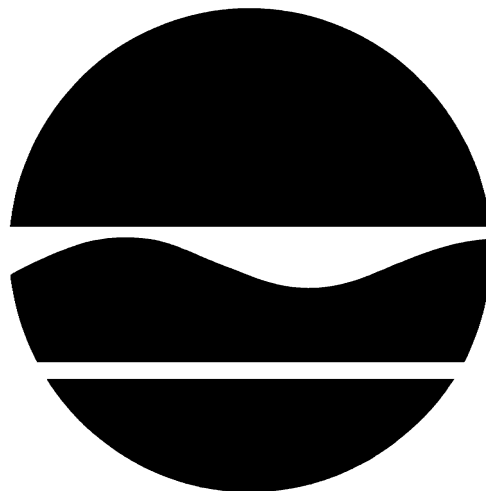


**PROPOSED REMEDIAL ACTION PLAN**  
**Utility Manufacturing/Wonder King**  
**Operable Unit No. 2 - Off-Site Contamination**  
**Town of North Hempstead, Nassau County, New York**  
**Site No. 1-30-043H**

February 2008



Prepared by:

Division of Environmental Remediation  
New York State Department of Environmental Conservation

# PROPOSED REMEDIAL ACTION PLAN

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## **SECTION 1: SUMMARY AND PURPOSE OF THE PROPOSED PLAN**

The New York State Department of Environmental Conservation (Department), in consultation with the New York State Department of Health (NYSDOH), is proposing a remedy for the off-site contamination at the Utility Manufacturing/Wonder King (“Utility”) site. The off-site contamination has been designated Operable Unit 2 (OU2). OU2 is limited to the area north of Old Country Road. On-site contamination, designated Operable Unit 1 (OU1), was addressed in the March 2003 Record of Decision (ROD). Off-site groundwater contamination south of Old Country Road, designated Operable Unit 3 (OU3) was addressed in an October 2003 ROD. The presence of hazardous waste has created significant threats to human health and/or the environment that are addressed by this proposed remedy. As more fully described in Sections 3 and 5 of this document, discharges into underground cesspools and dry wells have resulted in the disposal of hazardous wastes, including volatile organic compounds (VOCs). These wastes have contaminated the groundwater at the site, and have resulted in:

- a significant threat to human health associated with potential exposure to contaminated groundwater and soil vapor.
- a significant environmental threat associated with the impacts of contaminants to a sole source aquifer.

To eliminate or mitigate these threats, the Department proposes natural attenuation of contaminated off-site groundwater and soil vapor intrusion mitigation.

The proposed remedy, discussed in detail in Section 8, is intended to attain the remediation goals identified for this site in Section 6. The remedy must conform with officially 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.

This Proposed Remedial Action Plan (PRAP) identifies the preferred remedy, summarizes the other alternatives considered, and discusses the reasons for this preference. The Department will select a final remedy for the site only after careful consideration of all comments received during the public comment period.

The Department has issued this PRAP as a component of the Citizen Participation Plan developed pursuant to the New York State Environmental Conservation Law and Title 6 of the Official Compilation of Codes,

Rules and Regulations of the State of New York (6 NYCRR) Part 375. This document is a summary of the information that can be found in greater detail in the December 2005 “Off-Site Remedial Investigation (RI) Report”, the February 2006 “Off-Site Feasibility Study (FS) Report” the October 2007 “Supplemental Remedial Investigation (RI) Report”, and other relevant documents. The public is encouraged to review the project documents, which are available at the following repositories:

New York State Department of Environmental Conservation  
625 Broadway  
Albany, New York 12233-7015  
Mr. Jeffrey Dyber, Project Manager  
(518) 402-9621  
Hours: M-F 8:30 a.m. to 4:45 p.m.

New York State Department of Environmental Conservation  
Region 1 Office  
Loop Road, Building 40  
Stony Brook, New York 11790-2356  
(631) 444-0354  
Hours: M-F 8:30 a.m. to 4:45 p.m.  
Attn: William Fonda

New Cassel/Westbury Youth Services Project  
817 Prospect Avenue  
Westbury, New York 11590  
(516) 333-9224  
Hours: M-F 10:30 a.m. to 10:00 p.m.

New Cassel Environmental Justice Project  
847 Prospect Avenue  
Westbury, New York 11590  
(516) 876-9526  
Hours: M-F 10:30 a.m. to 6:00 p.m.

Town of North Hempstead - Town Clerk  
200 Plandome Road  
Manhasset, New York 11030  
(516) 627-0590  
Hours: M-F 9:00 a.m. to 5:00 p.m.  
Westbury Memorial Public Library  
Reference Section  
445 Jefferson Street  
Westbury, New York 11590  
(516) 333-0176  
Hours: M-F 9:30 a.m. to 9:00 p.m.  
Sat 9:30 a.m. to 5:30 p.m.  
Sun 1 to 5 p.m.

The Department seeks input from the community on all PRAPs. A public comment period has been set from February 22, 2008 to March 21, 2008 to provide an opportunity for public participation in the remedy selection process. A public meeting is scheduled for March 4, 2008 at the W. Trespar Clarke High School beginning at 7:30 p.m.

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. Jeffrey Dyber at the above address through March 21, 2008.

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 Department's final selection of the remedy for this site.

## **SECTION 2: SITE LOCATION AND DESCRIPTION**

The Utility site, No. 1-30-043 H, is located at 700 Main Street. The site is situated on the south side of Main Street, approximately 500 feet north of Old Country Road in the New Cassel Industrial Area (NCIA). The NCIA is a 170-acre industrial and commercial area in the Town of North Hempstead, Nassau County. Currently eleven (11) Class 2 sites exist in the NCIA. A Class 2 site is a site where hazardous waste presents a significant threat to the public health or the environment and action is required. Figures 1 and 2 show the locations of the NCIA and the Class 2 sites within the NCIA.

A two-story industrial building occupies most of the 1-acre site. The remainder of the site is paved. The site is owned by Nest Equities Inc. and is occupied by the Utility Manufacturing Company. The Utility Manufacturing Company blends and repackages materials.

The off-site study area extends southwest from the Utility site to Old Country Road. The study area was chosen to include the portion of the groundwater contamination plume directly downgradient of the site. Refer to Figure 3 for a study area map.

The Former Applied Fluidics site, No. 1-30-043M is located approximately 750 feet east of the Utility site. The 89 Frost Street site, No. 1-30-043L, and the Former Autoline Automotive site, No. 1-30-043I, are adjacent to the Former Applied Fluidics site. All three of these sites are Class 2 sites.

The NCIA is highly developed and no significant surface water sources exist near the Utility site. The nearest surface waters are small ponds within the Eisenhower Memorial Park located about two miles southwest of the site

The entire Utility site is covered with either the building or pavement. Beneath the site are two water bearing layers, the Upper Glacial Aquifer (UGA) and the Magothy Aquifer. The deposits that make up the UGA are found from the surface to a depth of approximately 80 feet below ground surface (bgs). The UGA is an unconfined aquifer consisting of poorly sorted sands and gravels. However, one clay lense was found

in the UGA beneath the Utility site at approximately 40 feet bgs. The underlying Magothy Aquifer consists of finer sands, silts and small amounts of clay.

Usually, the upper surface of the Magothy formation is found at least 100 feet bgs. However, based on observations during well installation for this investigation, the Magothy is found in the NCIA at significantly shallower depths (60-87 feet bgs) than in many other areas of Long Island. Similarly, the UGA and the Magothy are usually separated by a clay aquitard but in this area the UGA and the Magothy are in direct hydraulic connection. Depth to groundwater is about 60 feet bgs in the area of the site and groundwater flows in a southwesterly direction. Both the UGA and Magothy have been designated as sole source aquifers and are protected under state and federal legislation.

The off-site study area geology was investigated to a depth of 125 feet below ground surface (bgs). The geology at the site generally consists of sand and gravel. Clay lenses were also found in the subsurface, but no continuous clay layer exists in the vicinity the site. The water table fluctuates between 55-65 feet bgs and groundwater flows southwest toward the Bowling Green public supply wells.

Operable Unit (OU) No. 2, which is the subject of this document, consists of off-site contamination. OU2 is limited to the area north of Old Country Road and lies entirely within the NCIA. An operable unit represents a portion of the site remedy that for technical or administrative reasons can be addressed separately to eliminate or mitigate a release, threat of release or exposure pathway resulting from the site contamination.

The remaining operable units for this site are: on-site contamination (OU1) and off-site groundwater contamination south of the NCIA (OU3). Remedies were selected for OU1 and OU3 in RODs dated March 2003 and October 2003, respectively. The selected remedy for OU1 was remediation of contaminated groundwater using air sparge/soil vapor extraction. The selected remedy for OU3 was remediation of contaminated groundwater using in-well vapor stripping. While the remedy for OU1 has successfully remediated on-site contamination, the remedy for OU3 is not yet implemented.

### **SECTION 3: SITE HISTORY**

#### **3.1: Operational/Disposal History**

Utility Manufacturing is an active facility that blends and repackages materials, including tetrachloroethene (PCE). This company has operated since 1976 and processes several thousand pounds of PCE each year. For example, Utility's annual PCE purchases from 1990-1994 ranged from 23,600-45,760 pounds. Utility stated in a December 26, 2002 letter that they currently repackage approximately 4,000 pounds of PCE each year. In 1971, two 550-gallon above ground storage tanks were installed inside the building. Utility has stored PCE in these tanks since occupying the facility.

#### **3.2: Remedial History**

In 1996, the Department listed the site as a Class 2 site in the Registry of Inactive Hazardous Waste Disposal Sites in New York. A Class 2 site is a site where hazardous waste presents a significant threat to the public health or the environment and action is required.

In 1986, the Nassau County Department of Public Works (NCDPW) completed an investigation of groundwater quality and found the NCIA to be a major source of volatile organic compound (VOC) contamination in groundwater. As a result of this investigation, the Department classified the entire NCIA as a Class 2 site in August 1988.

In 1988, several dry wells and cesspools were sampled at the Utility site by Utility Manufacturing's consultant. Sampling results indicated that these drainage structures were contaminated with PCE and other VOCs. In 1989, Utility Manufacturing pumped out and power washed the drainage structures. The remediation was overseen by the Nassau County Department of Health (NCDOH). Endpoint sampling results met soil cleanup objectives. In 1989, the facility was connected to the municipal sewer.

In February 1995, the Department's consultant completed a site investigation report for the NCIA under the New York State Superfund program. Based on this report, the Department removed the NCIA from the Registry in March 1995. At the same time, five sites within the NCIA (not including the Utility site) were added to the Registry as individual Class 2 sites.

In 1996, the Department's consultant issued a Preliminary Site Assessment (PSA) for several properties in the NCIA. Groundwater sampling results from the PSA showed PCE concentrations downgradient of the Utility site an order of magnitude greater than upgradient concentrations. The site was added to the Registry as a Class 2 in 1996.

