Nature and Extent of Contamination

This section describes the findings of the investigation for all environmental media that were investigated during the ESI and previous investigations.

As described in the ESI report, many soil, groundwater, subslab vapor, and indoor air samples were collected to characterize the nature and extent of contamination. As summarized in Table 1, the main categories of contaminants that exceed their SCGs are volatile organic compounds (VOCs). For comparison purposes, where applicable, SCGs are provided for each medium.

Chemical concentrations are reported in parts per billion (ppb) for water and parts per million (ppm) for soil. Air samples are reported in micrograms per cubic meter ($\mu g/m^3$).

Figure 3 and Table 1 summarize the degree of contamination for the contaminants of concern in groundwater and compare the data with the SCGs for the site. The following are the media which were investigated and a summary of the findings of the investigation.

Surface Soil

Based on the surface soil sampling completed during site investigation activities, no site-related surface soil contamination of concern was identified. Therefore, no remedial alternatives need to be evaluated for surface soil.

Subsurface Soil

To better understand the nature and extent of contamination and to identify a possible disposal area/areas, a total of 66 subsurface soil samples were collected for laboratory analysis during the ESI and during previous site investigations. The majority of subsurface soil sampling locations were based on the results of a passive soil gas sampling program and the known dimensions of the groundwater plume.

TCE was detected in 32 of 66 subsurface soil samples, but not at concentrations exceeding the protection of groundwater SCG. Low levels of TCE, ranging from non detect to 0.110 ppm were detected in soil samples collected from the vadose zone along the west-central margin of the 400 Block during the installation of monitoring well MW-18 (Figure 3) and in soil samples collected during the test pit program. Although high levels of TCE were not detected in the vadose zone soil samples, the presence of low levels of TCE in soil collected from the unsaturated zone suggest that a TCE release had occurred in the area of the 400 Block.

The results of the subsurface soil sampling did not identify highly contaminated subsurface soil in the unsaturated zone subsurface soil. Instead, the presence and distribution of low concentrations (below the protection of groundwater SCGs) of the site contaminants indicate that past releases occurred at the site and that the contaminants have been transported downward to the saturated zone.

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

Groundwater

As summarized in Table 1, a total of 123 groundwater samples were collected from the site monitoring well network during the ESI and during earlier investigations. Fifty-two of the 123 groundwater samples were collected as part of the ESI during three (3) separate sampling events from a network of existing monitoring wells and from monitoring wells installed as part of the ESI. Figure 3 illustrates the TCE groundwater sampling results from the June 2005 sampling event.

Four VOCs, including TCE, 1,1,1-TCA, PCE, and carbon tetrachloride, were detected at concentrations exceeding their respective SCGs and TCE was the VOC detected at the highest concentration in groundwater. Specifically, TCE was detected in 28 of the 52 ESI groundwater samples at concentrations exceeding the SCG and at a maximum concentration of 810 ppb in groundwater from monitoring well GEP-2. 1,1,1-TCA and PCE were detected in 14 and 8 of the 52 ESI groundwater samples respectively at concentrations exceeding the respective SCGs. During the ESI, the highest 1,1,1-TCA concentration (41 ppb) was detected in a groundwater sample collected from GEP-2 and the highest PCE concentration (51 ppb) was detected in a groundwater sample collected from MW-21 (Figure 3).

As shown on Figure 3, the highest TCE concentrations were detected in groundwater samples collected from monitoring wells (GEP-1, GEP-2 and GEP-3) installed near the boundary between the 300 and 400 blocks. The groundwater contamination extends approximately 800 feet further upgradient from this area and onto the north portion of the 400 block near monitoring well MW-20 (Figure 3). During the ESI, MW-20 contained TCE at a maximum concentration of 200 ppb. Monitoring well MW-6, the most downgradient well, contained TCE at a maximum concentration of 72 ppb. Off-site, TCE was detected at a concentration of 48 ppb in a disconnected residential well.

In addition to the TCE groundwater plume, data collected as part of the ESI and from past investigations, indicate that a northeast-southwest trending carbon tetrachloride groundwater plume is also present beneath the site (Figure 3). The carbon tetrachloride plume is located offset and to the north of the TCE groundwater plume and likely extends off-site. Data suggests that the carbon tetrachloride contamination originated from the northeast corner of the 300 Block; possibly from the area of a former drywell removed as part of an IRM in 2005. Carbon tetrachloride was detected in monitoring wells MW-5, MW-8, MW-11, MW-12, and PMW-3 at concentrations ranging from 1 ppb to 10 ppb, but was only detected in 3 of the 52 groundwater samples at concentrations exceeding the SCG (5 ppb).

Groundwater contamination identified during the site investigations will be addressed in the remedy selection process.

Surface Water

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

Soil Vapor/Sub-Slab Vapor/Air

The results of the soil vapor intrusion evaluation completed during the ESI indicate off-site groundwater containing TCE is not influencing the quality of indoor air at homes that directly overlie or that are along the margins of the TCE groundwater plume. Specifically, a total of 15 vapor intrusion sample sets were collected during the ESI at ten (10) off-site locations and no further action was considered the appropriate outcome for TCE at each of these locations.

The presence of low concentrations of carbon tetrachloride in a dissolved phase groundwater plume offset to the north of the TCE plume (see Figure 3), however, is potentially influencing both subslab and indoor air quality at off-site structures.

The following summarizes the evaluation of the vapor intrusion samples relative to Soil Vapor/Indoor Air Matrix 1 for carbon tetrachloride included in the Guidance for Evaluating Soil Vapor Intrusion in the State of New York:

- No Further Action was considered appropriate at 7 of the 10 properties. At these locations, detected CVOC concentrations are considered to be associated with indoor and/or outdoor sources rather than vapor intrusion given the concentration detected in the subslab samples.
- Monitoring was the outcome at one (1) residential property to evaluate whether concentrations change over time and if mitigation is necessary at this location.
- Mitigation was the outcome at two (2) residential properties due to the presence of carbon tetrachloride in subslab and indoor air samples. Sub-slab depressurization systems were recommended for installation by the NYSDOH for both homes but were declined by each of the two property owners. Follow-up sampling was completed on one occasion for both properties and owners were notified that additional sampling would follow.

Other VOCs detected in the vapor intrusion samples mainly included petroleum and refrigerant compounds, many of which were detected in each of the subslab, basement air, and first floor air samples. The presence and concentrations of these compounds is consistent with typical background levels of VOCs in indoor and outdoor air.

During the expanded site investigation, the vapor intrusion pathway was not evaluated for on-site structures.

