Department of Environmental Conservation

Division of Environmental Remediation

Record of Decision

New Cassel Industrial Area Sites
Town of North Hempstead
Nassau County, New York
Off-site Groundwater
South of the New Cassel Industrial Area
Operable Unit No. 3

Site Numbers 1-30-043A, 1-30-043B, 1-30-043C, 1-30-043D, 1-30-043E, 1-30-043H, 1-30-043I, 1-30-043K, 1-30-043L, 1-30-043M, 1-30-043P, 1-30-043S, 1-30-043U, & 1-30-043V

October 2003

New York State Department of Environmental Conservation
GEORGE E. PATAKI, *Governor* ERIN M. CROTTY, *Commissioner*

DECLARATION STATEMENT - RECORD OF DECISION

New Cassel Industrial Area (NCIA)
Inactive Hazardous Waste Disposal Sites

Town of North Hempstead, Nassau County, New York
Operable Unit 03 - Off-site Groundwater South of the NCIA
Site Nos. 1-30-043A, 1-30-043B, 1-30-043C, 1-30-043D, 1-30-043E, 1-30-043H, 1-30-043I, 1-30-043K, 1-30-043L, 1-30-043M, 1-30-043P, 1-30-043S, 1-30-043U, & 1-30-043V

Statement of Purpose and Basis

The Record of Decision (ROD) presents the selected remedy for Operable Unit 03 (OU3) of the New Cassel Industrial Area sites, Class 2 inactive hazardous waste disposal sites. The selected remedial program was chosen in accordance with the New York State Environmental Conservation Law and is not inconsistent with the National Oil and Hazardous Substances Pollution Contingency Plan of March 8, 1990 (40CFR300), as amended.

This decision is based on the Administrative Record of the New York State Department of Environmental Conservation (NYSDEC) for OU3 of the New Cassel Industrial Area inactive hazardous waste disposal sites, and the public's input to the Proposed Remedial Action Plan (PRAP) presented by the NYSDEC. A listing of the documents included as a part of the Administrative Record is included in Appendix B of the ROD.

Assessment of the Site

Actual or threatened release of hazardous waste constituents from these sites, if not addressed by implementing the response action selected in this ROD, presents a current or potential significant threat to public health and the environment.

Description of Selected Remedy

Based on the results of the Remedial Investigation and Feasibility Study (RI/FS) for OU3 of the New Cassel Industrial Area sites and the criteria identified for evaluation of alternatives, the NYSDEC has selected full plume remediation of upper and deep portions of the aquifer (to 225 feet below ground surface) with in-well vapor stripping/localized vapor treatment. The elements of the remedy are:

- A remedial design program to verify the components of the conceptual design and provide the details necessary for the construction, operation, and maintenance and monitoring of the remedial program. Any uncertainties identified during the RI/FS process will be resolved;

- Installation of one 225-ft vapor stripping well with ancillary systems, for the purpose of a pilot study to determine the radius of influence, and the number of additional stripping wells needed;

- Based on the pilot test data, the effectiveness of the in-well vapor stripping system will be evaluated. If, for engineering or economic reasons, in-situ treatment should prove to be less practical, ex-situ extraction and treatment (treatment at the surface, possibly at a centralized location) will be substituted without impairing the overall effectiveness of treatment system;

- Based on the results of the pilot test, design and installation of three additional 225-ft vapor stripping wells, four 200-ft vapor stripping wells, and three 140-ft vapor stripping wells, plus their ancillary systems. Actual number and locations of these wells will be determined by the pilot test results. The wells will be placed approximately as shown in Figure 22, subject to revision due to the results of the pilot test, the final design parameters and access restrictions;

- Operation and maintenance of the treatment system until the remediation goals are achieved or the NYSDEC and NYSDOH determine that further operation of the treatment system is not necessary;

- Continued monitoring of two (2) existing Bowling Green Water District supply wells, located directly downgradient of the NCIA;

- Installation of nine (9) new monitoring wells at locations downgradient of Old Country Road;

- Implementation of a long term groundwater monitoring program requiring quarterly sampling of nine (9) new and thirteen (13) existing groundwater monitoring wells for the first two years and periodically thereafter, and;

- Institutional controls in the form of existing use restrictions limiting the use of groundwater as a potable or process water without necessary water quality treatment as determined by the Nassau County Department of Health from the affected areas.

New York State Department of Health Acceptance

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

Declaration

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

NOV - 7 2003

Date

Dale A. Desnoyers, Director
Division of Environmental Remediation

TABLE OF CONTENTS

RECORD OF DECISION

New Cassel Industrial Area Sites
Town of North Hempstead, Nassau County, New York
Operable Unit No. 03 - Off-site Groundwater South of the NCIA
Site Nos.: 1-30-043A, 1-30-043B, 1-30-043C, 1-30-043D, 1-30-043E, 1-30-043H, 1-30-043I, 1-30-043K, 1-30-043L, 1-30-043M, 1-30-043P, 1-30-043S, 1-30-043U & 1-30-043V
October 2003

SECTION 1: SUMMARY OF THE RECORD OF DECISION

The New York State Department of Environmental Conservation (NYSDEC), in consultation with the New York State Department of Health (NYSDOH), has selected a remedy for the New Cassel Industrial Area Site, OU 03 - Off-site Groundwater, for the area south of Old Country Road and Grand Boulevard. The presence of hazardous waste has created significant threats to human health and/or the environment that are addressed by this selected remedy. As more fully described in Sections 3 and 4 of this document, a variety of disposal activities within the New Cassel Industrial Area (NCIA) have resulted in the disposal of hazardous wastes, including 1,1,1-trichloroethane (1,1,1-TCA), tetrachloroethylene (PCE) and trichloroethylene (TCE), some of which were released or have migrated from the sites to surrounding areas, including the area bordering the NCIA south of Old Country Road and Grand Boulevard. This area includes the Bowling Green Water District well field. These wastes have contaminated the groundwater at the site, and have resulted in:

- a significant threat to human health associated with this site's contravention of groundwater standards in a sole source aquifer.

- a significant environmental threat associated with contravention of groundwater standards in a sole source aquifer.

The contaminated groundwater at the NCIA presents a potential route of exposure to humans. The area is served by public water, however, the underlying aquifer is the source of the water supply for the Bowling Green Water District customers. A supplemental treatment system, air stripping followed by carbon polishing, was constructed in 1996 to mitigate the impact of the groundwater contamination on the Bowling Green Water District water supply wells. The Bowling Green water supply wells are routinely monitored for volatile organic contamination. Presently, no site specific contaminants exceeding drinking water standards have been detected in water distributed to the public. Early warning monitoring wells have been installed south of Old Country Road, in locations downgradient of the NCIA hazardous waste disposal sites and upgradient of the water supply wells, as a precautionary measure. Because of the supplementary treatment system, use of the groundwater in the area is not currently considered to be an exposure pathway of concern. Additionally, existing use and development restrictions prevent the use of groundwater as a

source of potable or process water without necessary treatment as required by the Nassau County Department of Health (NCDH).

Currently, there are eleven (11) class 2 sites in the NCIA. A Class 2 site is a site at which hazardous waste constitutes a significant threat to the environment or the public health and action is required. The NYSDEC has been using a three-prong strategy in remediating the Class 2 sites in the NCIA. The first action identifies source areas of contamination at each site which have been remediated; the second action investigates groundwater contamination at and beneath each site and takes appropriate remedial measures; and the third action consists of a detailed Remedial Investigation(RI) of groundwater contamination that is migrating from all Class 2 sites in the NCIA. This investigation is now complete as is a comprehensive Feasibility Study (FS) evaluating possible treatment systems for contaminant plumes originating from the NCIA.