In 1997, Utility Manufacturing entered into a Consent Order with the Department to perform a Remedial Investigation/Feasibility Study (RI/FS) for the Site. Although the Consent Order included investigation of on-site and off-site contamination, Utility limited the investigation to within the site boundaries.

The results of the RI indicated that the on-site groundwater was contaminated with VOCs. The maximum VOC concentration in groundwater was 1,019 ppb, which included 846 ppb of tetrachloroethene (PCE). The groundwater standard for PCE is 5 ppb. PCE was detected in on-site soils at a maximum concentration of 0.0822 ppm. Although this concentration does not exceed Department soil cleanup objectives, PCE contamination in unsaturated soil is evidence of past disposal because PCE is not naturally occurring.

An interim remedial measure (IRM) consisting of an air sparge/soil vapor extraction (AS/SVE) system was installed to remediate on-site soil and groundwater contamination. The AS/SVE system operated from December 2001 to December 2002. By December 2002, the system had reduced total VOC levels in groundwater to 13 ppb and the contaminant levels had stopped decreasing. The AS/SVE system was chosen as the final remedy for on-site contamination in the Record of Decision (ROD), dated March 2003. Utility obtained groundwater samples annually from 2003 to 2007 to detect any rebound in groundwater contaminant concentrations. As no rebound occurred during that period, on-site remediation is complete.

In 2002, the Department asked the Potentially Responsible Parties (PRPs) to perform an off-site investigation to Old Country Road. The PRPs refused to perform this work in accordance with the Department's requirements. Therefore, the Department conducted the off-site Remedial Investigation/Feasibility Study using State Superfund money.

## **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 Utility Manufacturing Company and Nest Equities, Inc.

The PRPs declined to implement the off-site RI/FS at the site 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 5: SITE CONTAMINATION**

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

### **5.1: Summary of the Remedial Investigation**

The purpose of the RI was to define the nature and extent of any contamination resulting from previous activities at the site. The RI was conducted between September 2004 and October 2007. The field activities and findings of the investigation are described in the RI report.

The following activities were conducted during the RI:

- Research of historical information;
- Installation of soil borings and monitoring wells for analysis of groundwater as well as physical properties of soil and hydrogeologic conditions;
- Sampling of new monitoring wells;
- Collection of discrete groundwater samples using a direct push technique;
- A survey of public and private water supply wells in the area around the site;
- Collection of soil vapor samples to identify which off-site buildings have the potential for vapor intrusion; and
- Collection of sub-slab vapor samples, indoor air samples and outdoor air samples to determine if vapor intrusion is a concern at off-site properties.

### **5.1.1: Standards, Criteria, and Guidance (SCGs)**

To determine whether the groundwater, sub-slab vapor and/or indoor air 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 Department "Ambient Water Quality Standards and Guidance Values" and Part 5 of the New York State Sanitary Code.
- 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. Tetrachloroethene (PCE) and 1,1,1-trichloroethane (TCA) concentrations were compared to values in Matrix 2 in the guidance. Trichloroethene levels were compared to values in Matrix 1 in the guidance.
- Concentrations of other 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 RI 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 below. More complete information can be found in the RI report.

### **5.1.2: Nature and Extent of Contamination**

This section describes the findings of the investigation for all environmental media that were investigated.

As described in the RI report, many soil vapor, sub-slab vapor, indoor air, outdoor air and groundwater samples were collected to characterize the nature and extent of contamination. As seen in Figure 4 and Tables 1 and 2, 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 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) for air samples.

Figure 4 and Tables 1 and 2 summarize the degree of contamination for the contaminants of concern in groundwater, soil vapor, sub-slab vapor and indoor air and compares 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.

#### **Groundwater**

Hydropunch samples were obtained downgradient of the Utility site from September to November 2004 to determine the extent of groundwater contamination between the site and Old Country Road. Groundwater contamination south of Old Country Road has been investigated as part of the overall NCIA off-site groundwater investigation.



Borings were completed at 11 locations and groundwater samples were taken from each boring at 10-foot intervals from the water table [50 to 65 feet below ground surface (bgs)] to 125 feet bgs. Figure 4 depicts the groundwater sampling results.

The highest VOC concentrations were detected in HP-3. Of the samples obtained in this boring, the highest total VOC concentrations were found at 80 feet bgs. At 80 feet bgs, PCE, cis-1,2-DCE, TCE and total VOC concentrations were 67 ppb, 44 ppb, 15 ppb and 130 ppb, respectively. The groundwater standard for PCE, TCE and DCE is 5 ppb. Total VOC levels at 120 feet bgs were 113 ppb, including 100 ppb of TCE.

VOC concentrations also exceeded groundwater standards in other hydropunch borings. PCE levels exceeded their groundwater standard of 5 ppb in HP-2 (14 ppb at 75 feet bgs), HP-4 (8 ppb at 85 feet bgs), HP-8 (13 ppb at 60 feet bgs), HP-9 (45 ppb at 80 feet bgs) and HP-11 (18 ppb at 100 feet bgs). Sampling results revealed TCE levels above the groundwater standard of 5 ppb at HP-1 (39 ppb at 125 feet bgs), HP-2 (11 ppb at 75 feet bgs), HP-9 (6 ppb at 70 feet bgs) and HP-11 (7 ppb at 120 feet bgs).

Acetone was detected at a maximum concentration of 10 ppb, which is below the groundwater standard of 50 ppb. However, acetone is stored and processed at the Utility site and was also detected in downgradient soil vapor and air samples (see below). The presence of acetone in the groundwater establishes a possible pathway between the site and the downgradient soil vapor and indoor air contamination.

Based on the results of the hydropunch sampling, two groundwater monitoring wells were installed and sampled at the location of HP-3. MW-01S and MW-01D were installed to depths of 90 feet bgs and 120 feet bgs, respectively. MW-1S had 220 ppb of PCE, 84 ppb of cis-1,2-DCE and 344 ppb of total VOCs. The total VOC concentration in MW-1S was more than twice as high as the total VOC concentration in HP-3 at the same depth. MW-01D had 54 ppb of PCE, 22 ppb of 1,1-DCE and 111 ppb of total VOCs.

During the Utility off-site investigation, the highest groundwater concentrations (344 ppb of total VOCs) were detected at MW-01S on the north side of Old Country Road. Total VOC levels were below 100 ppb at all other groundwater sampling locations. As part of the selected remedy for OU3, in-well vapor stripping systems will be installed within 600 feet downgradient (south) of Old Country Road. These groundwater treatment systems will intercept the contaminant plume originating at the Utility site ahead of the Bowling Green public supply wells.

There are no existing private wells affected by the contaminant plume, so the only water supply wells threatened by the plume are public water supply wells. As the OU3 remedy will prevent contaminated groundwater from reaching the public water supply wells, the public is not being exposed to the groundwater contamination north of Old Country Road (See Section 5.3). However, groundwater contamination identified during the RI/FS will be addressed in the remedy selection process.

### **Soil Gas/Sub-Slab Vapor/Air**

Thirteen soil vapor samples were obtained to determine the potential for vapor intrusion downgradient from the site. Several site-related VOCs were detected in the soil gas, including PCE, acetone, and 1,1,1-TCA. PCE levels ranged from non-detect to 1,600  $\mu\text{g}/\text{m}^3$ . Acetone concentrations ranged from non-detect to 1,000  $\mu\text{g}/\text{m}^3$ . TCE levels ranged from non-detect to 75  $\mu\text{g}/\text{m}^3$  while 1,1,1-TCA levels ranged from non-detect to 98  $\mu\text{g}/\text{m}^3$ .

Based on the soil vapor sampling, the Department sampled the sub-slab vapor, indoor air and outdoor air at eight off-site properties. The Department offered to sample five additional off-site buildings, but the property owners declined. At the buildings that were sampled, maximum PCE and TCE concentrations in the sub-slab vapor were 436  $\mu\text{g}/\text{m}^3$  and 74.6  $\mu\text{g}/\text{m}^3$ , respectively. Acetone and 1,1,1-TCA were also found in the sub-slab vapor at maximum concentrations of 581  $\mu\text{g}/\text{m}^3$  and 640  $\mu\text{g}/\text{m}^3$ , respectively. The highest indoor air concentrations were 1607  $\mu\text{g}/\text{m}^3$ , 35.4  $\mu\text{g}/\text{m}^3$ , 1.36  $\mu\text{g}/\text{m}^3$ , and 6,047  $\mu\text{g}/\text{m}^3$  for PCE, TCE, 1,1,1-TCA and acetone, respectively. In comparison, the maximum outdoor air concentrations were 96.3  $\mu\text{g}/\text{m}^3$ , 3.96  $\mu\text{g}/\text{m}^3$ , and 403  $\mu\text{g}/\text{m}^3$  for PCE, TCE and acetone, respectively. The maximum PCE and acetone levels were found in a sample collected outside an auto body repair shop. None of the outdoor air sampling results revealed detections of 1,1,1-TCA.

The decision matrixes in the NYSDOH Draft Vapor Intrusion guidance were consulted to determine if mitigation is needed at the eight locations that were sampled. The results of the decision matrix analysis is shown on Table 2. As acetone is not listed in the decision matrixes, acetone levels were compared to background levels provided in the NYSDOH guidance document. Soil vapor and indoor air contamination identified during the RI/FS 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.

There were no IRMs performed at this site during the off-site RI/FS.

## **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 4.3 of the RI report. 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.

There are two potential exposure pathways at the site. The potential exposure pathways are:

- Inhalation of contaminated soil vapor
- Ingestion of contaminated groundwater

Dermal contact with contaminated soils is not expected since the site and surrounding area is either covered with pavement or buildings.

Site-related groundwater is not used for drinking water purposes and restrictions are in place to prevent its future use at or around the site. Although the ingestion of contaminated groundwater is a potential exposure pathway, its ingestion is not expected since the surrounding area is serviced by municipal water which is tested regularly to determine that it meets New York State drinking water standards. The site-related groundwater contamination has contributed to the “eastern portion” of the New Cassel Industrial Area groundwater plume impacting the downgradient Bowling Green public supply wells. An air stripping system is in place on those supply wells to treat contaminated groundwater prior to its distribution.

There is a potential for inhalation exposures since sub-slab and indoor air sampling at several nearby and downgradient facilities detected tetrachloroethene (PCE), trichloroethene (TCE), and 1,1,1-trichloroethane (1,1,1-TCA) at levels that may need mitigation because the levels detected could potentially impact indoor air. These compounds were detected at background levels in indoor air during previous earlier sampling. Recent sampling detected one or more of these compounds above background levels in indoor air and/or at levels that may need mitigation below the slab. As a result of past and recent sampling data, continued indoor air and sub-slab soil vapor monitoring is needed, with at least one event during the heating season for Long Island between January 1 and March 1.