Soil vapor and indoor air contamination identified during the ESI will be addressed in the remedy selection process.

5.2: 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 completion of the RI/FS.

Unrelated and prior to the ESI, the DNSC completed shallow soil sampling at the site in preparing for ultimate transfer of the property to the GSA. Based on this shallow soil sampling, two soil removal projects were completed to restore the site to its original soil quality condition. The soil removal occurred in former metal and ore stockpile areas where metals were detected above background concentrations. Specifically, and as part of an IRM, approximately 560 tons of soil was removed from around the former ferrochrome and lead/zinc open storage areas, located in the 402 and 301 sub-blocks respectively in 2004. Additionally, two (2) dry wells and seven (7) storm water catch basins were removed from the vicinity of the former lead/zinc open storage area and backfilled with clean backfill as part of an IRM in 2005.

5.3: Summary of Human Exposure Pathways:

This section describes the types of human exposures that may present added health risks to persons at or around the site. A more detailed discussion of the human exposure pathways can be found in Section 1.4.4 of the FS report found at the document repositories identified in Section 1.0. An exposure pathway describes the means by which an individual may be exposed to contaminants originating from a site. An exposure pathway has five elements: [1] a contaminant source, [2] contaminant release and transport mechanisms, [3] a point of exposure, [4] a route of exposure, and [5] a receptor population.

The source of contamination is the location where contaminants were released to the environment (any waste disposal area or point of discharge). Contaminant release and transport mechanisms carry contaminants from the source to a point where people may be exposed. The exposure point is a location where actual or potential human contact with a contaminated medium may occur. The route of exposure is the manner in which a contaminant actually enters or contacts the body (e.g., ingestion, inhalation, or direct contact). The receptor population is the people who are, or may be, exposed to contaminants at a point of exposure.

An exposure pathway is complete when all five elements of an exposure pathway exist. An exposure pathway is considered a potential pathway when one or more of the elements currently does not exist, but could in the future.

Potential exposure pathways that could exist in the future include the following:

- Inhalation of vapors from contaminants in groundwater for construction workers involved in excavation activities.
- Occupants of on-site buildings and four off-site structures could be exposed to site related volatile organic compounds via soil vapor intrusion. This pathway has not been evaluated on-site but is proposed to begin after issuance of the Record of Decision. This exposure pathway is continuing to be evaluated such that additional vapor intrusion sampling is warranted and proposed at four off-site residential properties.
- The potential for exposures to contaminants in on-site and off-site groundwater is unlikely due to the availability of a public water supply.

5.4: 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.

Investigations at the site did not identify any current or potential impacts to ecological, surface water, or wetland resources.

Groundwater resources at the site include groundwater that occurs in sand and gravel that is part of an EPA designated sole source aquifer referred to as the Great Flats Aquifer. Contamination originating from the site has impacted the groundwater resources in this overburden groundwater unit. Data collected during the ESI indicates that the depth to groundwater is approximately 60 to 70 feet beneath the ground surface and flows from the site to the west-southwest. The highest contaminant concentrations were detected off-site in the central portion of the 300 Block (Figure 3). The groundwater plume extends approximately 2,000 feet west-southwest beyond the GSA owned property.

Groundwater near the site is used as a potable water source by five Schenectady County municipalities (City of Schenectady, Village of Scotia, and Towns of Glenville, Niskayuna, and Rotterdam). Site related contamination is impacting a sole source aquifer that is used as a source of potable water. The remedy must address the impacts of the site to the groundwater aquifer.

SECTION 6: SUMMARY OF THE REMEDIATION GOALS

Goals for the remedial program have been established through the remedy selection process stated in 6 NYCRR Part 375. At a minimum, the remedy selected must eliminate or mitigate all significant threats to public health and/or the environment presented by the hazardous waste disposed at the site through the proper application of scientific and engineering principles.

The remediation goals for this site are to eliminate or reduce to the extent practicable:

- exposures of persons at or around the site to VOCs in groundwater; and
- the release of contaminants from groundwater beneath structures into indoor air through soil vapor intrusion.

Further, the remediation goals for the site include attaining to the extent practicable:

- ambient groundwater quality standards and
- the air guidelines provided in the Guidance for Evaluating Soil Vapor Intrusion in the State of New York, dated October 2006.

SECTION 7: SUMMARY OF THE EVALUATION OF ALTERNATIVES

The selected 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. Potential remedial alternatives for the Defense National Stockpile Center Scotia Depot site were identified, screened and evaluated in the FS report which is available at the document repositories established for this site.

A summary of the remedial alternatives that were considered for this site is discussed below. The present worth 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.

7.1: Description of Remedial Alternatives

The following potential remedies were considered to address the contaminated groundwater, soil vapor, and air at the site.

With the exception of Alternative 1 (No Further Action), the following common remedial actions would be included as elements of Alternatives 2 through 8:

- Long-term groundwater quality monitoring program;
- An environmental easement to restrict the use of groundwater at the site;
- Implementation of a vapor intrusion monitoring program, and if necessary, installation of mitigation systems;
- Provisions for any new structures in the area of the groundwater contamination to include subslab construction that allows for installation and operation of mitigation systems; and
- Periodic reviews to evaluate the proposed remedy.

Alternative 1: No Further Action

The no further action alternative recognizes remediation of the site conducted under previously completed IRMs (e.g. removal of the drywells in the north section of the 300 Block). The no further action alternative would include no further work, no long-term monitoring, and no institutional controls. Since Alternative 1 includes no further actions, there would be no costs associated with this alternative.

This alternative would leave the site in its present condition and would not provide any additional protection to human health or the environment.

Alternative 2: In-Situ Bioremediation

Biodegradation, or bioremediation, is the controlled management of microbial processes in the subsurface to facilitate the breakdown of site contaminants. Enhanced bioremediation is accomplished by injecting an organic carbon source, nutrients (including phosphate, nitrate, and potassium), electron donors, and/or microbial cultures into the impacted groundwater or soil to stimulate degradation. The injection of biostimulant or bacteria would be in a linear treatment zone located generally perpendicular to groundwater flow and downgradient from the area where the TCE groundwater concentrations are the highest (see Proposed Groundwater Treatment Zone on Figure 3). In-situ bioremediation typically requires multiple injections to sustain anaerobic conditions and microbial populations in the subsurface. It is expected that two injection events per year for 30 years would be conducted to provide the necessary long-term reduction of contamination in groundwater flowing through the treatment zone. Long-term groundwater quality monitoring upgradient and downgradient of the treatment area would be required to evaluate the effectiveness of the in-situ bioremediation injections at reducing contaminant concentrations and protecting downgradient areas from further dissolved phase plume migration.