The following remedy has been selected to address the impact of groundwater contamination that has migrated from the NCIA sites: Full plume remediation of upper and deep portions of the aquifer (to 225 feet below ground surface) with in-well vapor stripping/localized vapor treatment. The elements of the remedy are:

- A remedial design program to verify the components of the conceptual design and provide the details necessary for the construction, operation, and maintenance and monitoring of the remedial program. Any uncertainties identified during the RI/FS process will be resolved;

- Installation of one 225-ft vapor stripping well with ancillary systems, for the purpose of a pilot study to determine the radius of influence, and the number of additional stripping wells needed;

- Based on the pilot test data, the effectiveness of the in-well vapor stripping system will be evaluated. If, for engineering or economic reasons, in-situ treatment should prove to be less practical, ex-situ extraction and treatment (treatment at the surface, possibly at a centralized location) will be substituted without impairing the overall effectiveness of treatment system;

- Based on the results of the pilot test, design and installation of three additional 225-ft vapor stripping wells, four 200-ft vapor stripping wells, and three 140-ft vapor stripping wells, plus their ancillary systems. Actual number and locations of these wells will be determined by the pilot test results. The wells will be placed approximately as shown in Figure 22, subject to revision due to the results of the pilot test, the final design parameters and access restrictions;

- Operation and maintenance of the treatment system until the remediation goals are achieved or the NYSDEC and NYSDOH determine that further operation of the treatment system is not necessary;

- Continued monitoring of two (2) existing Bowling Green Water District supply wells, located directly downgradient of the NCIA;

- Installation of nine (9) new monitoring wells at locations downgradient of Old Country Road;

- Implementation of a long term groundwater monitoring program requiring quarterly sampling of nine (9) new and thirteen (13) existing groundwater monitoring wells for the first two years and periodically thereafter, and;

- Institutional controls in the form of existing use restrictions limiting the use of groundwater as a potable or process water without necessary water quality treatment as determined by the NCDH from the affected areas.

The selected 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.

SECTION 2: SITE LOCATION AND DESCRIPTION

The New Cassel Industrial Area (NCIA) is located in the Town of North Hempstead, Nassau County (Figure 1). It encompasses approximately 170 acres of land. It is bounded by the Long Island Railroad to the north, Frost Street to the east, Old Country Road to the south, and Grand Boulevard to the southwest. The NCIA is a heavily developed industrial and commercial area. Development in this area dates back to the 1950's and many of the properties have housed various businesses over the years. The topography is generally flat. A total of seventeen (17) sites within the NCIA were listed as Class 2 sites in the New York State Registry of Inactive Hazardous Waste Disposal Sites (the Registry). The listing of the 17 Class 2 sites, occurred between May 1995 and September 1999. Of the 17 Class 2 sites, three (3) were investigated and delisted from the Registry. Two sites were investigated, remediated and delisted from the Registry. Another site was investigated, remediated and reclassified as a Class 4 site.

Operable Unit (OU) No. 3, which is the subject of this ROD, consists of off-site groundwater primarily located to the south of 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 are associated with the individual sites located within the NCIA, and are described in section 3.2.1 below.

This ROD addresses off-site groundwater contamination that has migrated from the Class 2 sites within the NCIA. In general terms, this area includes the commercial and residential areas south of Old Country Road and Grand Boulevard. The properties along Old Country Road are primarily commercial with residential neighborhoods to the south. The area south of Grand Boulevard and the area north of the NCIA are also residential areas.

Site locations and descriptions for the seventeen sites are provided in Section 3. The sites are divided into three areas, the western area located between Grand Street and Urban Avenue, the central area located between Urban Avenue and Bond Street and the eastern area located between Bond Street and Frost Street sites. See Figure 2 for the site locations.

SECTION 3: SITE HISTORY

3.1: Operational/Disposal History

The NCIA was first developed during the early 1950s. Past light industrial activities conducted within the NCIA have resulted in extensive VOC contamination of groundwater in the vicinity of the NCIA. The

specific activities carried out at the 17 constituent sites located within the NCIA are described in section 3.2.1 below.

3.2: Remedial History

The NCIA was first recognized as an area with widespread groundwater contamination during a county-wide groundwater investigation conducted by the NCDH in 1986.

In 1988, the NYSDEC listed the NCIA as a Class 2 site in the Registry of Inactive Hazardous Waste Disposal Sites in New York.

In order to identify the sources of the contamination within the NCIA, and hence the responsible parties, the NYSDEC conducted Preliminary Site Assessments (PSAs) within the NCIA. Field investigations were completed in fall 1994, fall 1995 and fall 1996. The NYSDEC also collected several soil and groundwater samples in December 1998, January 1999 and December 1999. Based on the findings of these PSAs, a total of 17 sites were identified and listed as Class 2 sites in the Registry between May 1995 and September 1999. Of the 17 Class 2 sites, three were investigated and delisted from the Registry and two sites were investigated, remediated and delisted from the registry. Another site was investigated, remediated and reclassified as a Class 4 site. As described in Section 3.2 below, remedial activities have been conducted at several of the sites by the NYSDEC and individual potentially responsible parties (PRPs). For a more detailed description of these investigations and their results, see section 3.2.1 of this document, the New Cassel Industrial Area Off-site Groundwater Remedial Investigation Report, and the Records of Decision (RODs) and ancillary documentation for individual sites within the NCIA. Figure 3 shows active and planned groundwater remediation systems for individual sites.

Individual site descriptions, operational/disposal histories and remedial histories for sites at which past practices have led to inappropriate disposal of hazardous waste follow.

3.2.1: Operational/Disposal and Remedial History of Individual Class 2 Sites within the NCIA

3.2.1.1: IMC Magnetics (Site No. 1-30-043A)

This site is located at 570 Main St. in the western part of the NCIA. The site is a little over two acres, with one manufacturing building and a paved parking area covering most of the area. The site was occupied by IMC Magnetics Inc. from the early 1950s until 1992. Products made during IMC's occupation of the site included induction motors, fans and blowers, stepper motors and other rotating machines. Soils and groundwater at the site are contaminated with chlorinated hydrocarbons, petroleum hydrocarbons and metals. This site was listed on the Registry as a Class 2 site in 1995. Further investigations on this site revealed that the soils and groundwater were contaminated with chlorinated VOCs. Beginning in October 1997, IMC has operated a soil vapor extraction (SVE) system to remediate on-site soil contamination. The ROD for OU-1, On-Site Soil Contamination, incorporating the SVE system, was issued in January of 1998. A focused on-site groundwater RI/FS at this site confirmed the presence of an on-site chlorinated VOC groundwater plume. The ROD for OU-2 On-Site Groundwater, was issued by NYSDEC in March 2000. The remedy selected for groundwater remediation at this site is in-situ oxidation using hydrogen peroxide injection. Treatment began in December 2001 and is on-going. This site is considered to be a contributor to the western groundwater plume.

3.2.1.2: Atlas Graphics (Site No. 1-30-043B)

This site is located at 567 Main Street in the western part of the NCIA. The site is approximately one acre, with one manufacturing building and a paved parking area covering most of the area. The building was built in 1950, and used as a warehouse for construction vehicles until 1997. In 1997, the property was purchased by Atlas Graphics Inc., which currently operates a photo engraving manufacturing operation. This operation uses a reported 312 gallons per year of TCE. At the time of its purchase, the building was connected to a cesspool for its sanitary waste disposal. In 1977, there was a documented discharge of approximately 50 gallons of TCE to the cesspool. This site was listed on the Registry as a Class 2 site in 1995. The analytical results for this site indicated that elevated levels of TCE were found on-site in both the soil and groundwater. The ROD for this site, issued in February 2000, selected air sparging/soil vapor extraction (AS/SVE) as the remedy to address the on-site contaminated soil and groundwater. The system was constructed in October 2000 and has been treating on-site groundwater since November 2000. This site is considered to be a contributor to the western groundwater plume.