#### **5.4: Summary of Environmental Assessment**

This section summarizes the existing and potential future environmental impacts presented by the site. Environmental impacts include existing and potential future exposure pathways to fish and wildlife receptors, as well as damage to natural resources such as aquifers and wetlands.

Site contamination has impacted the groundwater resource in the Upper Glacial and Magothy Aquifers. These aquifers are federally designated sole source aquifers.

Due to the density of commercial and industrial buildings in the NCIA, there are no significant sources of surface water in close proximity to the site. Virtually every open space in the industrial area has been covered by asphalt, concrete or buildings. As the industrial area is so highly developed no wildlife habitat exists in or near these sites. The nearest surface water sources are several small ponds in and around Eisenhower Memorial Park, approximately two miles southwest of the site across Old Country Road. Therefore, the potential for plants and animal species being exposed to site-related contaminants is highly unlikely.

### **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 375-1.10. 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 volatile organic compounds in groundwater and indoor air;
- the release of contaminants from groundwater into indoor air through soil vapor;
- the release of contaminants from groundwater into the public water supply through the Bowling Green public water supply wells; and
- migration of the contaminant plume

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

- ambient groundwater quality standards
- indoor air guidance values.

## **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 Utility Site were identified, screened and evaluated in the FS report which is available at the document repositories identified in Section 1.

A summary of the remedial alternatives that were considered for this site are 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 indoor air at the site.

#### **Alternative 1: No Action**

The No Action Alternative is evaluated as a procedural requirement and as a basis for comparison. 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: Natural Attenuation of Off-Site Groundwater and Soil Vapor Intrusion Mitigation

|                               |           |
|-------------------------------|-----------|
| <i>Present Worth:</i> .....   | \$770,000 |
| <i>Capital Cost:</i> .....    | \$320,000 |
| <i>Annual OM&amp;M:</i> ..... | \$43,000  |

Under this alternative, contaminated groundwater would be remediated through natural attenuation. Natural attenuation relies on natural processes to break down groundwater contaminants. Natural attenuation processes include physical, chemical or biological processes that, under favorable conditions, act without human intervention to reduce mass, toxicity, mobility, volume or concentration of contaminants in groundwater. These processes include biodegradation, dispersion, dilution, sorption, volatilization, and chemical or biological stabilization, transformation or destruction of contaminants.

Long-term monitoring would be required to measure the progress of the remedy. Up to three new pairs of nested monitoring wells would be installed south of Old Country Road at 90 feet bgs and 125 feet bgs as part of the long-term monitoring program. Three existing monitoring wells would also be monitored. The locations of these wells are shown in Figure 5. Groundwater samples would be obtained periodically for VOCs, dissolved oxygen, nitrates, sulfates, dissolved iron, carbon dioxide and methane.

As mentioned earlier, the selected remedy for the NCIA combined off-site groundwater plume (OU3) will treat the groundwater contamination south of Old Country Road using in-well vapor stripping systems. Any groundwater contamination that does not naturally attenuate would be remediated by the OU3 remedy. The locations of the in-well vapor stripping systems are shown in Figure 6.

This alternative would meet remedial goals for groundwater contamination. Natural attenuation would reduce and eventually eliminate: human exposure to site-related VOCs, release of contaminants into the indoor air and public water supply, and migration of the contaminant plume. Natural attenuation would also attain ambient groundwater quality standards and restore the groundwater to its expected beneficial use.

This alternative would also address soil vapor intrusion in off-site buildings. Three affected buildings would be mitigated using sub-slab depressurization (SSD) systems. As part of the SSD system, one or more pipes would be installed through the slab of each building. A fan at the other end of the pipe would create suction through the pipe and would induce a negative pressure beneath the slab. This negative pressure would prevent the intrusion of vapors into the indoor air and prevent human exposure to indoor air contamination. An SSD schematic is shown in Figure 7. Also, periodic monitoring would be performed in three buildings with the potential for vapor intrusion.

The cost estimate conservatively assumes that the remedy would meet remedial goals within 15 years based on the time needed for the groundwater contamination to naturally attenuate or be treated by the OU3 remedy. This estimate would be refined based on groundwater monitoring data. Design and construction of SSD systems would take one year and 18 months, respectively.

### Alternative 3: In-Situ Chemical Oxidation of Off-Site Groundwater and Soil Vapor Intrusion Mitigation

|   |             |
|---|-------------|
| <i>Present Worth:</i> .....               | \$1,100,000 |
| <i>Capital Cost:</i> .....                | \$900,000   |
| <i>Annual OM&amp;M (Years 1-5):</i> ..... | \$40,000    |
| <i>Annual OM&amp;M (Years 6-7):</i> ..... | \$19,000    |

Under this alternative, a chemical oxidant would be injected into the contaminated groundwater. The oxidant would react with the contaminants to form nontoxic byproducts. The oxidant would consist of either sodium permanganate or potassium permanganate. The choice of oxidant would be determined based on bench scale testing.

The cost estimate assumes that sodium permanganate would be injected. In this scenario, 89,000 pounds of sodium permanganate in a 12.5% solution would be injected into the groundwater. As the sodium permanganate is purchased in a 40% solution, the chemical would be diluted at the site before injection. Figure 8 shows a schematic of the injection process.

To inject the oxidant, approximately six injection wells would be installed into the aquifer. Three wells would be screened at 90-120 feet bgs while the other three wells would be screened at 60-90 feet bgs. Figure 9 depicts the proposed locations of the injection wells.

Long-term monitoring would be required to measure the progress of the remedy. Three new pairs of nested monitoring wells would be installed south of Old Country Road at 90 feet bgs and 125 feet bgs as part of the long-term monitoring program. Three existing monitoring wells would also be monitored. The locations of these wells are shown in Figure 5. Groundwater samples would be obtained periodically for VOCs.

By remediating the groundwater contamination, in-situ chemical oxidation would meet the groundwater related remediation goals. The remedy would reduce human exposure to contaminants in groundwater, eliminate the source of soil vapor contamination, protect the public water supply, prevent migration of the contaminant plume, restore the aquifer to its beneficial use and meet ambient water quality standards.

This alternative would also address soil vapor intrusion in off-site buildings. Three affected buildings would be mitigated using sub-slab depressurization (SSD) systems. As part of the SSD system, one or more pipes would be installed through the slab of each building. A fan at the other end of the pipe would create suction through the pipe and would induce a negative pressure beneath the slab. This negative pressure would prevent the intrusion of vapors into the indoor air and prevent human exposure to indoor air contamination. An SSD schematic is shown in Figure 7. Periodic monitoring would be performed in three buildings with the potential for vapor intrusion.

After a one-year design period, the alternative would require approximately seven years to meet the remediation goals. Approximately five years will be required for implementation of the remedy followed by about two years of groundwater monitoring.

## **Alternative 4: Air Sparge/Soil Vapor Extraction of Off-Site Groundwater and Soil Vapor Intrusion Mitigation**

|   |             |
|---|-------------|
| <i>Present Worth:</i> .....               | \$2,200,000 |
| <i>Capital Cost:</i> .....                | \$1,200,000 |
| <i>Annual OM&amp;M (Years 1-2):</i> ..... | \$480,000   |
| <i>Annual OM&amp;M (Years 3-5):</i> ..... | \$40,000    |
| <i>Annual OM&amp;M (Years 6-7):</i> ..... | \$19,000    |

Under this alternative, off-site groundwater contamination would be remediated using a combination of air sparging (AS) and soil vapor extraction (SVE). Approximately 39 air sparge wells would be installed into the aquifer. Air would be injected into these wells and would bubble up through the aquifer. As the air rises, it removes contaminants from contaminated groundwater. Once the air reaches the water table, it would be captured using 27 soil vapor extraction wells. Before being discharged into the atmosphere, the air would pass through activated carbon to remove the VOCs. The locations of the air sparge and soil vapor extraction wells are shown in Figure 10. A schematic of a typical AS/SVE system is depicted in Figure 11.

The air sparge wells would be screened below the water table while the SVE wells would be screened above the water table. Approximately 29 air sparge wells would be screened from 50 to 95 feet bgs while approximately ten air sparge wells would be screened from 50 to 120 feet bgs. All of the SVE wells would be screened from 35 to 55 feet bgs.

Long-term monitoring would be required to measure the progress of the remedy. Three new pairs of nested monitoring wells would be installed south of Old Country Road at 90 feet bgs and 125 feet bgs as part of the long-term monitoring program. Three existing monitoring wells would also be monitored. The locations of these wells are shown in Figure 5. Groundwater samples would be obtained periodically for VOCs.

By remediating the groundwater contamination, AS/SVE would meet the groundwater related remediation goals. The remedy would reduce human exposure to contaminants in groundwater, eliminate the source of soil vapor contamination, protect the public water supply, prevent migration of the contaminant plume, restore the aquifer to its beneficial use and meet ambient water quality standards.

This alternative would also address soil vapor intrusion in off-site buildings. Three affected buildings would be mitigated using sub-slab depressurization (SSD) systems. As part of the SSD system, one or more pipes would be installed through the slab of each building. A fan at the other end of the pipe would create suction through the pipe and would induce a negative pressure beneath the slab. This negative pressure would prevent the intrusion of vapors into the indoor air and prevent human exposure to indoor air contamination. An SSD schematic is shown in Figure 7. Periodic monitoring would be performed in three buildings with the potential for vapor intrusion.

After a one-year design period, the alternative would require approximately seven years to meet the remediation goals. Approximately five years will be required for implementation of the remedy followed by about two years of groundwater monitoring.

## 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 State. 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 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 3.

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 2, Natural Attenuation of Off-Site Groundwater and Soil Vapor Intrusion Mitigation as the remedy for this site. The elements of this remedy are described at the end of this section.

The proposed remedy is based on the results of the RI and the evaluation of alternatives presented in the FS. Alternative 2 is being proposed because, as described below, it satisfies the threshold criteria and provides the best balance of the primary balancing criteria described in Section 7.2.

Alternative 2 would achieve the remediation goals for the site by mitigating any vapor intrusion impacts and allowing groundwater contamination to naturally attenuate. Achieving the remediation goals would satisfy the two threshold criteria, achievement of SCGs and protection of human health and the environment. The vapor intrusion mitigation measures would meet the goal of eliminating exposures to contaminants in indoor air. The groundwater remedy would restore the groundwater to its beneficial use and would meet ambient groundwater quality standards. Alternatives 3 and 4 would achieve these goals through active groundwater remediation and sub-slab depressurization.

Alternative 1 would not achieve remediation goals because no remedial action would be implemented. Therefore, Alternative 1 would not meet the threshold criteria and is eliminated from consideration.

Because Alternatives 2, 3, and 4 satisfy the threshold criteria, the five balancing criteria are particularly important in selecting a final remedy for the site.