In-situ bioremediation would treat the plume as the affected groundwater flows through the treatment area, which would reduce the continued migration of the VOC contamination within the plume. There would also be some downgradient treatment as the bioremediation amendments flow with the groundwater. However, areas of the plume downgradient of the treatment area would continue to migrate off-site. An in-situ bioremediation pilot study would be conducted to evaluate the injection well spacing, implementability, effectiveness, and feasibility of this technology at the site.

It is expected that it would take approximately one (1) year to design and implement the in-situ bioremediation remedy. Since Alternative 2 focuses on the area of greatest groundwater VOC concentrations and because of the persistent nature of the contaminants and the length of the groundwater plume it is not expected that Alternative 2 would achieve the groundwater SCGs within the near future.

The components of Alternative 2 are readily implementable technologies. The success of in-situ bioremediation would be highly dependent on the ability to effectively distribute the biostimulant or bacteria into the treatment area. Costs are based on design of the in-situ bioremediation program, injection of the biostimulant or bacteria during two events annually for 30 years, purchase of the actual biostimulant or bacteria, long-term groundwater quality monitoring, and a soil vapor intrusion investigation and soil vapor intrusion mitigation as needed.

Present Worth: *$7,100,000*
Capital Cost: *$1,400,000*
Annual Costs:
(Years 1-30): *$370,000*

Alternative 3: In-Situ Chemical Oxidation

Under Alternative 3, multiple injections of an oxidant would be required to establish and maintain a linear treatment zone located generally perpendicular to groundwater flow and downgradient from the area where the TCE groundwater concentrations are the highest (see Proposed Groundwater Treatment Zone on Figure 3). In-situ chemical oxidation (ISCO) injections would provide treatment of the groundwater plume as the affected groundwater flows through this zone. However, areas of the plume downgradient of the treatment area would continue to migrate off-site. Groundwater monitoring upgradient, downgradient, and within the treatment area would be required to evaluate the effectiveness of the ISCO injections at reducing contaminant concentrations.

Since ISCO relies on direct contact between the oxidant solution and the contaminant, the success of the ISCO treatment would be highly dependent on the ability to effectively distribute the oxidant through the treatment area. If such distribution can be achieved, it is anticipated that the ISCO treatment is capable of meeting the RAOs for the site. Multiple injections are typically required to sustain the oxidants in the subsurface treatment zone and to maintain long-term treatment of the plume. Although the costs for this alternative were based on an estimated four (4) injection events per year for 30 years, the Department does not believe that this many applications would be required to maintain the treatment zone. An ISCO pilot study would be conducted to evaluate the implementability, effectiveness, and feasibility of this technology at the site.

It is expected that it would take approximately one (1) year to design and implement the remedy. Since Alternative 3 focuses on the area of greatest groundwater VOC concentrations and because of the persistent nature of the contaminants and the length of the groundwater plume it is not expected that Alternative 3 would achieve the groundwater SCGs within the near future.

As with Alternative 2, the components of Alternative 3 are readily implementable technologies. Costs are based on design of the in-situ chemical oxidation program, purchase and injection of the ISCO material during four events per year for 30 years, long-term groundwater quality monitoring, and a soil vapor intrusion investigation and soil vapor intrusion mitigation as needed. With four injections per year for 30 years, the cost estimate for Alternative 3 is a conservative estimate. The overall frequency and duration of ISCO injections would be based on the periodic monitoring results and evaluation of the remedy effectiveness.

Present Worth: *$9,600,000*
Capital Cost: *$1,600,000*
Annual Costs:
(Years 1-30): *$530,000*

Alternative 4: Groundwater Extraction

A groundwater extraction system would consist of a series of recovery wells piped to a treatment system, in which groundwater would be treated before discharging to a sewer system or a surface water body or re-injecting back to the aquifer through a series of injection wells. The extraction wells would be installed in a pattern perpendicular to groundwater flow in the area of greatest groundwater concentrations to provide hydraulic control of the plume and limit further downgradient plume migration. The extracted water would be treated using granular activated carbon or air stripping to remove VOCs from the water.

An aquifer pumping test would be required to provide additional information for design of the groundwater extraction system. Analytical sampling performed during the aquifer test would provide additional information for design of an air stripping or carbon treatment system. After system installation, a comprehensive site management plan (SMP) would be developed for the system to ensure proper system performance.

It is expected that it would take approximately one (1) year to design and implement the remedy. Since Alternative 4 focuses on the area of greatest groundwater VOC concentrations and because of the persistent nature of the contaminants and the length of the groundwater plume, it is not expected that Alternative 4 would achieve the groundwater SCGs within the near future.

Costs are based on completion of an aquifer pumping test, installation and operation of the groundwater extraction and treatment system for a 30 year period, long-term groundwater quality monitoring, and a soil vapor intrusion investigation and soil vapor intrusion mitigation as needed.

Present Worth: $3,500,000
Capital Cost: $1,700,000
Annual Costs:
(Years 1-30): $120,000

Alternative 5: Permeable Reactive Barrier

Under Alternative 5, a zero-valent iron permeable reactive barrier (PRB) would be constructed using injection technology. The PRB would be located generally perpendicular to groundwater flow and downgradient from the area where the TCE groundwater concentrations are the highest (see Proposed Groundwater Treatment Zone on Figure 3). The PRB would extend vertically from approximately 65 feet bgs (average depth of the water table) to an approximate average depth of 105 feet bgs. Assuming a 250-foot long PRB, the treatment area would contain approximately 250 to 300 tons of zero valent iron, depending on the barrier thickness.

A PRB would treat the TCE plume as the affected groundwater flows through the treatment area, which would limit migration of the plume from its source. However, areas of the plume downgradient of the PRB would continue to migrate off-site toward the Mohawk River. Groundwater monitoring both upgradient, downgradient, and within the treatment area would be required to evaluate the effectiveness of the PRB at reducing contaminant concentrations and protecting downgradient areas from further dissolved phase plume migration.

It is expected that it would take approximately one (1) year to design and implement the remedy. Since Alternative 5 focuses on the area of greatest groundwater VOC concentrations and because of the persistent nature of the contaminants and the length of the groundwater plume, it is not expected that Alternative 5 would achieve the groundwater SCGs within the near future.

The Alternative 5 costs are based on design and installation of the PRB along with long-term groundwater quality monitoring, and a soil vapor intrusion investigation and soil vapor intrusion mitigation as needed.