3.2.1.3: Tishcon Corp. (Site No. 1-30-043C)

The site is located at 125 State Street in the central part of the NCIA. The site is approximately one acre and is occupied by a two-story building. Tishcon Corporation was a tenant in this location from 1984 to 1996. Tishcon produced dietary supplements and vitamin products in the form of powders and tablets. The powders and tablets were produced in a dry blending process. From 1985 to 1993, the chemicals methylene chloride, 1,1,1-trichloroethane and methanol were used in the tablet coating process. Equipment used in the process was rinsed out in the driveway where the storm drains are located. Based on the presence of chlorinated VOCs and metals in four storm drains at the site, the NCDH requested that contaminated sediment be removed from storm drains and a distribution box on the property in August 1993. The site was placed on the Registry in 1995. The excavation and restoration of the contaminated source areas of two storm drains and a distributor was completed as an Interim Remedial Measure (IRM) in October 1997. The ROD for the site was issued in January of 1998 and required the excavation and restoration of the remaining contaminated source area. Excavation and disposal of this material was conducted in Spring of 1999. In March of 2000, the site was reclassified as a Class 4 site. Class 4 indicates that the site was properly closed and monitoring is required. This site is considered to be a contributor to the central groundwater plume.

3.2.1.4: Arkwin Industries (Site No. 1-30-043D)

This site includes a number of individual lots located at 648, 656, 662 and 670 Main Street and 66 Brooklyn Ave in the central part of the NCIA. The site is approximately four acres and is occupied by five separate buildings. Arkwin began operations in the NCIA in 1955. Arkwin receives metal stock which is then machined, fabricated, degreased, polished, painted and assembled into finished products. Arkwin used 1,1,1-trichloroethane, tetrachloroethene and other solvents in their production process. Based on the presence of chlorinated VOCs and petroleum hydrocarbons in the soils and groundwater at the site, the Arkwin site was added to the Registry as a Class 2 site in May 1995. The contaminated soil was excavated in June 1997 as part of an IRM. The No Action ROD for OU-1, On-Site Soil, was issued in January 1998. A focused RI/FS for the on-site groundwater (OU 2) was subsequently conducted. The RI results indicated the presence of several VOCs and their breakdown products above the groundwater standard in both the upper glacial aquifer (UGA) and the Magothy aquifer. The focused FS evaluated a number of remedial

alternatives for the groundwater. Based on the FS, NYSDEC selected air sparging and soil vapor extraction (AS/SVE) as the remedy for the groundwater. The ROD for OU 2 was issued in December 1999.

A pilot test for AS/SVE was conducted in July 2002, and the system began continuous operation in December 2002. This site is considered to be a contributor to the central groundwater plume.

3.2.1.5: Tishcon Corporation at Brooklyn Avenue (Site No. 1-30-043E)

This site is located at 30-36 New York Avenue and 30-33 Brooklyn Avenue in the central part of the NCIA. The site is approximately 1.5 acres, and is almost entirely occupied by a single structure. Tishcon has operated at this site from 1982 to present. As part of their gelatin capsule manufacturing process, the Tishcon Corporation used 1,1,1-trichloroethane (1,1,1-TCA) to remove mineral oil from the gelatin capsules. In May 1997, Tishcon phased out the use of 1,1,1-TCA and incorporated a closed loop, petroleum based process into their manufacturing. Based on information obtained from a NCIA-wide PSA, Tishcon was added to the Registry as a Class 2 site in 1995. Sampling results showed high levels of chlorinated VOCs (including 1,1,1-TCA) in the soils and groundwater. An IRM, completed in November 1997, removed the soil contamination in an out-of-service cesspool, a sealed storm drain, and an exterior floor drain. A ROD for OU-1, On-Site Soils, was issued by NYSDEC in January 1998. This ROD required the installation of an AS/SVE system to address remaining on-site soil and groundwater contamination. Construction of the on-site AS/SVE system was completed in December 1999, and system operation began in January 2000. A focused off-site groundwater RI/FS was finalized in September 1999. The ROD for OU-2, Off-site Groundwater, was issued in March 2000. The selected remedy consists of the installation of an AS/SVE system to remove the VOC contamination in the off-site groundwater near Old Country Road. Pilot tests for the selected remedy were carried out in July 2002, and full system installation is scheduled to begin in the fall of 2003. This site is considered to be a contributor to the central groundwater plume.

3.2.1.6: Former Tishcon (Site No. 1-30-043F)

This site is located at 68 Kinkel Street in the central part of the NCIA. The one-quarter acre site is occupied by a single story, 2-bay garage. In 1982 and 1983, Tishcon encapsulated materials at this site, utilized 1,650 gallons of TCE as well as 8,000 gallons of methylene chloride and 3,000 gallons of shellac in its manufacturing process. This site was added to the Registry as a Class 2 site in 1995. A State Superfund investigation was completed in July 1996. In January 1997, a ROD requiring no action was issued for this site. The site was delisted from the Registry in December of 1997.

3.2.1.7: Metpar Steel Corp. (Site No. 1-30-043G)

This site is located at 95, 97 and 99 State Street in the in the central part of the NCIA. Metpar manufactures metal toilet components. This site was listed on the Registry in 1995. The RI for the site was completed in July 1996 and a ROD was issued in January 1997, requiring no action. The site was delisted from the Registry in December of 1997.

3.2.1.8: Utility Manufacturing/Wonder King Site (Site No. 1-30-043H)

This site is located at 700-712 Main Street in the eastern part of the NCIA. The site is approximately one acre, most of which is occupied by a single building. The remainder of the site is paved. The original

building on this site was constructed in 1967. The property was leased to Radalabs, which manufactured communications equipment. In 1975, Utility Manufacturing sublet part of the building. In February 1976, Utility Manufacturing became the sole occupant. The Utility Manufacturing Company manufactures a variety of cleaning and lubricating products.

A NYSDEC monitoring well sampling program and a PSA confirmed that soil and groundwater were contaminated with PCE and other related VOCs above standards and guidelines. Consequently, the NYSDEC listed the site as a Class 2 site in 1996. A subsequent field investigation was complete in May 1998 and included the collection of soil samples and installation and sampling of monitoring wells. The NYSDEC required Utility Manufacturing to conduct an additional investigation to delineate the on–site groundwater contamination (completed December 2000) and perform an IRM (AS/SVE) to remediate the on-site groundwater. The AS/SVE system was constructed and began operation in November 2001. A ROD for this site, calling for continued operation of the AS/SVE system and no further action, was signed in March 2003. This site is considered to be a contributor to the eastern groundwater plume.

3.2.1.9: Former LAKA Industries, Inc. (Site No. 1-30-043K)

The site is located west of the intersection of Old Country Road and the Wantagh State Parkway at 62 Kinkel Street in the central part of the NCIA. The site is entirely paved or covered with the footprint of the one story main building with the exception of a small landscaped area on the west side of the building. The LAKA Tool and Stamping Co., Inc., occupied the site from 1971 to 1978, performing precision metal stamping operations as a defense contractor. LAKA Industries, Inc., the parent company, operated the site from 1979 to 1984 as a machine shop specializing in tools, dies and precision stamping. Both companies used TCE and lubricating oils. As the NCIA was not serviced by public sewers until the 1980s, subsurface disposal was the common means of waste disposal in the area. The site was added to the Registry as a Class 2 site in 1996. A focused RI/FS was conducted to define the nature and extent of contamination at the site. The RI (finalized May 1999) confirmed that contamination existed in the vicinity of an on-site cesspool and that an additional source area existed in a catch basin located downgradient of the site. The NYSDEC issued a ROD for On-Site Soils in February 2000. The ROD selected excavation of the cesspool and the source area, and did not include any groundwater remediation. The selected remedy was implemented in May 2001. This site is considered to be a contributor to the central groundwater plume.

3.2.1.10: Frost Street Sites: Former Autoline Automotive (Site No. 1-30-043I), 89 Frost Street (Site No. 1-30-043L), Former Applied Fluidics (Site No. 1-30-043M)

The Frost Street sites include three adjacent sites which are located at 89 Frost Street, 101 Frost Street and 770 Main Street in the eastern part of the NCIA. The NYSDEC designated the sites as Class 2 sites in 1996.