Alternative 2 (natural attenuation) would be favorable because of limited short-term impacts. As major construction activities would be limited to installation of monitoring wells and sub-slab depressurization systems, Alternative 2 would not detrimentally affect the surrounding businesses. However, Alternatives 3 (chemical oxidation) and 4 (AS/SVE) would have significant short-term impacts. For both alternatives, treatment wells and equipment would be placed inside one or more buildings in the study area. This would affect business activities at these properties.

Alternatives 2, 3 and 4 would achieve long-term effectiveness. All three alternatives would mitigate vapor intrusion impacts. Alternative 2 would remediate the groundwater contamination within 15 years while Alternatives 3 and 4 would remediate the groundwater contamination within seven years.

Alternative 2 would be most easily implementable because all construction activities would be performed outside, except for vapor mitigation equipment. Alternatives 3 and 4 would require construction and placement of treatment equipment in buildings with active businesses, making these alternatives more difficult to implement.

Alternatives 3 and 4 would reduce the toxicity, mobility and volume of contaminated groundwater. Alternatives 3 and 4 would satisfy this criterion through active groundwater remediation while Alternative 2 would reduce groundwater concentrations over time through natural attenuation.

Alternative 2 could be implemented at a lower overall cost than Alternatives 3 and 4. Capital costs for Alternatives 3 and 4 are significantly higher than the capital costs for Alternative 2 because Alternatives 3 and 4 require the construction of active groundwater remediation systems. Alternative 4 has the highest overall operation and maintenance (O&M) costs followed by Alternatives 2 and 3. Alternative 4 would require maintenance of a groundwater treatment system while Alternatives 2 and 3 would only require groundwater monitoring. Alternative 2 would require groundwater monitoring for a longer time period (15 years) than Alternatives 3 and 4 (7 years each), which increases the monitoring costs of Alternative 2. However, the total cost of Alternative 2 is less than either Alternatives 3 or 4.

In summary, Alternative 2 is proposed because it is favorable for three of the five balancing criteria. Alternative 2 is the superior remedy for short-term effectiveness, implementability and cost. All three alternatives are satisfactory for the other two balancing criteria: long-term effectiveness and reduction of toxicity, mobility and volume.

The estimated present worth cost to implement the remedy is \$770,000. The cost to construct the remedy is estimated to be \$320,000 and the estimated average annual operation, maintenance, and monitoring costs for 15 years is \$43,000.

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.
2. Sub-slab depressurization systems would be installed in three off-site buildings that have vapor intrusion impacts.
3. Periodic vapor sub-slab vapor, indoor air and outdoor air samples will be obtained at three properties where the potential for vapor intrusion exists. Periodic sampling will continue until sampling results indicate that continued sampling is no longer required.
4. Groundwater contamination within the study area would be allowed to naturally attenuate.
5. Imposition of an institutional control in the form of an environmental easement on the site that would require: (a) compliance with the approved site management plan; and (b) the property owner to complete and submit to the Department a periodic certification of institutional and engineering controls.
6. Development of a site management plan which would include the following institutional and engineering controls: (a) monitoring of groundwater, sub-slab vapor, indoor air and outdoor air; and (b) provisions for the continued proper operation and maintenance of the components of the remedy.
7. The property owner 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.

8. 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.
9. Since the remedy results in untreated hazardous waste remaining at the site, a long term monitoring program would be instituted. Up to nine monitoring wells will be sampled periodically for VOCs to track the progress of the natural attenuation. In addition, sub-slab vapor, indoor air and outdoor air samples would be obtained and analyzed for VOCs at three buildings with potential vapor intrusion impacts. This program would allow the effectiveness of the natural attenuation and soil vapor intrusion mitigation measures to be monitored and would be a component of the operation, maintenance, and monitoring for the site.

**TABLE 1**  
**Nature and Extent of Contamination**  
September 2004 to May 2007

| <b>HYDROPUNCH<br/>GROUNDWATER</b>            | <b>Contaminants of<br/>Concern</b> | <b>Concentration<br/>Range Detected (ppb)<sup>a</sup></b> | <b>SCG<sup>b</sup><br/>(ppb)<sup>a</sup></b> | <b>Frequency of<br/>Exceeding SCG</b> |
|--|------------------------------------|---|--|---------------------------------------|
| <b>Volatile Organic<br/>Compounds (VOCs)</b> | Trichloroethene                    | ND to 100   | 5  | 7 of 84                               |
|  | Tetrachloroethene                  | ND to 67  | 5  | 17 of 84                              |
|  | cis-1,2-Dichloroethene             | ND to 44  | 5  | 2 of 84                               |
|  | Toluene                            | ND to 22  | 5  | 1 of 84                               |
|  | 1,1,1-Trichloroethane              | ND to 11  | 5  | 2 of 84                               |
|  | Methylene Chloride                 | ND to 10  | 5  | 1 of 84                               |

| <b>MONITORING<br/>WELL<br/>GROUNDWATER</b>   | <b>Contaminants of<br/>Concern</b> | <b>Concentration<br/>Range Detected (ppb)<sup>a</sup></b> | <b>SCG<sup>b</sup><br/>(ppb)<sup>a</sup></b> | <b>Frequency of<br/>Exceeding<br/>SCG</b> |
|--|------------------------------------|---|--|---|
| <b>Volatile Organic<br/>Compounds (VOCs)</b> | Tetrachloroethene                  | 8.6 to 220  | 5  | 2 of 2                                    |
|  | cis-1,2-Dichloroethene             | 4.4 to 84   | 5  | 1 of 2                                    |
|  | Trichloroethene                    | 33 to 54  | 5  | 2 of 2                                    |
|  | 1,1-Dichloroethene                 | 1.4 to 22   | 5  | 1 of 2                                    |
|  | 1,1,1-Trichloroethane              | 3.6 to 17   | 5  | 1 of 2                                    |

**TABLE 1**  
**Nature and Extent of Contamination**  
September 2004 to May 2007

| SOIL GAS                          | Contaminants of Concern | Concentration Range Detected ( $\mu\text{g}/\text{m}^3$ ) <sup>a</sup> | SCG <sup>b</sup> ( $\mu\text{g}/\text{m}^3$ ) <sup>a</sup> | Frequency of Exceeding SCG |
|-----------------------------------|-------------------------|--|--|----------------------------|
| Volatile Organic Compounds (VOCs) | Tetrachloroethene       | ND to 1,600  | N/A  | N/A                        |
|                                   | Acetone                 | ND to 1,000  | N/A  | N/A                        |
|                                   | Cyclohexane             | ND to 960  | N/A  | N/A                        |
|                                   | Xylenes (total)         | ND to 780  | N/A  | N/A                        |
|                                   | Isooctane               | ND to 750  | N/A  | N/A                        |
|                                   | Toluene                 | ND to 720  | N/A  | N/A                        |
|                                   | 1,2,4-Trimethylbenzene  | ND to 490  | N/A  | N/A                        |
|                                   | n-Heptane               | ND to 350  | N/A  | N/A                        |
|                                   | p-Ethyltoluene          | ND to 290  | N/A  | N/A                        |
|                                   | Dichlorodifluoromethane | ND to 270  | N/A  | N/A                        |
|                                   | n-Hexane                | ND to 240  | N/A  | N/A                        |
|                                   | 1,3,5-Trimethylbenzene  | ND to 210  | N/A  | N/A                        |
|                                   | Benzene                 | ND to 200  | N/A  | N/A                        |
|                                   | Ethylbenzene            | ND to 180  | N/A  | N/A                        |
|                                   | 2-Butanone              | ND to 110  | N/A  | N/A                        |
|                                   | 1,1,1-Trichloroethane   | ND to 98   | N/A  | N/A                        |
|                                   | Trichloroethene         | ND to 75   | N/A  | N/A                        |
|                                   | 1,3-Butadiene           | ND to 17   | N/A  | N/A                        |
|                                   | Trichlorofluoromethane  | ND to 15   | N/A  | N/A                        |
|                                   | Methylene Chloride      | ND to 14   | N/A  | N/A                        |
|                                   | Carbon Disulfide        | ND to 12   | N/A  | N/A                        |
| Chloroform                        | ND to 6.8               | N/A  | N/A  |                            |
| 2-Hexanone                        | ND to 4.9               | N/A  | N/A  |                            |
| 1,1-Dichloroethane                | ND to 3.2               | N/A  | N/A  |                            |
| Chloromethane                     | ND to 1.3               | N/A  | N/A  |                            |

<sup>a</sup> ppb = parts per billion, which is equivalent to micrograms per liter,  $\mu\text{g}/\text{L}$ , in water  
ppm = parts per million, which is equivalent to milligrams per kilogram,  $\text{mg}/\text{kg}$ , in soil  
 $\mu\text{g}/\text{m}^3$  = microgram per meter cubed

ND = non-detect

N/A = not applicable

<sup>b</sup> SCG = standards, criteria, and guidance values

**Table 2**  
**Soil Vapor Intrusion Recommendations Based on NYSDOH Decision Matrices**

**Utility Manufacturing/Wonder King, OU2**  
**Town of North Hempstead, Nassau County, New York**

| Location   | Compound  | Sub-slab Air Concentration | Indoor Air Concentration | Outdoor Air Concentration | Action Recommended | Final Action Recommended  |
|------------|-----------|----------------------------|--------------------------|---------------------------|--------------------|---|
| Property 1 | PCE       | 339D                       | 0.81                     | 0.26 U                    | Monitor            | Based on PCE results, monitoring is recommended to determine whether concentrations in the indoor air or sub-slab vapor have changed. |
|            | TCE       | 3.11                       | 1.88                     | 2.04                      | Reasonable Action  |   |
|            | 1,1,1-TCA | 100                        | 0.12 U                   | 0.12 U                    | Monitor            |   |
| Property 2 | PCE       | 182                        | 20                       | 0.68 J                    | Monitor/Mitigate   | Based on TCE results, mitigation is recommended to minimize current or potential exposures associated with soil vapor intrusion.      |
|            | TCE       | 74.6                       | 1.13                     | 1.02                      | Mitigate           |   |
|            | 1,1,1-TCA | 8.7                        | 0.12U                    | 0.12 U                    | No Further Action  |   |
| Property 3 | PCE       | 19                         | 0.88                     | 0.81                      | No Further Action  | Based on PCE and TCE results, no further action is necessary due to the low concentrations detected.                                  |
|            | TCE       | 1.5                        | 0.12 U                   | 0.25 U                    | No Further Action  |   |
|            | 1,1,1-TCA | 0.24 U                     | 0.12 U                   | 0.55 U                    | No Further Action  |   |
| Property 6 | PCE       | 80.7                       | 3.58                     | 0.95                      | Reasonable Action  | Based on TCE results, mitigation is recommended to minimize current or potential exposures associated with soil vapor intrusion.      |
|            | TCE       | 22.7                       | 5.47                     | 0.25 U                    | Mitigate           |   |
|            | 1,1,1-TCA | 45.6                       | 1.36                     | 0.55 U                    | No Further Action  |   |

**Notes:**

- Concentrations in ug/m<sup>3</sup>.
- PCE = Tetrachloroethene.
- TCE = Trichloroethene.
- 1,1,1-TCA = 1,1,1-Trichloroethane.
- Compounds listed were detected at concentration greater than NYSDOH (2006) decision matrix value in at least one sample.
- "U" indicates the compound was not detected at or above the quantitation limit shown.
- "Action Recommended" based on NYSDOH Decision Matrices for Soil Vapor Intrusion.
- "Final Action Recommended" is strictest action recommended for the structure based on recommendations listed.
- "D" indicates the sample was diluted during analysis due to high contaminant concentrations.