Present Worth: $3,300,000
Capital Cost: $2,700,000
Annual Costs:
(Years 1-30): $42,000

Alternative 6: Air Sparing and SVE

Under Alternative 6, a series of air sparging wells would be installed with an orientation generally perpendicular to groundwater flow and downgradient from the area where the TCE groundwater concentrations are the highest (see Proposed Groundwater Treatment Zone on Figure 3). Soil vapor extraction (SVE) wells would be installed in the vadose zone in the vicinity of the air sparging wells. Air would be injected from approximately 65 feet bgs (average depth of the water table) to an approximate average depth of 105 feet bgs, although the majority of air would be injected in the lower 20 feet of this interval. Soil vapor extraction (SVE) wells would be installed to within 10 feet above the water table.

After system installation, a comprehensive site management plan (SMP) would be developed to ensure proper performance of the air sparging and SVE system. This would include groundwater quality monitoring both upgradient and downgradient of the air sparging and SVE treatment area to evaluate overall effectiveness of the air sparging system at reducing VOC concentrations and protecting downgradient areas from further dissolved phase plume migration.

Air sparging would treat the plume as the affected groundwater flows through the treatment area. However, areas of the dissolved phase plume downgradient of the treatment area would continue to migrate off-site toward the Mohawk River. Groundwater sampling in areas downgradient of the air sparging treatment area would be conducted to monitor the reduction of contaminant concentrations over time.

It is expected that it would take approximately one (1) year to design and implement the remedy. Since Alternative 6 focuses on the area of greatest groundwater VOC concentrations and because of the persistent nature of the contaminants and the length of the groundwater plume, it is not expected that Alternative 6 would achieve the groundwater SCGs within the near future.

Costs are based on installation and operation of the air sparging with SVE system for a 30 year period, long-term groundwater quality monitoring, and a soil vapor intrusion investigation and soil vapor intrusion mitigation as needed

Present Worth: *$4,000,000*
Capital Cost: *$1,900,000*
Annual Costs:
(Years 1-30): *$140,000*

Alternative 7: In-Well Air Stripping

The in-well air stripping alternative would include the installation of a series of in-well air stripping wells orientation generally perpendicular to groundwater flow and downgradient from the area where the TCE groundwater concentrations are the highest (see Proposed Groundwater Treatment Zone on Figure 3). The in-well air stripping wells would capture and re-circulate groundwater to create in-situ vertical groundwater circulation cells by drawing groundwater from the aquifer through the lower screen of a double-screened well and discharging it through the upper screen section. Off gas from the stripping system would be collected and treated on-site.

The radius of influence is limited by the pumping capacity of each well and the hydrogeologic characteristics of the site. Effective installations require a well-defined contaminant plume and well-placed screens to prevent the spreading of the contamination. Pilot testing and field measurements would be required to determine the exact well and piping configuration.

An SMP would detail on-site monitoring of the system to evaluate overall system effectiveness. Groundwater monitoring both upgradient and downgradient of the treatment area would be required to evaluate the effectiveness of the in-well air stripping system at reducing VOC concentrations and protecting downgradient areas from further dissolved phase plume migration.

In-well air stripping would treat the plume as the affected groundwater flows through the treatment area. However, areas of the dissolved phase plume downgradient of the treatment area would continue to migrate off-site toward the Mohawk River. Groundwater sampling in areas downgradient of the treatment area would be performed to monitor the reduction of contaminant levels over time.

It is expected that it would take approximately one (1) year to design and implement the remedy. Since Alternative 7 focuses on the area of greatest groundwater VOC concentrations and because of the persistent nature of the contaminants and the length of the groundwater plume it is not expected that Alternative 7 would achieve the groundwater SCGs within the near future.

Costs are based on installation and operation of the in-well air stripping system for a 30 year period, long-term groundwater quality monitoring, and a soil vapor intrusion investigation and soil vapor intrusion mitigation as needed.

Present Worth:..*$4,500,000*
Capital Cost:..*$1,600,000*
Annual Costs:
(Years 1-30):..*$190,000*

Alternative 8: Restoration to Pre-Disposal Conditions

Alternative 8 would include the installation of three PRBs to reduce groundwater VOC concentrations to pre-disposal conditions. The implementation of Alternative 8 would be the same as for Alternative 5, except that three (3) PRBs would be installed instead of one (1). The PRBs would be installed in the area of greatest groundwater VOC concentrations, in the NYS Route 5 right-of-way, and a third location between these two PRBs. It is expected that it would take approximately one (1) year to design and implement the remedy. With the installation of multiple PRBs under Alternative 8, it is expected that the groundwater SCGs would be achieved in the shortest time frame.

Costs are based on design and installation of the PRBs and the long-term groundwater quality monitoring, and the cost of implementing a soil vapor intrusion investigation and soil vapor intrusion mitigation as needed.

Present Worth:..*$11,900,000*
Capital Cost:..*$11,300,000*
Annual Costs:
(Years 1-30):..*$42,000*

7.2 Evaluation of Remedial Alternatives

The criteria to which potential remedial alternatives are compared are defined in 6 NYCRR Part 375, which governs the remediation of inactive hazardous waste disposal sites in New York. 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.

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.

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

3. Short-term 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.

4. 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.

5. 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.

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.

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 for each alternative are presented in Table 2.

This final criterion 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.

8. Community Acceptance - Concerns of the community regarding the RI/FS reports 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.

SECTION 8: SUMMARY OF THE PROPOSED REMEDY

The Department is proposing Alternative 5, Permeable Reactive Barrier (PRB) as the remedy for this site. The elements of this remedy are described at the end of this section. As shown on Figure 3, the PRB would be installed directly downgradient of the area where the groundwater VOC concentrations are the highest in the central portion of the 300 Block.

The proposed remedy is based on the results of the expanded site investigation and previous investigations and the evaluation of alternatives presented in the FS. As described in Section 7.1, Alternative 5 (Permeable Reactive Barrier) would include the direct injection of a zero-valent iron permeable reactive barrier to reduce the on-site mass of residual groundwater contamination and to reduce the off-site flux of groundwater contamination. Based on the orientation and distribution of groundwater VOC contamination, the PRB would be located off-site and in the central portion of the 300 Block (Figure 3). The PRB would be constructed by directly injecting zero valent iron into the aquifer. The zero valent iron would create reducing groundwater conditions that would degrade the VOC contamination as groundwater flows through the PRB. It is expected that the PRB would continue to treat the VOC groundwater contamination for up to 30 years. The proposed remedy would also include the remaining common remedial actions outlined in Section 7.1. Specifically, this would include long-term groundwater quality monitoring program, an environmental easement restricting groundwater use at the site, implementation of a vapor intrusion monitoring program, and if necessary, installation of mitigation systems, provisions for any new structures in the area of the groundwater contamination to include subslab construction that allows for installation and operation of mitigation systems, and periodic reviews to evaluate the proposed remedy.