Former Autoline Automotive (Site No. 1-30-043I)

This site is located at 101 Frost Street in the eastern part of the NCIA. The site is approximately one acre, most of which is occupied by one-story building. The rest of the site is paved. Several tenants occupied the building at this site including a toy warehouse, a home laboratory supply company, a textiles manufacturer and an automobile ignition parts manufacturer. National Bassen Textiles, which occupied the property from 1974 to 1983, had documented use of degreasers and other unknown chemicals. Autoline Automotive occupied the site from 1984 to 1992, manufacturing ignition wires and wire harness sets.

89 Frost Street (Site No. 1-30-043L)

This site is located at 89 Frost Street in the eastern part of the NCIA. This site is entirely paved. The 55,000 sq. ft structure which formerly occupied the site was built in 1968 and rented by several facilities. Adchem Corporation, a double coated adhesive tape manufacturer, occupied the site from 1971 to 1973. Unicord, a manufacturer of music amplifiers, occupied the site from 1980 to 1987. Marvex Corporation, a processing and finishing company, occupied the site sometime during the life of the structure, although the exact time period is unknown. The last known occupant of the building was Korg Electronics from 1988 to 1994.

Former Applied Fluidics (Site No. 1-30-043M)

This site is located at 770 Main Street in the eastern part of the NCIA. The site is approximately one acre, and is currently occupied by a department store built in 1998. The rest of the site is paved. Applied Fluidics occupied this site from 1974 to 1982. Applied Fluidics was a defense contractor that manufactured research instruments and leak detectors. The company used trichloroethylene, paint thinners and petroleum distillates. The building was demolished in 1998 and excavated to a depth of 20 ft below ground surface (bgs) as part of the redevelopment of the site. All drainage structures were removed.

In 1998, a State funded RI/FS was conducted at the Frost Street sites. The investigation determined that the VOC contaminants of concern were PCE, TCE, and xylene. Based on the FS, NYSDEC issued three separate RODs in March 2000 that described the selected remedies for the contaminated soils at each of the three sites. The remedies consist of:

- Soil Vapor Extraction of deep soils with excavation and off-site disposal of surface soil for the Former Autoline site.
- Soil Vapor Extraction of deep soils for the 89 Frost Street site.
- No Action for the Former Applied Fluidics site.

The groundwater contamination was addressed as a combined operable unit since the contamination emanating from the three Frost Street sites co-mingle, such that the contamination from an adjacent site forms a common plume of VOC contamination. Based on the RI/FS, in March 2000, the NYSDEC issued a groundwater ROD that requires the installation of an AS/SVE system to address VOC contamination in the groundwater source areas and an in-well vapor stripping system to address the deeper contamination along Old Country Road. The PRP for these sites signed a Remedial Design/Remedial Action consent order in January 2003 to implement the soil and groundwater remedies selected in the March 2000 RODs. These three sites are considered to be contributors to the eastern groundwater plume.

3.2.1.11: 118-130 Swalm Street Site (Site No. 1-30-043P)

This site is located at 118-130 Swalm Street in the western part of the NCIA. The site is approximately 3 acres, with a one story building. The property is bordered by the Long Island Railroad to the north. Tenants of the Swalm Street site include All Records Distributors from 1971 to 1974, Allomatic Industries from 1979 to 1992, Louis Jordan Labs (a vitamin manufacturer) from 1978 to 1980, and Varitek from 1979 to 1992. The current tenant, Liqui-Mark has occupied the building since 1994. The site was listed on the

Registry as a Class 2 site in 1997. Field work was completed in January 1999. RI results indicated low levels of VOC contamination in on-site cesspools and that the groundwater contamination had decreased over time. Additional investigation near the cesspool located in the southwest corner of the site and at the drains inside the building was undertaken in April of 2001. Additional groundwater sampling was carried out during September of 2002. Based on the results of the RI, a PRAP addressing on-site soil and groundwater at this site is expected in the fall of 2003. This site is considered to be a contributor to the western groundwater plume.

3.2.1.12: 299 Main Street Site (Site No. 1-30-043S)

The site is located at 299 Main Street in the western part of the NCIA. The site is approximately two acres and is occupied by a one story building. The site was developed between 1950 and 1962. It is currently occupied by One Stop Auto and Truck Center. The property was formerly used as a junk yard and a transportation company (dates unknown). Island Transport Corporation used large quantities of petroleum related compounds including gasoline and approximately 275 gallons of TCE between July and December 1978 to clean trucks.

The NYSDEC listed the 299 Main Street site on the Registry as a Class 2 site in 1997. Field work was completed in October 1999 and a draft focused RI report was submitted which indicated the soils and groundwater at the site were contaminated with chlorinated compounds, predominantly TCE. Additional investigations were undertaken in the spring of 2001, and the RI report was finalized in September 2001. Contamination was found in an on-site injection well and in an equipment repair bay within the building. Based on the RI results, the PRP submitted an IRM work plan which includes removal of contaminated material from the site and installation of an AS/SVE system, which began in the spring of 2003 and is scheduled to be completed in the fall of 2003. This site is considered to be a contributor to the western groundwater plume.

3.2.1.13: Northeast Corner of Hopper and Main Streets (Site No. 1-30-043T)

This site is located at the intersection of Hopper and Main Streets in the western part of the NCIA. There are no permanent structures located on the property. The site was added to the Registry as a Class 2 site in 1997. The site was investigated from December 1998 to January 1999. No on-site contamination was found, and a ROD requiring no action at this site was issued in February 2000. The site was delisted from the Registry in December of 2000.

3.2.1.14: 36 Sylvester Street Site (Site No. 1-30-043U)

The site is located at 36 Sylvester Street in the central part of the NCIA. The site is approximately one half acre and is occupied by a one-story building. The site was initially developed in 1952 with a one story masonry building. The building covers most of the lot, with the exception of alleys on the north and south sides of the property, and a loading area on the east side. Historically, the site was used for industrial applications that included the manufacturing of precision machinery. Former occupants of the site include American Express Warehousing Corp., Universal Transistor Products Corp., National Machinery Exchange and National Gear Products. The property was occupied by National Gear Products from 1980 to 1996 and is currently occupied by GEL-TEC (a division of Tishcon Corp.). The results of the PSA indicated that past site operations have contaminated the groundwater beneath and downgradient of the site with 1,1,1-TCA.

The NYSDEC listed the site as a Class 2 site on the Registry in 1999. The NYSDEC negotiated a Consent Order with the PRP to conduct a RI/FS which was signed in March of 2000. An IRM to remove contaminated material from an on-site drywell was completed in May 2002. Based on the results of the IRM, a no further action ROD was signed in March 2003, and the site was delisted from the Registry in September 2003. This site is considered to be a contributor to the central groundwater plume.

3.2.1.15: Tishcon Corporation Site at 29 New York Avenue (Site No. 1-30-043V)

This site is located at 29 New York Avenue in the central part of the NCIA, is approximately one acre and is occupied by a single building. The site was developed in 1952, and was used to manufacture electronic equipment until the late 1970s, after which it was occupied by Tishcon from 1979-1991. The site was sold to Equity 1 Associates in 1991.

This site was listed on the Registry as a Class 2 site in 1995 as part of the Tishcon Corporation at Brooklyn Avenue site. The 29 New York Avenue site was investigated further as part of another PSA conducted in 1996. A soil/sediment sample from an on-site catch basin had 1,1,1-TCA-related compounds above cleanup guidelines. Based on these results, the NYSDEC listed the Tishcon Corporation at 29 New York Avenue site as a separate Class 2 site on the Registry in March 1998. The RI report was received by NYSDEC in December 1999. An IRM was carried out in August 2000, consisting of the clean out of a cesspool on the site. Based on the results of the IRM, a no further action ROD for this site was signed in March 2002, and the site was delisted from the Registry in December 2002. This site is considered to be a contributor to the central groundwater plume.