**Table 2**  
**Soil Vapor Intrusion Recommendations Based on NYSDOH Decision Matrices**

**Utility Manufacturing/Wonder King, OU2**  
**Town of North Hempstead, Nassau County, New York**

| Location    | Compound  | Sub-slab Air Concentration | Indoor Air Concentration | Outdoor Air Concentration | Action Recommended | Final Action Recommended   |
|-------------|-----------|----------------------------|--------------------------|---------------------------|--------------------|--|
| Property 7  | PCE       | 37.6                       | 1.9 J                    | 2.44                      | No Further Action  | Based on TCE results, monitoring is recommended to determine whether concentrations in the indoor air or sub-slab vapor have changed.  |
|             | TCE       | 12.3                       | 3.27 J                   | 3.96                      | Monitor            |  |
|             | 1,1,1-TCA | 1.58                       | 0.87 J                   | 0.12 U                    | No Further Action  |  |
| Property 9  | PCE       | 436 D                      | 1.02                     | 0.26 U                    | Monitor            | Based on TCE results, mitigation is recommended to minimize current or potential exposures associated with soil vapor intrusion.   |
|             | TCE       | 39.4                       | 35.4                     | 1.93                      | Mitigate           |  |
|             | 1,1,1-TCA | 640 D                      | 0.12 U                   | 0.12 U                    | Monitor            |  |
| Property 11 | PCE       | 244                        | 1607 D                   | 96.3                      | Mitigate           | This property is used as an active auto paint shop. The TCE and PCE concentrations are likely a result of current activities at the site. Therefore, No further action is recommended for this property. |
|             | TCE       | 0.39 U                     | 0.59                     | 0.12 U                    | Reasonable Action  |  |
|             | 1,1,1-TCA | 5.33                       | 0.12 U                   | 0.12 U                    | No Further action  |  |
| Property 13 | PCE       | 71.3                       | 1.9                      | 0.26 U                    | No Further Action  | Based on TCE results, monitoring is recommended to determine whether concentrations in the indoor air or sub-slab vapor have changed.  |
|             | TCE       | 42.4                       | 0.48                     | 1.93                      | Monitor            |  |
|             | 1,1,1-TCA | 76.3                       | 0.12 U                   | 0.12 U                    | No Further Action  |  |

**Notes:**

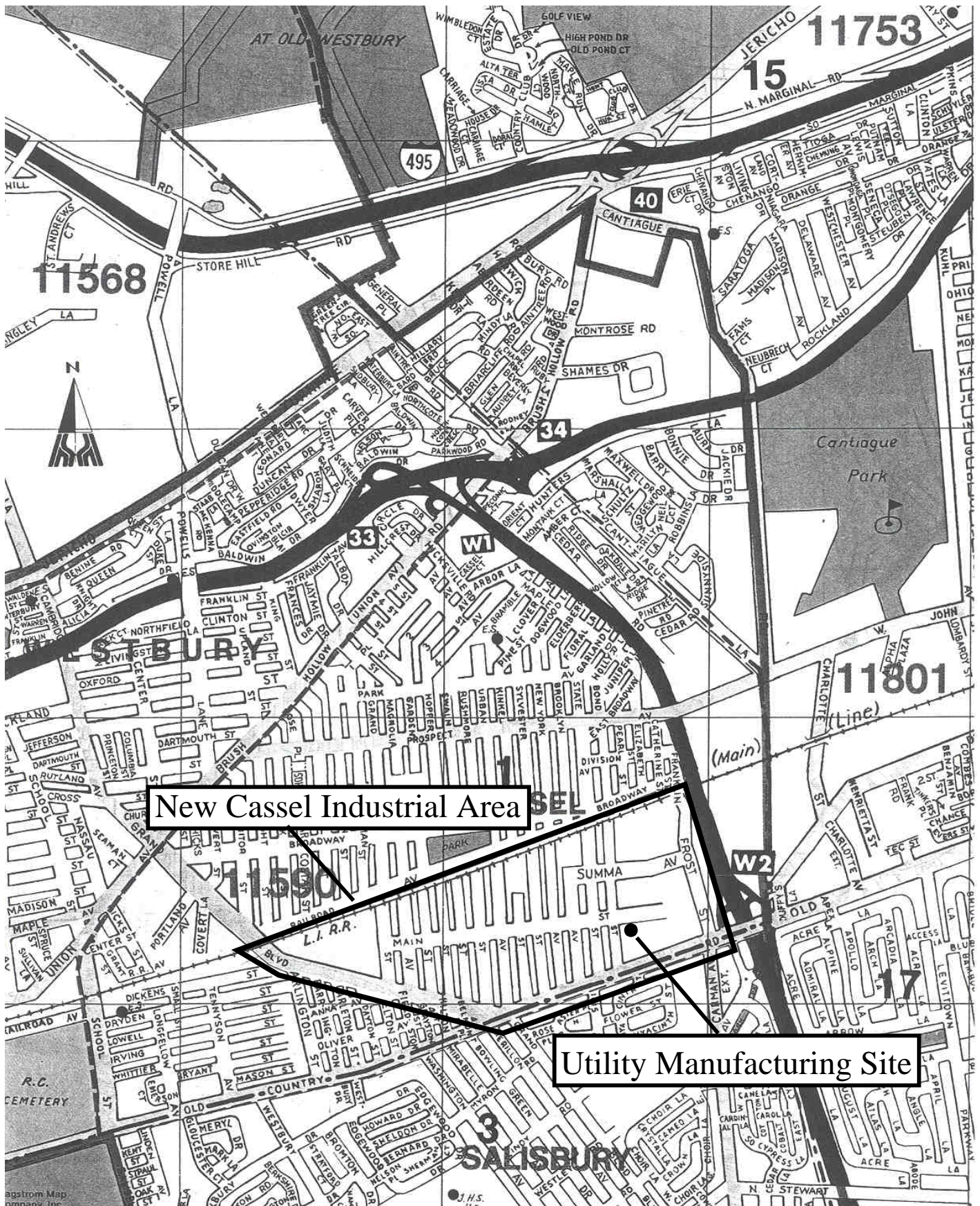
1. Concentrations in ug/m<sup>3</sup>.
2. PCE = Tetrachloroethene.
3. TCE = Trichloroethene.
4. 1,1,1-TCA = 1,1,1-Trichloroethane.
5. Compounds listed were detected at concentration greater than NYSDOH (2006) decision matrix value in at least one sample.
6. "U" indicates the compound was not detected at or above the quantitation limit shown.
7. "Action Recommended" based on NYSDOH Decision Matrices for Soil Vapor Intrusion.
8. "Final Action Recommended" is strictest action recommended for the structure based on recommendations listed.
9. "D" indicates the sample was diluted during analysis due to high contaminant concentrations.

**Table 3**  
**Remedial Alternative Costs**

| <b>Remedial Alternative</b>   | <b>Capital Cost</b> | <b>Annual OM&amp;M</b>   | <b>Total Present Worth</b> |
|---|---------------------|--|----------------------------|
| Alternative 1: No Action  | \$0                 | \$0  | \$0                        |
| Alternative 2: Natural Attenuation of Off-Site Groundwater              | \$320,000           | \$43,000   | \$770,000                  |
| Alternative 3: In-Situ Chemical Oxidation of Off-Site Groundwater       | \$900,000           | Years 1-5: \$40,000<br>Years 6-7: \$19,000                         | \$1,100,000                |
| Alternative 4: Air Sparge/Soil Vapor Extraction of Off-Site Groundwater | \$1,200,000         | Years 1-2: \$480,000<br>Years 3-5: \$40,000<br>Years 6-7: \$19,000 | \$2,200,000                |

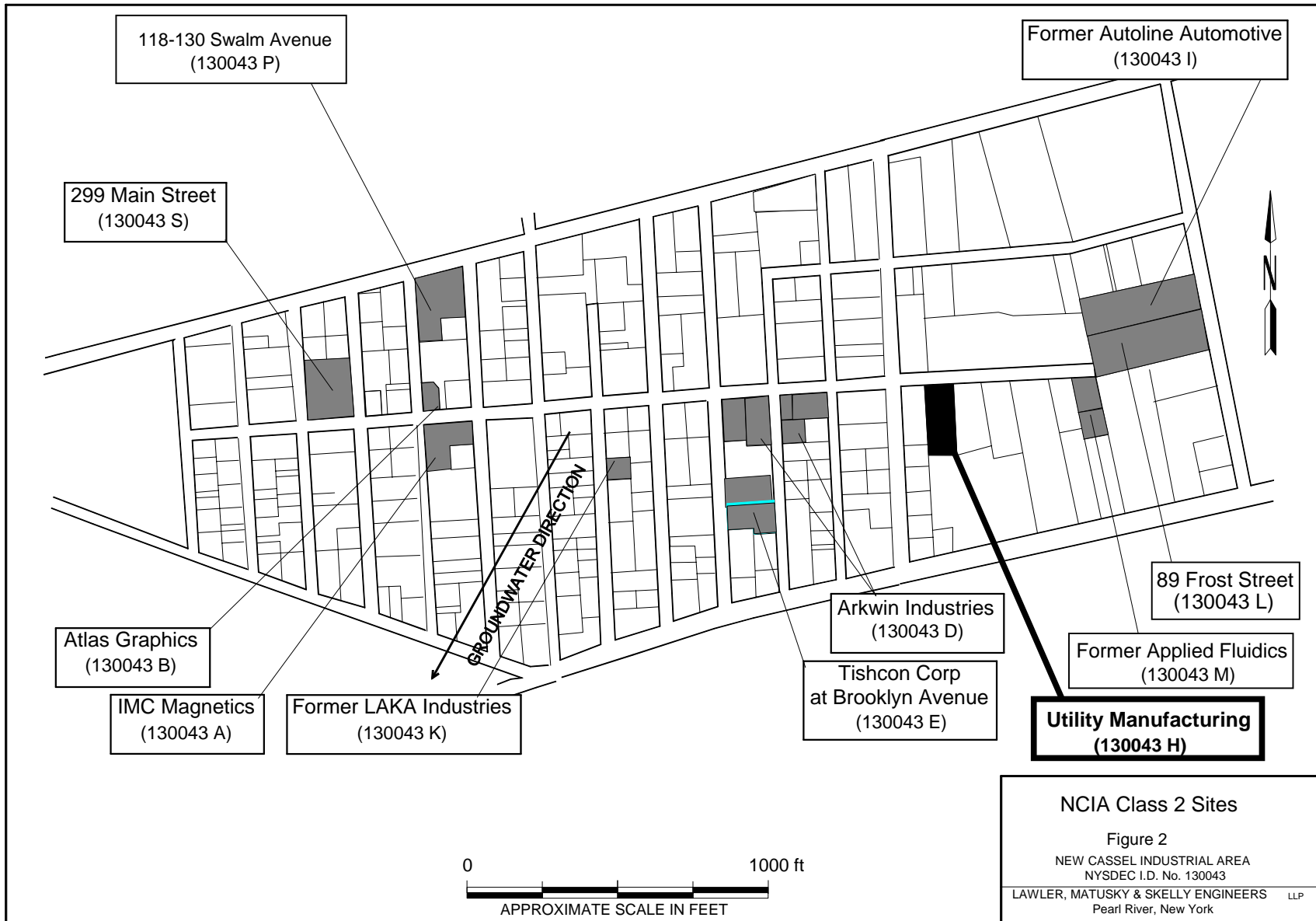


# Figure 1 - Site Location Map



New Cassel Industrial Area

Utility Manufacturing Site





BOWLING GREEN WATER DISTRICT  
PUBLIC SUPPLY WELL NOS.  
N8956 (470' - 530')  
N8957 (524' - 584')