Alternative 5 (Permeable Reactive Barrier) is being proposed because, as described below, it satisfies the threshold criteria and provides an optimum balance of the five primary balancing criteria described in Section 7.2. With the exception of the No Action Alternative (Alternative 1), each of the alternatives outlined in Section 7.0 would be protective of human health and the environment. Protection of human health and the environment is provided through the use of remedial approaches to reduce VOCs present in groundwater along with implementation of a vapor intrusion monitoring program, and if necessary, installation of mitigation systems. Alternative 1 (No Further Action) would not be protective of human health since it would not include remediation or continued groundwater or vapor intrusion monitoring. Through the use of multiple PRBs, Alternative 8 (Restoration to Pre-disposal Conditions) would be more effective in reducing the total mass of VOC groundwater contamination and would provide more protection to human health and the environment than the other alternatives.

Alternative 1 (No Further Action) would rely on the natural reduction of the VOC contamination to achieve groundwater SCGs and would not include long-term groundwater quality monitoring. Since Alternative 1 (No Further Action) relies solely on the natural reduction of site contaminants, it is not expected that this alternative would achieve the NYS Class GA Groundwater Standards in the foreseeable future. Alternative 1 (No Further Action) would also not include implementation of the soil vapor intrusion assessment and therefore the SCGs for indoor air may not be achieved under Alternative 1. Alternatives 2 through 7 would rely on active remedial approaches combined with long-term groundwater monitoring to achieve groundwater SCGs. Based on the persistent nature of the contaminants and the length of the groundwater plume, however, it is not expected that Alternatives 2 through 7 would achieve the groundwater SCGs in all areas of the groundwater plume in the near future. Alternative 8, including the installation of multiple PRBs over the length of the groundwater plume, would be the most effective alternative in achieving the SCGs in the near future. Through the implementation of a vapor intrusion monitoring program, and if necessary, installation of mitigation systems included in Alternatives 2 through 8, the indoor air SCGs would be achieved for on-site and off-site properties.

Because Alternatives 2 through 8 satisfy the threshold criteria, the five balancing criteria are particularly important in selecting a final remedy for the site. As described above, long-term groundwater quality monitoring, an environmental easement, implementation of a vapor intrusion monitoring program, and if necessary, installation of mitigation systems, provisions for any new structures in the area of the groundwater contamination to include subslab construction that allows for installation and operation of mitigation systems, and periodic reviews, are common elements of Alternatives 2 through 8. The difference between these seven (7) alternatives is the method used to address residual VOCs in groundwater.

Since each alternative includes established technologies that have been applied during cleanup programs, possible short-term impacts on the community, workers and the environment can easily be controlled using standard work practices and engineering controls during remedy implementation. Since Alternative 8 would involve the installation of three PRBs perpendicular to the groundwater plume in both a road right-of-way and on private property, this alternative would have the greatest short-term impact on the local community. Alternatives 2 through 8 would be implemented on private property so access agreements would be needed. Since Alternatives 2 through 7 would be implemented exclusively on private property, these alternatives would not have significant short-term community impacts. Alternatives 2 through 7 would be effective in the short-term at reducing groundwater VOC concentrations within the treatment area but would have less of an impact on groundwater VOC concentrations outside of the treatment area. With multiple treatment areas, Alternative 8 (Restoration to Pre-disposal Conditions) would be the most effective alternative in reducing the VOC concentrations within the entire plume during the short-term.

Alternatives 2 through 8 would be effective in the long-term because the VOC mass in the area of the highest VOC groundwater concentrations would be reduced within the treatment area. Alternatives 4 (Groundwater Extraction), 6 (Air Sparging and SVE), and 7 (In-Well Air Stripping) each involve active remedies to address VOC groundwater contamination that would require continued, long-term operation and maintenance to be effective. With each of these alternatives (Alternatives 4, 6, and 7), there is the potential for incomplete capture and/or treatment of contaminants if heterogeneities or stratified soil is present or if the areas of influence of the air sparging, air stripping, or extraction wells do not overlap. The biodegradation/enhanced biodegradation and ISCO alternatives are only effective as a barrier to plume migration if the biostimulant/bacteria or the oxidants, respectively, are distributed throughout the treatment area and are sustained in the subsurface. To achieve this sustained treatment, multiple injections may be necessary under Alternatives 2 (In-Situ Bioremediation) and 3 (In-Situ Chemical Oxidation). Alternative 5 (Permeable Reactive Barrier) is more effective and permanent than Alternatives 2 through 7 because the integrity of the PRB can be confirmed and a PRB will remain effective longer than other alternatives with no need for additional injections or maintenance and operation of an active remedial system. Alternative 8 (Restoration to Pre-disposal Conditions) would treat a larger volume of groundwater than the other alternatives and would therefore be the most effective in reducing the mass of VOC groundwater contamination over the long-term.

Alternatives 2 through 8 would reduce the toxicity, mobility, and volume of the plume by treating the groundwater as it flows through the treatment area, thereby reducing the continued off-site migration of VOC contaminated groundwater. The overall amount of reduction of the toxicity, mobility, or volume of the contamination is dependent on the degree to which uniform treatment is achieved within the treatment area. Each remedial alternative has uncertainties related to the ability to achieve uniform treatment;

although Alternative 5 (Permeable Reactive Barrier) and Alternative 8 (Restoration to Pre-Disposal Conditions) has the least amount of uncertainty because the continuity of the PRB can be verified.

Alternatives 5 (Permeable Reactive Barrier) and 8 (Restoration to Pre-disposal Conditions) would be relatively easy to implement once a PRB is installed because there are no operation and maintenance costs other than long-term monitoring. Alternatives 2, 3, 4, 6, and 7 would require significant operation and maintenance efforts for periodic injections or maintenance of above ground structures and equipment, such as injection, extraction, and surface treatment systems.

Alternative 1 (No Further Action) is the least costly alternative to implement but it would not actively reduce the VOC contamination in groundwater and would allow the groundwater plume to continue to migrate off-site. The Restoration to Pre-Disposal Condition Alternative (Alternative 9) has the highest total present worth. The remaining six (6) alternatives (Alternative 2, 3, 4, 5, 6, and 7) include remedial approaches focusing on addressing VOC contamination in the area where the concentrations are the highest. Of these six (6) alternatives, the two options (Alternatives 2 and 3) involving multiple injections to sustain the treatment zone for either bioremediation or ISCO respectively have the highest total cost. The total present worth estimates for Alternatives 4 through 6 are moderately close, ranging from $3,300,000 to $4,500,000. Relative to these four alternatives, the PRB Alternative (Alternative 5) has the lowest total present worth.