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 following sites are considered to be contributors to the western plume. The PRPs for the western plume sites, documented to date, include:

Site # 1-30-043A, IMC Magnetics **PRP: IMC Magnetics**

Consent Order Index Number	Subject	Date
WI-0750-96-02	OU1RI/FS	2/96
WI-0750-00-03	OU2RD/RA	4/01

Site # 1-30-043B, Atlas Graphics **PRP: Atlas Graphics, Inc.**

Consent Order Index Number	Subject	Date
WI-0861-99-16	RD/RA	9/00

Site # 1-30-043P, 118-130 Swalm St. **PRP: Barouh Eaton Allen Corp.**

Consent Order Index Number	Subject	Date
WI00816-97-09	RI/FS	10/98

Site # 1-30-043S, 299 Main St. **PRP: 2632 Realty Development Corp.**

Consent Order Index Number	Subject	Date
WI-0843-98-06	RI/FS	5/99

The following sites are considered to be contributors to the central plume. The PRPs for the central plume sites, documented to date, include:

Site # 1-30-043C, Tishcon at 125 State St. **PRP: Tishcon Corp.**

Consent Order Index Number	Subject	Date
WI-0757-95-05	RI/FS	6/96
WI-0757-98-02	RD/RA	5/98

Site # 1-30-043D, Arkwin Industries **PRP: Arkwin Industries Inc.**

Consent Order Index Number	Subject	Date
WI-0754-95-06	OU1RI/FS	7/96
WI-0861-00-02	OU1RD/RA	2/02

Site # 1-30-043E, Tishcon at Brooklyn and New York Avenue **PRP: Tishcon Corp.**

Consent Order Index Number	Subject	Date
WI-0758-95-05	OU1RI/FS	6/96
WI-0799-97-06	OU2RI/FS	1/98
WI-0799-98-02	OU1RD/RA	5/98
WI-0799-00-03	OU2RD/RA	1/03

Site # 1-30-043K, Former LAKA Industries
PRPs: LAKA Tool & Stamping Inc.
LAKA Industries, Inc.
DermKraft, Inc.

No Consent Order is associated with this site.

Site # 1-30-043U, 36 Sylvester St. **PRP: Grand Machinery (owner)**

Consent Order Index Number	Subject	Date
WI-0863-00-01	RI/FS	3/00

Site # 1-30-043V, Tishcon at 29 New York Ave. **PRP: Tishcon Corp.**

Consent Order Index Number	Subject	Date
WI-0828-98-05	FRI/FS	5/98

The following sites are considered to be contributors to the eastern plume. The PRPs for the eastern plume sites, documented to date, include:

Site # 1-30-043H, Utility Manufacturing Wonder King
PRPs: Nest Equities, Inc. (owner)
Wilbur Kranz,(operator)
Utility Manufacturing Co.

Consent Order Index Number	Subject	Date
WI-0785-97-06	RI/FS	1/97

Site # 1-30-043I, Former Autoline Automotive
PRPs: K.B. Company (owner)
Filco/Cobra, Inc., Formerly known as (fka) Autoline Automotive Corp. (former occupant)
Fabric Bonanza, fka National Bassen Textiles Inc. (former occupant)
101 Frost Street Associates LP. (Current Occupant)

Consent Order Index Number	Subject	Date
WI-0799-00-05	RD/RA	1/03

Site # 1-30-043L, 89 Frost Street
PRPs: Adchem Corp. (former occupant)
Jerry Speigel (former owner)
Emily Spiegel Trust et al
89 Frost Street Associates (former owner)
Millenium Realty, LLC (Current owner)

Consent Order Index Number	Subject	Date
WI-0799-00-05	RD/RA	01/03

Site # 1-30-043M, Former Applied Fluidics
PRPs: Applied Fluidics, Inc.
AFI Corp.
LeBlari Associates, L. P.
Emily Spiegel, Trust, et al.
Next Millenium Realty, LLC.

Consent Order Index Number	Subject	Date
WI-0893-01-07	RD/RA	01/03

The PRPs declined to implement the off-site groundwater RI/FS at the site when requested by the NYSDEC. 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 NYSDEC 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. Please refer to Table 1 for a summary of the remedial activities and enforcement status.

SECTION 5: CONTAMINATION

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

5.1: Summary of the Remedial Investigation

The purpose of the RI was to define the nature and extent of groundwater contamination that is migrating from all Class 2 sites within the NCIA.

State funded remedial investigations at the NCIA began in 1995. Major investigations included the sampling of 41 groundwater monitoring wells in the summer of 1996 by NYSDEC personnel, additional groundwater monitoring during the summer of 1997 which included the sampling of eleven hydropunch (a sampling method appropriate for deeper sampling in the Long Island geological environment) locations south of Old Country Road and Grand Boulevard, and the installation of two pairs of early warning groundwater monitoring wells upgradient of the Bowling Green water supply wells in the summer of 1998. The next phases of the off-site groundwater investigation were conducted during April of 1999, August of 1999, and

the final phase was conducted during January of 2000. These last three phases consisted of the sampling from 41 existing groundwater monitoring wells, several hydropunch points, and installation of four new groundwater monitoring wells. A report entitled Remedial Investigation for Off-site Groundwater in the New Cassel Industrial Area, September 2000, has been prepared which describes the field activities and findings of the RI in detail.

The following activities were conducted during the RI:

- Installation of four shallow monitoring wells and fifteen hydropunch locations downgradient of the NCIA (summer 1996).

- Five rounds of groundwater monitoring well sampling. The first round (summer 1996) sampled 41 existing wells, including the four new shallow wells.

- The second round (summer 1997) sampled the same wells as the first round, and eleven hydropunch locations south of Old Country Road.

- Early warning monitoring wells south of Old Country Road and upgradient of the Bowling Green water supply wells were installed and sampled in July of 1998.

- The third round (spring 1999) sampled 41 existing wells, and the four Bowling Green early warning wells. Four new wells were installed and sampled.

- The fourth round (summer 1999) sampled 41 existing groundwater monitoring wells, plus the four Bowling Green early warning monitoring wells.

- The fifth round (January 2000) sampled 22 existing monitoring wells and the four Bowling Green early warning monitoring wells.

After the completion of the RI report in September 2000, the Bowling Green early warning monitoring wells have continued to be monitored on a quarterly basis. In addition, eight (8) groundwater monitoring wells (one well quadruplet and two well couplets) were installed to the southwest of the Bowling Green production wells in October 2001, and an additional 300 foot deep monitoring well was installed in July of 2002. See Figure 3 for the location of these wells. These wells are also sampled on a quarterly basis.

To determine whether the groundwater contains 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 NYSDEC "Ambient Water Quality Standards and Guidance Values" and Part 5 of the New York State Sanitary Code.

Based on the RI results, in comparison to the SCGs and potential public health and environmental exposure routes, the groundwater south of Old Country Road requires remediation. More complete information can be found in the RI report.

5.1.1: Site Geology and Hydrogeology

The Upper Pleistocene deposits poorly sorted sand and gravel that make up the Upper Glacial Aquifer (UGA) are found from the surface to a depth of approximately 80 ft below ground surface (bgs). The UGA is an unconfined aquifer consisting of poorly sorted sands and gravel. The Magothy is located beneath the UGA and consists of finer sands, silt and small amounts of clay.

At the NCIA sites there are no other hydro-geologic units located between the UGA and the underlying Magothy formation. In general, the top of the Magothy formation is found at least 100 ft bgs. However, based on observations during installation of wells for this investigation, the Magothy is sometimes found at significantly shallower depths (60-80 ft bgs) in the NCIA than in many other areas of Long Island. The UGA and the Magothy are in direct hydraulic connection; however, clay lenses are often found in the upper Magothy in this area. Depth of water table is between 55-65 ft bgs in the NCIA, and groundwater flows in a southwesterly direction. Both the UGA and the Magothy have been designated as sole source aquifers and are protected under state and federal legislation.

5.1.2: Nature of Contamination

As described in the RI report, over 1,850 groundwater samples were collected at the NCIA since 1996 from over 100 separate monitoring wells, approximately 25 hydropunch locations, and over 50 geoprobe locations to characterize the nature and extent of contamination. The investigation included on-site sampling for individual sites within the NCIA, as well as work performed for the NCIA off-site groundwater investigation. The main categories of contaminants which exceed their SCGs are volatile organic compounds (VOCs).