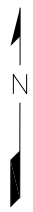
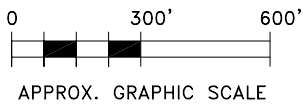
UTILITY MANUFACTURING  
SITE

STUDY AREA

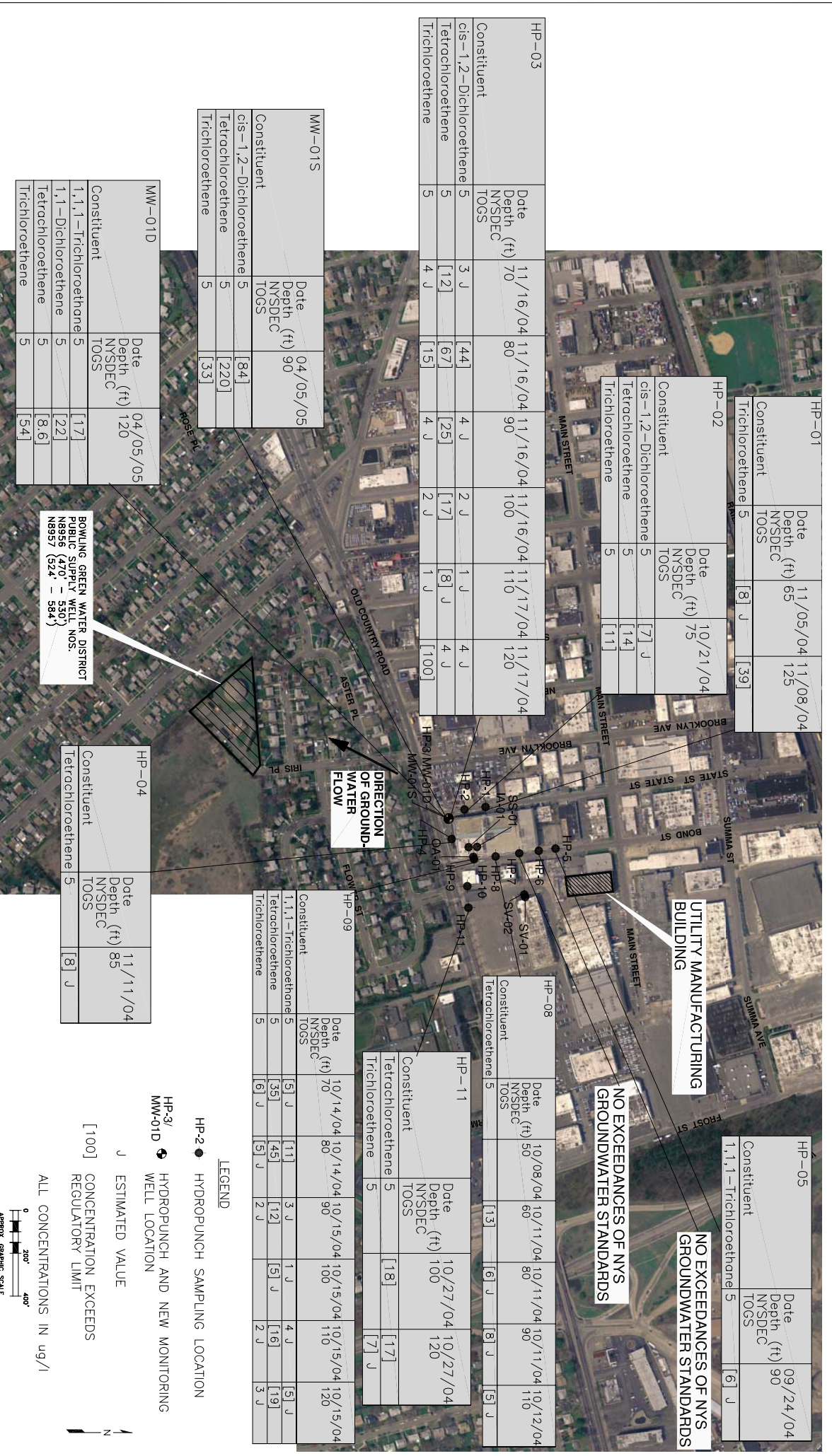
DIRECTION OF REGIONAL  
GROUNDWATER FLOW

LEGEND

- (HP-1) SOIL VAPOR/HYDROPUNCH SAMPLING LOCATION
- (HP-3/MW-01D) HYDROPUNCH, SOIL VAPOR AND NEW MONITORING WELL LOCATION



|   |                    |                             |                  |
|---|--------------------|-----------------------------|------------------|
| TITLE<br>STUDY AREA MAP<br>OFF-SITE REMEDIAL INVESTIGATION<br>UTILITY MANUFACTURING<br>NEW CASSEL, NEW YORK |                    |                             |                  |
| PREPARED FOR<br>NYSDEC SITE CODE No.1-30-043H   |                    |                             |                  |
| Environmental Resources Management<br>ERM   | SCALE<br>GRAPHIC   | FIGURE<br>3                 |                  |
| DRAWN<br>EMF  | JOB NO.<br>0020116 | FILE NAME<br>0020116-00-021 | DATE<br>12/19/05 |



|                 |                  |          |          |
|-----------------|------------------|----------|----------|
| HP-01           | Date NYSDEC TOGS | 11/05/04 | 11/08/04 |
| Constituent     | Depth (ft)       | 65       | 125      |
| Trichloroethene | TOGS             | [8] J    | [39]     |

|                        |                  |          |
|------------------------|------------------|----------|
| HP-02                  | Date NYSDEC TOGS | 10/21/04 |
| Constituent            | Depth (ft)       | 75       |
| cis-1,2-Dichloroethene | TOGS             | [7] J    |
| Tetrachloroethene      | TOGS             | [14]     |
| Trichloroethene        | TOGS             | [11]     |

|                        |                  |          |          |          |          |          |
|------------------------|------------------|----------|----------|----------|----------|----------|
| HP-03                  | Date NYSDEC TOGS | 11/16/04 | 11/16/04 | 11/16/04 | 11/17/04 | 11/17/04 |
| Constituent            | Depth (ft)       | 70       | 80       | 90       | 100      | 120      |
| cis-1,2-Dichloroethene | TOGS             | [5]      | [44]     | [4] J    | [2] J    | [1] J    |
| Tetrachloroethene      | TOGS             | [5]      | [67]     | [25]     | [17]     | [8] J    |
| Trichloroethene        | TOGS             | [5]      | [15]     | [4] J    | [2] J    | [1] J    |

|                        |                  |          |
|------------------------|------------------|----------|
| MW-01S                 | Date NYSDEC TOGS | 04/05/05 |
| Constituent            | Depth (ft)       | 90       |
| cis-1,2-Dichloroethene | TOGS             | [84]     |
| Tetrachloroethene      | TOGS             | [220]    |
| Trichloroethene        | TOGS             | [33]     |

|                       |                  |          |
|-----------------------|------------------|----------|
| MW-01D                | Date NYSDEC TOGS | 04/05/05 |
| Constituent           | Depth (ft)       | 120      |
| 1,1,1-Trichloroethene | TOGS             | [17]     |
| 1,1-Dichloroethene    | TOGS             | [22]     |
| Tetrachloroethene     | TOGS             | [8.6]    |
| Trichloroethene       | TOGS             | [54]     |

ROWING GREEN WATER DISTRICT  
PUBLIC SUPPLY WELL NOS.  
N8956 (470' - 530')  
N8957 (524' - 584')

|                   |                  |          |
|-------------------|------------------|----------|
| HP-04             | Date NYSDEC TOGS | 11/11/04 |
| Constituent       | Depth (ft)       | 85       |
| Tetrachloroethene | TOGS             | [8] J    |

|                   |                  |          |          |          |          |          |
|-------------------|------------------|----------|----------|----------|----------|----------|
| HP-08             | Date NYSDEC TOGS | 10/08/04 | 10/11/04 | 10/11/04 | 10/11/04 | 10/12/04 |
| Constituent       | Depth (ft)       | 50       | 60       | 80       | 90       | 110      |
| Tetrachloroethene | TOGS             | [13]     | [6] J    | [8] J    | [5] J    | [5] J    |

|                   |                  |          |          |
|-------------------|------------------|----------|----------|
| HP-11             | Date NYSDEC TOGS | 10/27/04 | 10/27/04 |
| Constituent       | Depth (ft)       | 100      | 120      |
| Tetrachloroethene | TOGS             | [18]     | [17]     |
| Trichloroethene   | TOGS             | [7] J    | [5] J    |

|                       |                  |          |          |          |          |          |
|-----------------------|------------------|----------|----------|----------|----------|----------|
| HP-09                 | Date NYSDEC TOGS | 10/14/04 | 10/15/04 | 10/15/04 | 10/15/04 | 10/15/04 |
| Constituent           | Depth (ft)       | 70       | 80       | 90       | 100      | 110      |
| 1,1,1-Trichloroethene | TOGS             | [5] J    | [11]     | [3] J    | [1] J    | [4] J    |
| Tetrachloroethene     | TOGS             | [35]     | [45]     | [12]     | [5] J    | [16]     |
| Trichloroethene       | TOGS             | [6] J    | [5] J    | [2] J    | [2] J    | [3] J    |

|                       |                  |          |
|-----------------------|------------------|----------|
| HP-05                 | Date NYSDEC TOGS | 09/24/04 |
| Constituent           | Depth (ft)       | 90       |
| 1,1,1-Trichloroethene | TOGS             | [6] J    |