Alternative 5 (Permeable Reactive Barrier) is preferred because it would be implemented quickly and would be an effective approach in treating the VOC groundwater plume over the long term. Alternative 5 would not require above ground structures that may interfere with future site development and would not require long-term operation and maintenance of active remedial systems. Although the permeable reactive barrier would be installed in the area of the highest contaminant concentrations and not along the property boundary, the off-site flux of VOC contamination would be reduced over the long-term.

The estimated present worth cost to implement the remedy is $3,300,000. The cost to construct the remedy is estimated to be $2,700,000 and the estimated average annual costs for 30 years is $42,000.

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. The pre-design study will be completed to verify the exact location and dimensions of the permeable reactive barrier

2. Over an approximately 250-foot width of the VOC plume (Figure 3) and using multiple borings, zero valent iron (ZVI) would be injected from approximately 65 feet bgs (average depth of the water table) to an approximate average depth of 105 feet below ground surface. Assuming a 250-foot long permeable reactive barrier (PRB), the treatment area would contain approximately 250 to 300 tons of iron, depending on the barrier thickness (to be determined during the pre-design study). Since this remedy requires no permanent above ground structures, the disturbed treatment area would be restored to pre-existing conditions following ZVI injection.

3. Imposition of an institutional control in the form of an environmental easement that would require (a) compliance with the approved site management plan; (b) restricting the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by NYSDOH; and

(c) the property owner, or designated representative, to complete and submit to the Department a periodic certification of institutional and engineering controls.

4. The property owner, or designated representative, would provide a periodic certification of institutional and engineering controls, prepared and submitted by a professional engineer or such other expert acceptable to the Department, until the Department notifies the property owner in writing that this certification is no longer needed. This submittal would: (a) contain certification that the institutional controls and engineering controls put in place are still in place and are either unchanged from the previous certification or are compliant with Department-approved modifications; (b) allow the Department access to the site; and (c) state that nothing has occurred that would impair the ability of the control to protect public health or the environment, or constitute a violation or failure to comply with the site management plan unless otherwise approved by the Department.

5. The operation of the components of the remedy would continue until the remedial objectives have been achieved, or until the Department determines that continued operation is technically impracticable or not feasible.

6. Since the remedy results in untreated hazardous waste remaining at the site, a site management plan is required, which would include the following institutional and engineering controls: (a) long-term groundwater quality monitoring from wells upgradient, downgradient, and in the vicinity of the PRB to evaluate the effectiveness of the remedy and to verify the extent of the dissolved-phase VOC plume; (b) continued implementation of a vapor intrusion monitoring program, and if necessary, installation of mitigation systems for buildings located above the trichloroethene and carbon tetrachloride plumes; (c) identification of any use restrictions on the site; (d) provisions for the continued proper operation and maintenance of the components of the remedy, and (e) provisions for any new structures in the area of the groundwater contamination to include subslab construction that allows for installation and operation of mitigation systems. The long-term monitoring program would allow the effectiveness of the groundwater VOC concentration reduction to be monitored and would be a component of the long-term management for the site.

TABLE 1
Nature and Extent of Contamination
Samples collected between 1999 and 2005

SURFACE SOIL	Contaminants of Concern	Concentration Range Detected (ppm)[a]	SCG[b] (ppm)[a]	Frequency of Exceeding SCG
Volatile Organic Compounds (VOCs)	Benzene	0.048 to 0.140	0.06	1 of 2
	Trichloroethene	ND – 0.180	0.47	0 of 2
PCBs/Pesticides	Endrin	0.077	0.06	1 of 1

SUBSURFACE SOIL	Contaminants of Concern	Concentration Range Detected (ppm)[a]	SCG[b] (ppm)[a]	Frequency of Exceeding SCG
Volatile Organic Compounds (VOCs)	Trichloroethene	ND to 0.130	0.47	0 of 66
	Tetrachloroethene	ND to 0.078	1.3	0 of 66

GROUNDWATER	Contaminants of Concern	Concentration Range Detected (ppb)[a]	SCG[b] (ppb)[a]	Frequency of Exceeding SCG
Volatile Organic Compounds (VOCs)	1,1,1-Trichloroethane	ND to 57 ppb	5	37 of 123
	Trichloroethene	ND to 810	5	51 of 123
	Tetrachloroethene	ND to 51	5	14 of 123
	Carbon Tetrachloride	ND to 17	5	11 of 123
	Toluene	ND to 41	5	4 of 71
Semivolatile Organic Compounds (SVOCs)	Bis(2-ethylhexyl) phthalate	ND to 81	5	3 of 71
Inorganic Compounds	Iron	118 to 51,000	300	39 of 42

SUB-SLAB VAPOR	Contaminants of Concern	Concentration Range Detected (µg/m^3)[a]	SCG[b] (µg/m^3)[a]	Frequency of Exceeding SCG
Volatile Organic Compounds (VOCs)	1,1,1-Trichloroethane	ND to 3000	NA	NA
	Carbon tetrachloride	ND to 310	NA	NA
	Tetrachloroethene	ND to 7	NA	NA
	Trichloroethene	ND to 5.2	NA	NA

TABLE 1
Nature and Extent of Contamination
Samples collected between 1999 and 2005