The VOCs of concern are PCE, 1,1,1-TCA and TCE. Also present are smaller quantities of the breakdown products of PCE and TCE, and an assortment of minor constituents all within the VOC category. For more detailed descriptions, please refer to the RI.

5.1.3: Extent of Contamination

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

Several extensive sampling efforts have been conducted at the NCIA to determine the sources and extent of this contamination. A major portion of the effort of this off-site groundwater RI has been to compile and interpret the historical data to determine the fate and transport of the contaminants as they relate to off-site locations. For the purpose of this PRAP, on-site is defined as the area within the NCIA as described in Section 2. Off-site refers to the area south of Old Country Road and Grand Boulevard, downgradient of the NCIA.

5.1.3.1: Area of Historically Impacted Groundwater: 1977 to 2000

The area of historically impacted groundwater is shown on Figures 4 through 7. Overall this set of figures shows the maximum area of impacted groundwater using the highest noted concentration of total VOCs over the years. Based on analysis of the groundwater data, four depth intervals were chosen to provide a comparative analysis. The contouring resulted in three individual plume areas over three of the depth

intervals examined (0-64 ft bgs, 64-100 ft bgs, 100-125 ft bgs) with the exception of the deepest level (125-200 ft bgs) where only two apparent plume areas were found.

The eastern most plume is located west of Frost Street and south of Summa Street with its source area centered about the Frost Street sites (#1-30-043I, -M, and -L) (Figure 4). The primary contaminant of concern in this plume area is PCE and its associated breakdown products. The total VOC concentrations in the shallow groundwater in this area exceeded 10,000 ppb at four sampling locations in the shallow groundwater. The shallow groundwater contamination associated with this plume area extends just south of Old Country Road (Figure 4). The axis of the plume is generally in the direction of the flow of shallow groundwater.

The total VOC concentration increases with depth in the eastern plume and reaches its highest concentration at the 65-99 ft interval with the highest single measurement of over 10,000 ppb at the center of this plume area (Figure 5). The extremely high concentrations noted in the area may be the result of DNAPL within the fine-grained matrix of the transition zone between the UGA and Magothy Aquifer. The maximum extent of this plume is slightly smaller than the noted plume in the shallow groundwater. At the deeper intervals (100-124 ft and 125-200 ft bgs), the contaminant concentrations decrease within the NCIA (north of Old Country Road). It appears that the plume has not migrated vertically downward in this area (Figures 6 and 7). It is not known whether this is a function of the time required to migrate to this depth or whether the fine-grained nature of the material at this depth is preventing downward migration. The planned groundwater remediation at the Frost Street sites should facilitate source removal and limit the further potential for downward migration on the site. At the deeper depths off-site, the eastern plume and the central plume are co-mingled. Generally the highest total VOC concentrations are located south of Old Country Road just north of the Bowling Green well field. Hydropunch data collected during the installation of the early warning wells indicate that below 150 ft bgs, the contaminant concentrations drop off rapidly.

The second plume area is located in the central section of the industrial area with the highest levels of contamination concentrated in the area south of Main Street (Figure 4). The major source area of this plume appears to be the Arkwin Industries site (#1-30-043D), and the Tishcon Corporation sites (#1-30-043V and -E). The contamination north of Main Street is attributable to the Tishcon Corporation site (#1-30-043C). The former LAKA site (#1-30-043K), the 36 Sylvester Street site (#1-30-043U) and the 29 New York Avenue site (#1-30-043V) are also located within the western portion of this central plume area. In this plume area the primary contaminant of concern is 1,1,1-TCA and its breakdown products. Significant concentrations of TCE and PCE were also found at certain sampling locations, especially at the deeper depths off-site. The total VOC concentrations in the shallow groundwater in this area exceeded 10,000 ppb at three sampling locations and exceeded 1,000 ppb at two locations in the shallow groundwater (Figure 4). The highest concentrations are located directly downgradient of the Tishcon Corporation site (#1-30-043E). The high concentrations found on-site also suggest that the on-site areas will continue to act as a source of contamination to the off-site groundwater. The on-going and planned remedial measures at Class 2 sites within the NCIA would serve to reduce the mass of contaminants available as a source for the off-site groundwater contamination.

Since this plume area extends into the vicinity of the Bowling Green well field the contaminant distribution with depth is critical. Both of the deeper depth intervals (Figures 6 and 7) indicate that a large plume with high concentrations (total VOCs in excess of 1,000 ppb) exists south of Old Country Road. The hydropunch sampling location completed in February 2000 on Myron Street (GWHP-01) indicates that total VOC

concentrations range from 856 to 5,480 ppb between 100-140 ft bgs. At these depths the primary contaminant of concern is TCE and 1,1-DCE. An additional groundwater hydropunch sampling location (GWHP-02) was located downgradient of the Bowling Green water supply wells. This hydropunch sampling location exhibited significantly lower concentrations at the deeper depths than GWHP-01. Total VOC concentrations at this location ranged from non-detect to 8 ppb between 100-140 ft bgs. The highest total VOC concentration found at this location was 31 ppb in the deepest sample (150 ft bgs) that was collected. Sampling conducted by hydropunch during the installation of the early warning wells (August 1998) indicate that at the two early warning well locations, the total VOC concentrations tend to decrease below 150 ft bgs.

The final plume area is located in the western section of the industrial area and extends from the Long Island Railroad to just south of Old Country Road (Figure 4). The most up-gradient source area for this plume appears to be the 118-130 Swalm Street site (#1-30-043P). Several other Class 2 sites including Atlas Graphics (#1-30-043B), IMC Magnetics (#1-30-043A), and 299 Main Street (#1-30-043S), are also located within this plume area. The primary contaminants of concern in this plume depends on location; significant concentrations of TCE, PCE, and 1,1,1-TCA are found throughout the plume. The total VOC concentrations in the shallow groundwater in this area exceeded 1,000 ppb at six sampling locations. Three of the six are located on the 118-130 Swalm Street site while the other three are located downgradient south of Main Street. The shallow groundwater contamination associated with this plume area extends approximately 100 ft south of Old Country Road. Between Grand Boulevard and Old Country Road the plume extends beneath a seven block residential area (Figure 4). This plume area reaches its apparent maximum extent in the shallow groundwater which may indicate that this plume is representative of more recent discharges or that the contaminants were released as dissolved product and have not vertically migrated downward.

5.1.3.2: Area of Impacted Groundwater: 1998 to 2000

The current area of impacted groundwater, based on data collected from 1998 to 2000 (Figures 8 to 11), is very similar to the area of historically impacted groundwater. Three plume areas are present including the eastern, central, and western plumes and they are of generally the same areal extent and shape. In some cases, the plume areas have decreased in apparent size from the historically impacted area. This is caused either by a lack of data in certain locations or by an actual decrease in contaminant concentrations. In the four depth ranges examined, the contaminant levels are very similar during this time period to the historically impacted groundwater areas.

The plume contours for the eastern area plume are essentially the same when comparing the historically impacted area and the data collected from 1998 to 2000 over the two shallow depths (Figures 4 and 8, Figures 5 and 9). The differences at the deeper depths (Figures 6 and 10, Figures 7 and 11) are attributable to a lack of sampling points over the time period of 1998 to 2000. The data collected during 1998 to 2000 is consistent with the previous data in that PCE is the primary contaminant of concern both on-site and off-site. At off-site locations, significant concentrations of breakdown products were also found from 1998 to 2000. As noted in the historical data, the apparent source areas for this contamination are the Class 2 sites in the vicinity of the Frost Street sites.

When comparing the available data for the shallow depth (0-64 ft bgs) for the central plume during the period 1998 to the present (Figure 8) against the historical data (Figure 4), only minor differences in the

plume configurations are noted. It is believed the differences are attributable to the limited number of sampling points available from 1998 to the present for on-site locations within the industrial area.