UTILITY MANUFACTURING BUILDING

NO EXCEEDANCES OF NYS GROUNDWATER STANDARDS

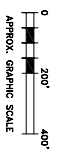
NO EXCEEDANCES OF NYS GROUNDWATER STANDARDS

DIRECTION OF GROUND-WATER FLOW

LEGEND

- HP-2 ● HYDROPUNCH SAMPLING LOCATION
- HP-3/ MW-01D ● HYDROPUNCH AND NEW MONITORING WELL LOCATION
- J ESTIMATED VALUE
- [100] CONCENTRATION EXCEEDS REGULATORY LIMIT

ALL CONCENTRATIONS IN ug/l



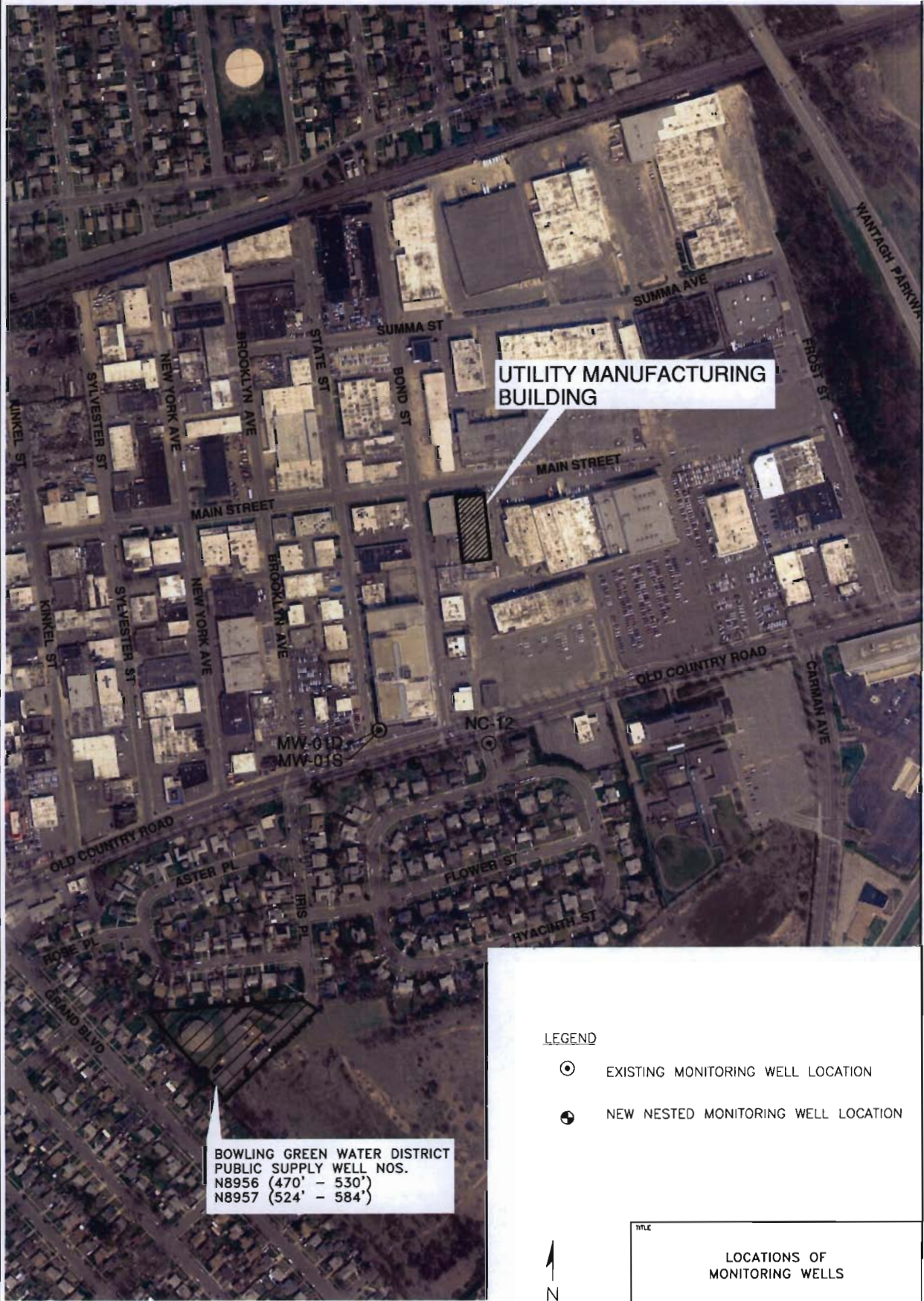
GROUNDWATER SAMPLING RESULTS

|                |      |       |                 |          |      |           |     |      |    |
|----------------|------|-------|-----------------|----------|------|-----------|-----|------|----|
| PROJECT NUMBER | DATE | SCALE | PROJECT MANAGER | APPROVED | DATE | REVISIONS | NO. | DATE | BY |
|                |      |       |                 |          |      |           |     |      |    |
| PROJECT NUMBER | DATE | SCALE | PROJECT MANAGER | APPROVED | DATE | REVISIONS | NO. | DATE | BY |
|                |      |       |                 |          |      |           |     |      |    |

NYSDEC SITE CODE No. 1-30-043H

Environmental Resources Management

|     |      |    |     |      |    |
|-----|------|----|-----|------|----|
| NO. | DATE | BY | NO. | DATE | BY |
|     |      |    |     |      |    |

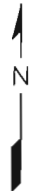
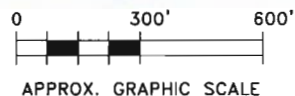


UTILITY MANUFACTURING BUILDING

BOWLING GREEN WATER DISTRICT  
PUBLIC SUPPLY WELL NOS.  
N8956 (470' - 530')  
N8957 (524' - 584')




LEGEND




- ⊙ EXISTING MONITORING WELL LOCATION
- ⊕ NEW NESTED MONITORING WELL LOCATION








|   |                     |                               |                 |
|---|---------------------|-------------------------------|-----------------|
| TITLE                                       |                     |                               |                 |
| LOCATIONS OF MONITORING WELLS               |                     |                               |                 |
| PREPARED FOR                                |                     |                               |                 |
| NYSDEC SITE CODE No.1-30-043H               |                     |                               |                 |
| ERM<br>Environmental Remediation Management |                     | SCALE<br>GRAPHIC              | FIGURE<br>5     |
| DRAWN:<br>EMF                               | JOB NO.:<br>0020117 | FILE NAME:<br>0020117-00-001b | DATE:<br>2/1/05 |

**Legend** NOTE: All locations are approximate

-  Treatment well (140 ft BGS)
-  Treatment well (225 ft BGS)
-  Treatment well (250 ft BGS)

-  Planned off-site treatment system
-  Active on-site treatment system
-  Planned on-site treatment system

 Average total VOC concentration (ppb) for groundwater depths of 65 to 200 ft bgs 1996-2000 plumes

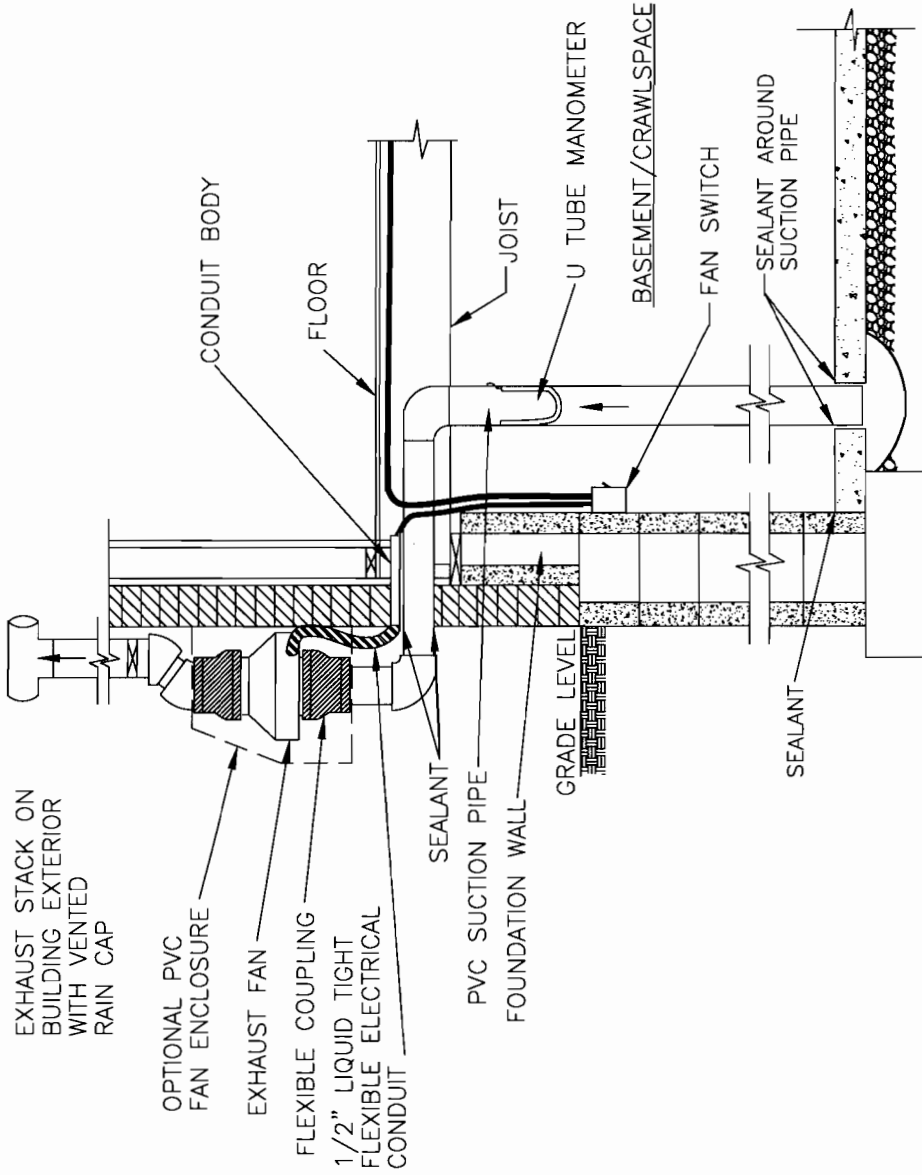
-  Early warning wells Couplet
-  Monitoring well Couplet
-  Monitoring well
-  Monitoring well Quadruplet

0 600 ft  
APPROX. SCALE  
1 in. = 600 ft



**Figure 6**  
**Alternative 8**  
Full Plume Remediation of Upper and Deep Portions of the Aquifer to 225 ft bgs with In-Well Vapor Stripping/Localized Vapor Treatment  
New Cassel Industrial Area