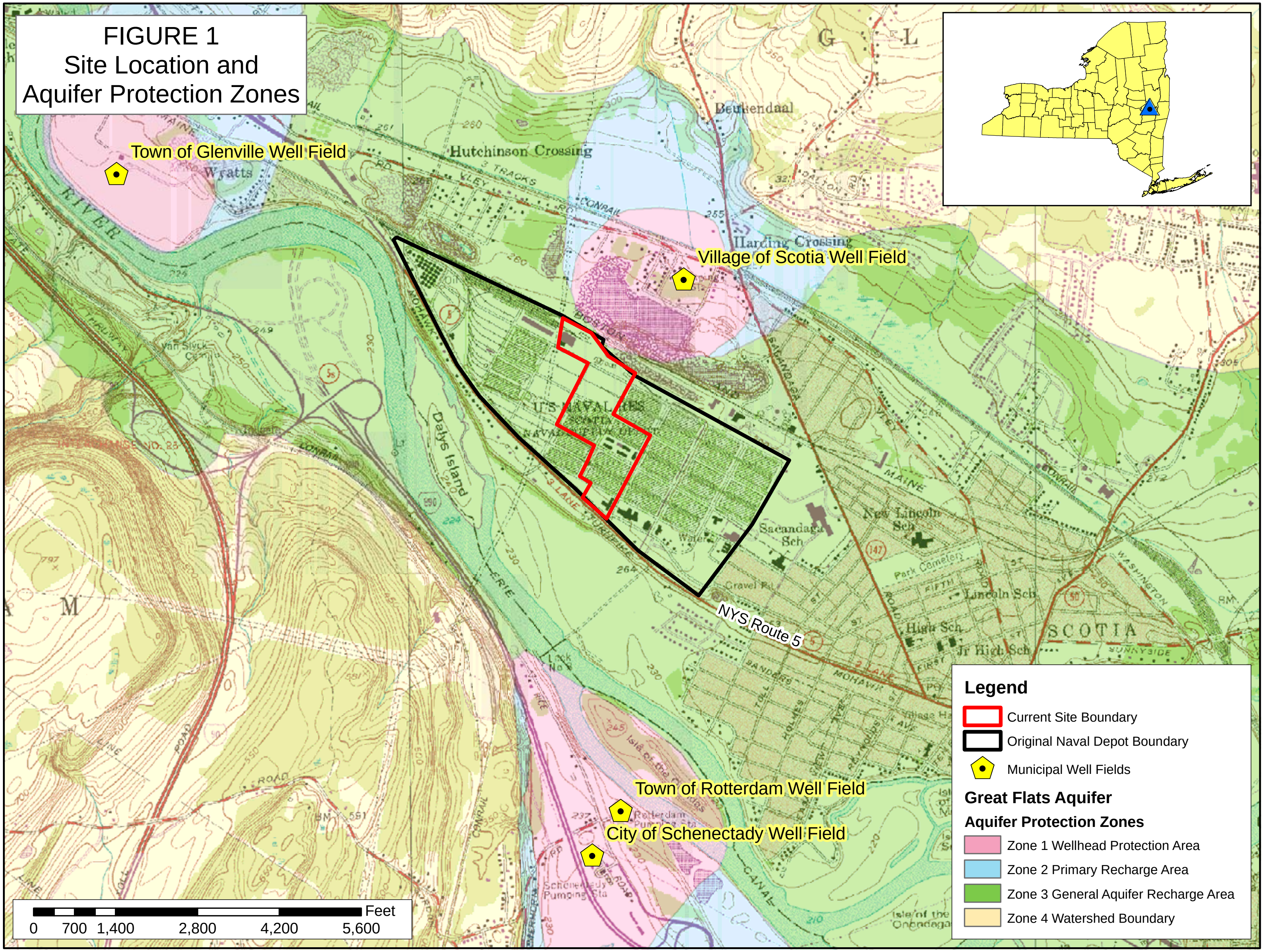
INDOOR AIR	Contaminants of Concern	Concentration Range Detected ($\mu g/m^3$)[a]	SCG[b] ($\mu g/m^3$)[a]	Frequency of Exceeding SCG
Volatile Organic Compounds (VOCs)	1,1,1-Trichloroethane	ND to 1,900	NA	NA
	Carbon tetrachloride	ND to 5.9	NA	NA
	Tetrachloroethene	ND to 7.7	100	0 of 16
	Trichloroethene	ND to 1.9	5	0 of 16

[a] ppb = parts per billion, which is equivalent to micrograms per liter, ug/L, in water;
ppm = parts per million, which is equivalent to milligrams per kilogram, mg/kg, in soil;
ug/m^3 = micrograms per cubic meter
[b] SCG = standards, criteria, and guidance values;
ND = Compound Not Detected
NA = Not Applicable
Analytical data compiled from the following reports:
1) Earth Tech. Phase II Site Investigation for proposed Glenville Energy Park, January 2002.
2) NYSDEC and GeoLogic NY, Inc.. Expanded Site Investigation, August 2007.
3) Parsons Engineering Science, Inc. Groundwater Investigation Report, August 2001.

Table 2
Remedial Alternative Costs

Remedial Alternative	Capital Cost ($)	Annual Costs ($)	Total Present Worth ($)
1 - No Action	$0	$0	$0
2 - In-Situ Bioremediation	$1,400,000	$370,000	$7,100,000
3 - In-Situ Chemical Oxidation	$1,600,000	$530,000	$9,600,000
4 - Groundwater Extraction	$1,700,000	$120,000	$3,500,000
5 - Permeable Reactive Barrier	$2,700,000	$42,000	$3,300,000
6 - Air Sparging and SVE	$1,900,000	$140,000	$4,000,000
7 - In-Well Air Stripping	$1,600,000	$190,000	$4,500,000
8 - Restoration to Pre-disposal Conditions	$11,000,000	$42,000	$12,000,000