For the depth range between 65-99 ft bgs significant differences are noted between the historical data (Figure 5) and the current data (Figure 9). A trend toward lower total VOC concentrations in the primary source area is apparent. This may be due to the removal of contamination sources at the Arkwin Industries site (#1-30-043D) and the Tishcon site (#1-30-043E).

For the two deeper depths of the central plume, the primary differences in the present plume configuration vs the historical plume configuration appear to be in the lower (less than 1000 ppb) concentration fringe areas of the plume. For example, the historical data indicate that the maximum extent of the 100-124 ft plume area should extend 300 ft downgradient of Washington Avenue. In this case, it is not known whether this indicates a decrease in concentration with time.

Comparing the various plume configurations with depth for the western plume is difficult since little data were historically collected downgradient of the source areas for this plume. This RI focused on the potential off-site impacts from the western plume and the data indicated that this plume does not appear to extend to the deeper depths at high concentrations (greater than 1,000 ppb). Hydropunch data collected in February 2000 at GWHP-03 located on Fieldstone Street indicate that the highest concentration area of this plume extends from 78-100 ft bgs with total VOC concentrations ranging from 123 ppb to 315 ppb. At the deeper depths the concentrations appear to be decreasing with the exception of 138-140 ft bgs (total VOCs 134 ppb).

Please refer to Table 2 for a summary of the historical groundwater data.

5.1.3.3: Early Warning Monitoring Wells

In response to the public's concerns regarding the impact of the groundwater plumes on the Bowling Green water supply wells during the summer of 1997, the NYSDEC installed four early warning monitoring wells between Old Country Road and the Bowling Green water supply wells. These wells are in two pairs, each pair consists of a shallow well (150-165 ft) and a deep well (500 ft). The locations were chosen to intercept known contaminant plumes from the NCIA sites that are migrating in the direction of the Bowling Green water supply wells, which extract water at depths in excess of 500 ft. Sampling results indicate the presence of VOCs in the deep wells. NYSDEC is monitoring these wells on a quarterly basis. Total VOCs in the shallow wells have ranged from 76 ppb to 1,401 ppb while total VOCs in the deep wells have ranged from non-detect to 18 ppb (See Table 3).

5.1.3.4 Off-site Groundwater Monitoring Wells: 2001-2002

Eight (8) groundwater monitoring wells (one well quadruplet and two well couplets were installed in October 2001, and one 300 ft deep monitoring well was installed in July 2002. These wells have been sampled concurrently with the early warning wells since their installation. See Figure 3 for the well locations, and Table 4 for the sampling results. The nine new wells show high concentrations of VOC contamination at depths from the groundwater table to 200 ft bgs in the area immediately to the southwest of the Bowling Green production wells with less contamination west of Washington Ave. These results are consistent with previous data as described above, and show the continued presence of groundwater

contamination at depths of up to over 200 ft bgs in the area immediately southwest of the Bowling Green public water supply wells. This area may act as a reservoir for VOC contamination which eventually reached the Bowling Green water supply wells.

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.

The potential for contaminated groundwater to affect the public drinking water supply wells is the primary health concern from the NCIA sites. The Bowling Green Water District has water supply wells located downgradient of the NCIA.

VOC contamination from the NCIA sites has been impacting the Bowling Green Water District wells since 1992. Table 5 provides a summary of the major contaminants and total VOCs detected at the Bowling Green water supply wells. A supplemental water treatment system was constructed in 1996 using State Superfund (SSF) money to ensure the protection of the public water supply. The supplemental water treatment system uses an air stripper to remove the contaminants, followed by carbon polishing, when necessary, to achieve drinking water standards. All Bowling Green Water District customers are provided with drinking water which is routinely monitored to ensure continued safety.

Removal of sources at several sites within the NCIA will prevent further release of contamination into the groundwater. NYSDEC believes that once all individual site remedies discussed above are implemented, all the sources of groundwater contamination will be eliminated and further migration of the contaminant plumes will be controlled.

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 8.3.1 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.

Pathways which are known to or may exist include:

- Ingestion of contaminated groundwater.

Since an active treatment system is in place that prevents the completion of this exposure pathway, no known completed exposure pathways exist.

The contaminated groundwater at the NCIA sites and at locations downgradient of these sites presents a potential route of exposure to humans. The area is served by public water, however, the underlying aquifer is the source of the water supply for the Bowling Green Water District customers. A supplemental treatment system, air stripping followed by carbon polishing, was constructed in 1996 to mitigate the impact of the groundwater contamination on the Bowling Green water supply wells. Bowling Green water supply wells are routinely monitored for VOCs and other contaminants. As of to date, no site specific contaminants exceeding groundwater or drinking water standards were detected in water distributed to the public. Early warning monitoring wells have been installed south of Old Country Road, upgradient of the water supply wells as a precautionary measure. Therefore, use of the groundwater in the area is not currently considered to be an exposure pathway of concern.

5.4: Summary of Environmental Impacts

This section summarizes the existing and potential future environmental impacts presented by the NCIA sites. 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.

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 sites. Virtually every open space in the industrial area has been covered by asphalt, concrete or buildings. Since the industrial area is highly developed, no wildlife habitat exists in or near the sites. The nearest surface water sources are several small ponds in and around Eisenhower Memorial Park, approximately two miles southwest of the NCIA across Old Country Road.

Site-related contamination has entered the groundwater. The Magothy aquifer is a sole source aquifer, providing virtually all the groundwater used for private, public and industrial groundwater on Long Island. The on-going contamination of this aquifer from the NCIA sites and other sources has resulted in contravention of groundwater standards, rendering much of the groundwater unusable without treatment. The contaminated groundwater at the sites, as well as in the entire NCIA, presents a potential route of exposure to the environment. There are no known exposure pathways of concern between the contaminated groundwater and the environment. The potential for plants or 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 NYSDEC has been using a three-prong strategy in remediating the Class 2 sites in the NCIA. The first action identifies source areas of contamination at each site which have been remediated; the second action investigates groundwater contamination at and beneath each site and takes appropriate remedial measures; and the third action consists of a detailed Remedial Investigation(RI) of groundwater contamination that is migrating from all Class 2 sites in the NCIA. The RI and FS reports from this investigation are now completed, and form the primary basis for this ROD.

The remediation goals selected for Off-site Groundwater south of the NCIA are:

- Elimination of ingestion of groundwater affected by the sites in the NCIA that does not attain NYSDEC Class GA Ambient Water Quality and New York State drinking water standards as outlined in 10 NYCRR Part 5, Subpart 5-1.

- Elimination of, to the extent practicable, off-site migration of groundwater that does not attain NYSDEC Class GA Ambient Water Quality Standards.

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 New Cassel Industrial Area Off-site Groundwater 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 the NCIA sites is discussed below. The present worth represents the amount of money invested in the current year at 5% interest 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. 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 at the NCIA sites.

7.1.0: Elements of Remediation that are Common to All Remedial Alternatives

All remedial alternatives discussed below rely upon the implementation of the following:

(i) active source removal and/or groundwater remediation that is in place or planned at the following source sites within the NCIA:

1. At the IMC Magnetics site (1-30-043A), a Soil Vapor Extraction (SVE) treatment system has been remediating the soil contamination since October 1997. An on-site groundwater remediation system was also constructed in December 2001, and one round of treatment was completed in January 2002.

2. At the Atlas Graphics site (1-30-043B), an AS/SVE treatment system was constructed in October 2000 and has been treating the contaminated soil and groundwater at and beneath the site.

3. At the Arkwin Industries site (1-30-043D), contaminated soil was removed from an on-site drywell in June 1997, and an on-site groundwater remediation system was construct during the summer of 2002, and has been in operation since December 2002.

4. Contaminated soil and sediments were removed from the out-of-service cesspool, outdoor floor drain, and the sealed storm drain at the Tishcon Corporation Site at Brooklyn and New York Avenues (1-30-043E). Construction of an Air Sparging/Soil Vapor Extraction (AS/SVE) treatment system was completed in December 1999. Since January 2000, the treatment system has been remediating the remaining soil and groundwater contamination at and beneath the site.