16504281graphics alternative map.dwt




TYPICAL SECTION  
NOT TO SCALE

TITLE

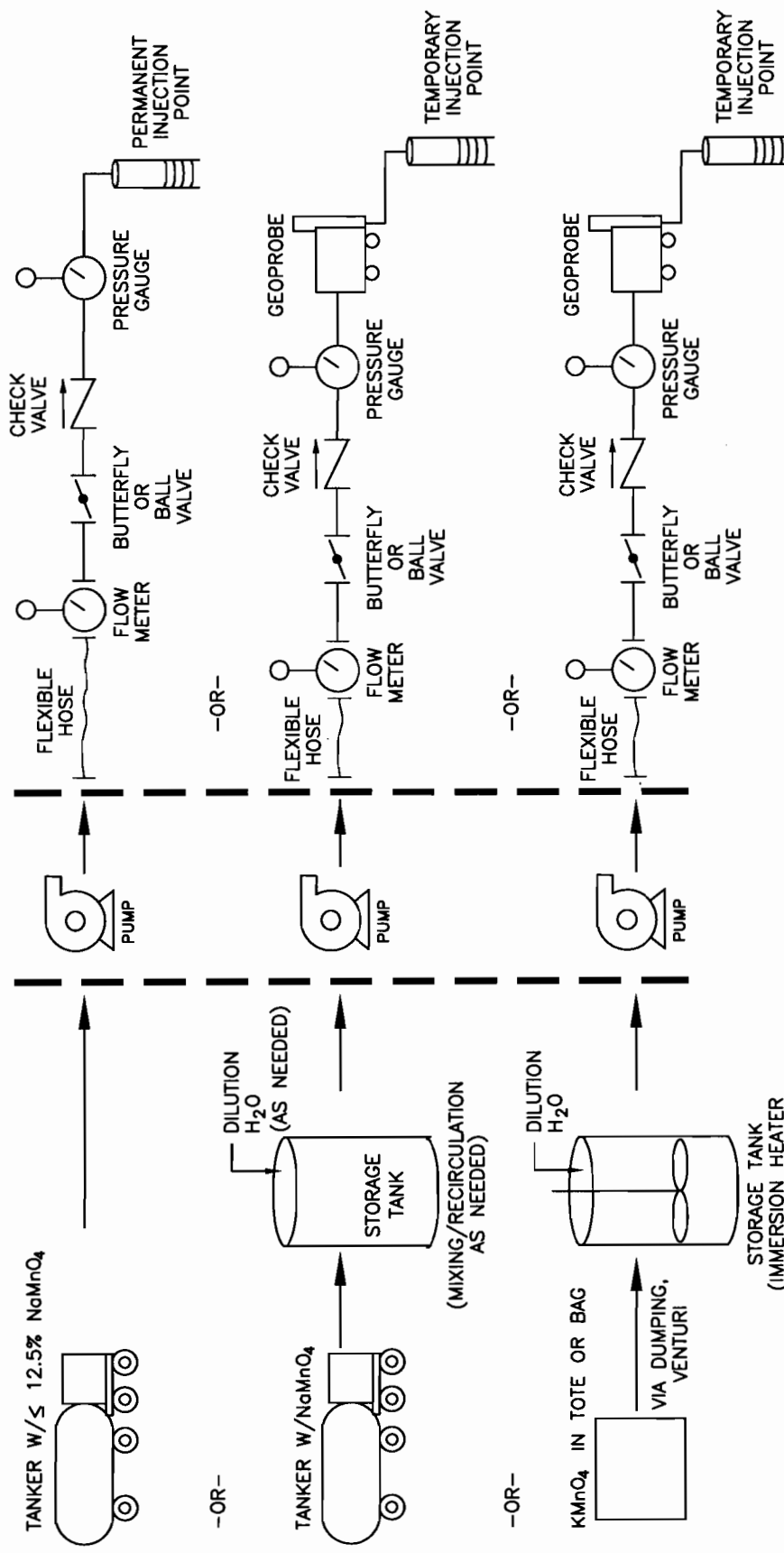
# SCHEMATIC OF THE SUBSLAB DEPRESSURIZATION SYSTEM

PREPARED FOR  
NYSDEC SITE CODE NO. 1-30-043H

|   |          |         |            |                  |   |
|---|----------|---------|------------|------------------|---|
| <br><b>ERM</b><br>Environmental Resources Management<br>DRAWN: EMF | JOB NO.: | 0020117 | FILE NAME: | 0020117-00-002bw |   |
|   | DATE     | 1/1/06  | SCALE      | NTS              |   |
|   |          |         |            | FIGURE           | 7 |

SOURCE: NYSDOH VI PRESENTATION


NaMnO<sub>4</sub> OR KMnO<sub>4</sub> - CHOOSE ONE OPTION FROM EACH COLUMN



TITLE

# SCHEMATIC OF THE IN-SITU CHEMICAL OXIDATION SYSTEM

PREPARED FOR  
**NYSDEC SITE CODE NO. 1-30-043H**

|   |                                |         |
|---|--------------------------------|---------|
| <br><b>ERM</b><br>Environmental Resources Management | SCALE                          | FIGURE  |
|   | NTS                            | 8       |
| JOB NO.:<br>0020117   | FILE NAME:<br>0020117-00-004bw | DATE    |
| DRAWN:<br>EMF/CWW   |                                | 2/15/06 |



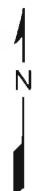
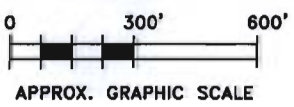


**UTILITY MANUFACTURING BUILDING**

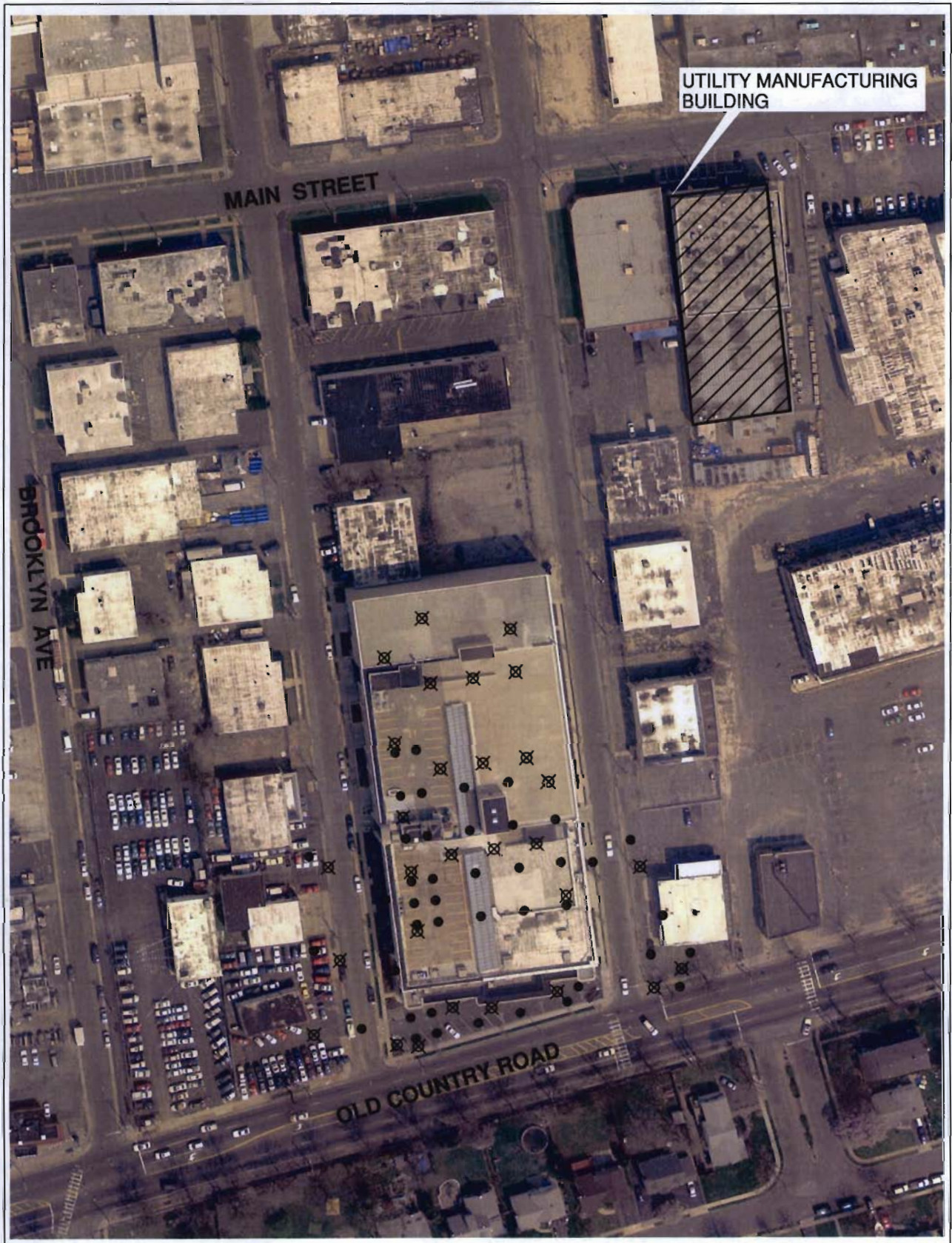
**BOWLING GREEN WATER DISTRICT  
PUBLIC SUPPLY WELL NOS.  
N8956 (470' - 530')  
N8957 (524' - 584')**

**LEGEND**

- ⊙ EXISTING MONITORING WELL LOCATION
- ⊕ NEW NESTED MONITORING WELL LOCATION
- DEEP ISCO INJECTION POINTS (90'-120' bgs)
- ⊙ SHALLOW ISCO INJECTION POINTS (60'-90' bgs)



|   |                         |                    |                             |
|---|-------------------------|--------------------|-----------------------------|
| <b>LOCATIONS OF PROPOSED ISCO INJECTION POINTS<br/>UTILITY MANUFACTURING<br/>700-712 MAIN STREET<br/>NEW CASSEL, NEW YORK</b> |                         |                    |                             |
| PREPARED FOR<br><b>NYSDEC SITE CODE No.1-30-043H</b>  |                         |                    |                             |
| <br><b>ERM</b><br>Environmental Remediation Management  | SCALE<br><b>GRAPHIC</b> | PROJECT<br>9       |                             |
|   | DATE<br>1/11/06         | JOB NO.<br>0020117 | FILE NAME<br>0020117-00-000 |



UTILITY MANUFACTURING BUILDING

**LEGEND**

- ⊗ SVE POINTS
- AS POINTS



TITLE  
 LOCATIONS OF PROPOSED  
 AIR SPARGING POINTS AND  
 SVE COLLECTION AREAS  
 700-712 MAIN STREET  
 NEW CASSEL, NEW YORK

PREPARED FOR  
 NYSDEC SITE CODE No. 1-30-043H

|   |       |        |
|---|-------|--------|
| ERM<br>Environmental Remediation Management | SCALE | FIGURE |
|   | DATE  | 10     |
| DATE  | DATE  | DATE   |
| 3/3/08                                      |       |        |