FIGURE 1
Site Location and Aquifer Protection Zones



New York State
Department of Environmental Conservation

Division of Environmental Remediation

Map Details

Created in ArcGIS 9.2

Created by J. Pelton

Date of Last Revision: 1/22/2010

UNAUTHORIZED DUPLICATION
IS A VIOLATION OF APPLICABLE LAWS

Defense National Stockpile
Center Scotia Depot Site
Site # 4-47-023

Schenectady County
Town of Glenville

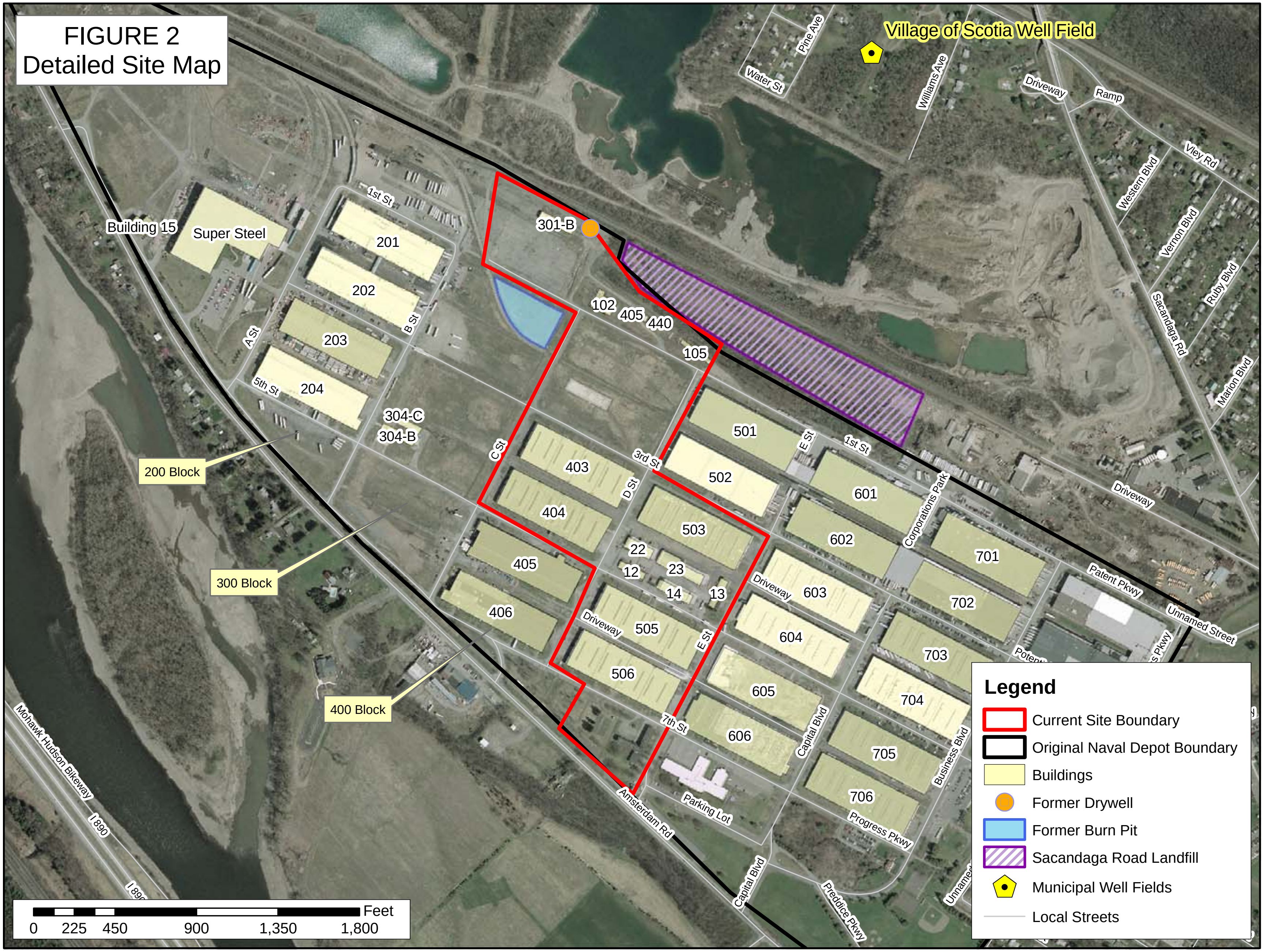
DEC Contacts:
J. Pelton

DOH Contact:
M. Schuck

Spring 2004
Aerial Photography

N
W E
S

North American Datum 1983
UTM Zone 18N



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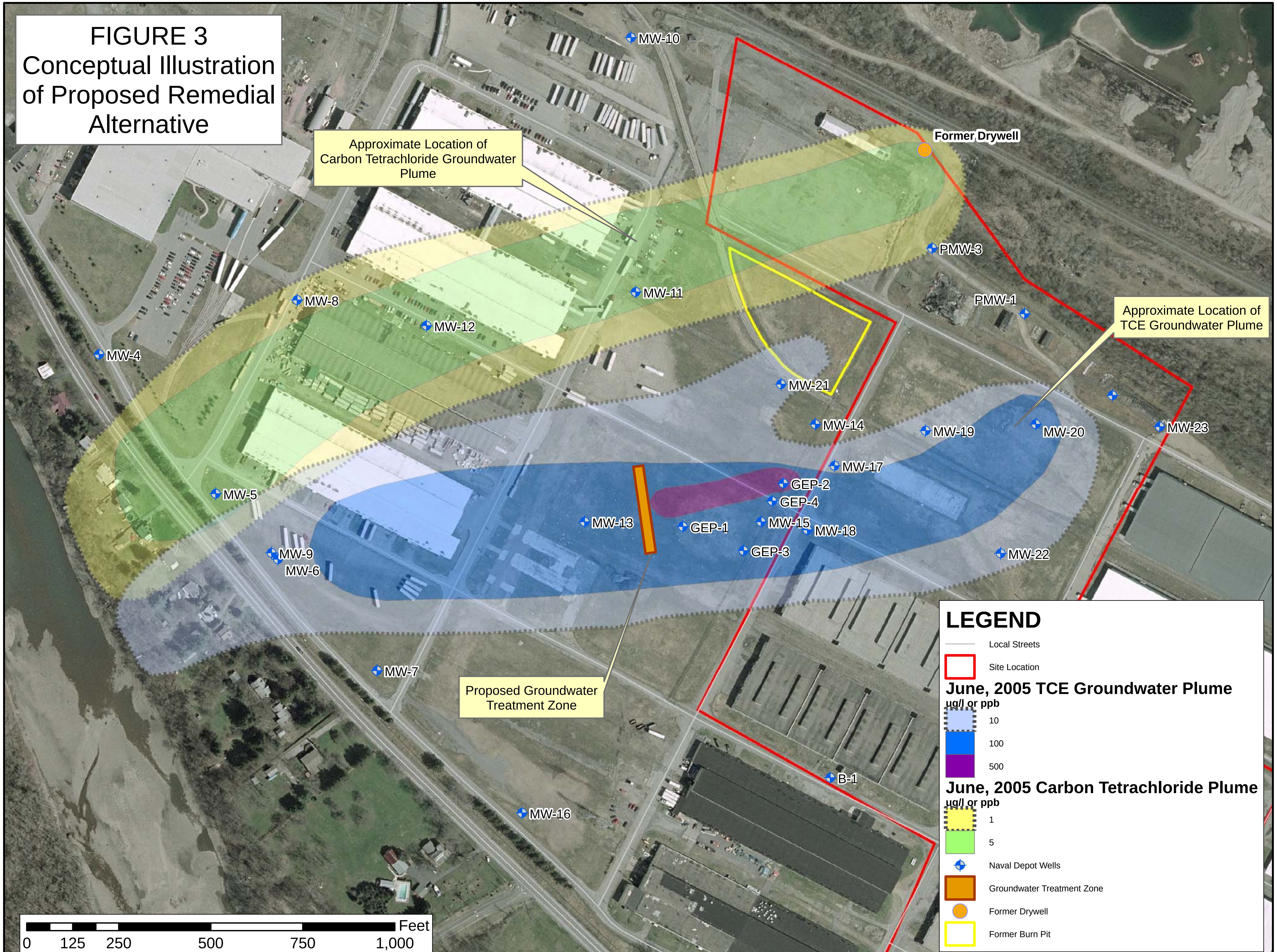

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