5. At the Utility Manufacturing/Wonder King site (1-30-043H), an on-site groundwater remediation system was constructed in October 2001 and has been treating the groundwater since November 2001.

6. Excavation and SVE have been selected to remove and treat the contaminated soil at and beneath the Former Autoline Automotive Corp. site (1-30-043I).

7. SVE has been selected to treat the contaminated soil at and beneath the 89 Frost Street site (1-30-043L).

8. At the 299 Main Street site (1-30-043S), an IRM requiring the removal of contaminated soil and AS/SVE to address contaminated soil and groundwater on-site is planned for the Summer of 2003.

9. At the Former Applied Fluidics site (1-30-043M), contaminated soil was excavated and removed from the site in the spring of 1998.

10. At the 36 Sylvester Street Site (1-30-043U), an IRM was completed on May 9, 2002 to remove contaminated sediment from an underground dry well.

11. In 1996, a supplemental treatment system consisting of air stripping followed by carbon polishing, was constructed to mitigate the impact of the groundwater contamination leaving the NCIA sites on the Bowling Green Water District supply wells.

(ii) institutional controls in the form of existing use restrictions preventing the use of groundwater as a potable or process water without necessary water quality treatment as determined by the NCDH.

7.1.1: **Alternative 1: No Further Action**

Present Worth:	*$1,500,000*
Capital Cost:	*$ 0*
Annual O&M:	*$ 83,000*
Time to Implement:	*30 years*

Alternative 1 is the no further action alterative. As discussed above, active source removal and groundwater remediation is completed or in-place or planned at 14 source sites within the NCIA. Alternative 1 includes institutional controls in the form of existing development and groundwater use restrictions. These controls would prohibit the use of groundwater for potable or industrial use. Groundwater use restrictions would be implemented to prevent development of the underlying groundwater as a potable or a process water source without necessary water quality treatment as determined by NCDH.

The cost estimate developed for this no further action alternative assumes operation and maintenance, including replacement of equipment as needed, of the supplemental treatment system which is currently in-place at the Bowling Green Water District.

The No Further Action alternative recognizes remediation of the site conducted under previously completed IRMs and remedial actions (see section 7.1.0).

7.1.2: **Alternative 2: Long Term Monitoring**

Present Worth:	*$2,326,000*
Capital Cost:	*$ 230,000*
Annual O&M:	*$ 225,000*
Time to Implement:	*30 years*

As described above, active contaminant source removal and groundwater remediation is completed or in-place or planned at 14 source sites within the NCIA. Alternative 2 would include all elements as described in Section 7.1.0. Under this alternative, groundwater quality would be assessed by a long-term monitoring program. Bowling Green water supply wells are screened at depths of 540-550 ft bgs. The purpose of the long-term groundwater monitoring program is to monitor any migration of the off-site contaminant plumes and their impact on the public health and the environment. Four existing early warning monitoring wells, that are located downgradient from Old Country Road and upgradient from the Bowling Green water supply wells, would be monitored. The early warning wells are screened at 142, 164, 514 and 516 ft bgs. Nine additional groundwater monitoring wells (one quadruplet, two couplets and one singlet, screened at depths from 90-300 ft bgs) were installed in 2001 and 2002, in the area to the west of the Bowling Green production wells (see Figure 3 for the locations of the monitoring wells). Nine additional wells would be installed (screened from 90-200 ft bgs) for the monitoring program. The monitoring program (developed here for cost estimating purposes) would include a total of 24 monitoring wells (13 existing and 9 new wells ranging in depth from 90-516 feet bgs) at locations south of the NCIA. The locations of the new monitoring wells would be within and downgradient of the existing off-site plumes.

The cost estimate is based on the assumption that the 24 monitoring wells would be sampled quarterly during the first two years, semi-annually for the next three years and every fifth quarter for years 6-20. These assumptions were used for cost estimation purposes, however, the actual monitoring schedule would

be determined during the design process. The continued need for monitoring would be re-evaluated at any time during the project time frames.

The capital cost ($230,000) for this alternative includes the installation of nine new groundwater monitoring wells. The present worth cost estimate ($2,326,000) for this long-term groundwater monitoring program assumes replacement of three of the monitoring wells being sampled every five years during the estimated 30 years of monitoring. The replacement cost is necessary because a monitoring well could become plugged, the casing could collapse, or the well could be damaged.

The cost estimate developed for this no further action alternative assumes operation and maintenance, including replacement of equipment as needed, of the supplemental treatment system which is currently in-place at the Bowling Green Water District.

7.1.3: **Alternative 3: Monitored Natural Attenuation, Assessment and Contingent Remediation**

Present Worth:	*$2,326,000*
Capital Cost:	*$ 230,000*
Annual O&M:	*$ 225,000*
Time to Implement:	*30 years*

Alternative 3, Monitored Natural Attenuation (MNA), Assessment and Contingent Remediation, would combine continued active contaminant source removal and groundwater remediation with long-term monitoring of the natural attenuation processes, and a contingency for active remediation should the long-term monitoring data show this to be necessary.

Alternative 3 would also include all elements as described in Section 7.1.0.

7.1.3.1: **Monitored Natural Attenuation (MNA)**

Natural attenuation processes may include a variety of physical, chemical, or biological processes that, under favorable conditions, act without human intervention to reduce the mass, toxicity, mobility, volume, and/or concentration of contaminants in the groundwater.

The natural attenuation processes may include biological processes such as aerobic or anaerobic biodegradation; physical phenomena such as dispersion, dilution, sorption, and volatilization; and chemical reactions such as hydrolysis and dehydrohalogenation. Natural attenuation processes typically occur at all sites, but to varying degrees of effectiveness depending on the types and concentrations of contaminants present and the physical, chemical, and biological characteristics of the soil and groundwater.

Natural attenuation processes may reduce the potential risk posed by site contaminants in three ways:

1. Transformation of contaminants to less toxic forms through biodegradation or chemical transformations;

2. Reduction of contaminant concentrations through dispersion, dilution and volatilization whereby potential exposure levels may be reduced; and,

3. Reduction of contaminant mobility and bioavailability through sorption onto the soil.

7.1.3.2: **Assessment**

Although MNA would not include an active treatment of the contaminated off-site groundwater, it would include the monitoring and evaluation of natural attenuation processes in the subsurface that can diminish contaminant concentrations in groundwater.

The long-term monitoring program would include a total of 24 monitoring wells, 13 existing and 9 new wells, at locations south of the NCIA. Please see Alternative 2 for the rationale for this long-term monitoring program.

For preparation of the cost estimate it is assumed that the 24 monitoring wells would be sampled quarterly during the first two years, semi-annually for the next three years and every fifth quarter for years 6-20. These assumptions were used for cost estimation purposes, however, the actual monitoring schedule would be determined during the design process. The continued need for monitoring would be re-evaluated at any time during the project time frames. The long-term MNA monitoring program would test for and track the following parameters: VOCs including potential VOC transformation compounds, total organic carbon (TOC), carbon dioxide, electron acceptors (such as dissolved oxygen, nitrate, sulfate, ferrous iron, methane), alkalinity, redox potential, chloride, pH, temperature, and conductivity.

Although a 30-yr time frame has been assumed for comparison purposes, a number of factors should be addressed in the detailed final design of the monitoring program to help define what is a reasonable time frame for long-term monitoring of natural attenuation to take place in the off-site groundwater plumes. For example, records of contaminant concentrations over time would be kept and periodically evaluated to monitor trends. Uncertainties regarding the mass of contaminants in the subsurface and predictive analyses (e.g., remediation time frame, i.e., travel time for contaminants to reach downgradient points of exposure appropriate for the area) would be assessed. In addition, factors relating to the affected drinking water resources and institutional controls would also be monitored. Data would be integrated into a model, which would be developed during the design, to more accurately assess natural attenuation on- and off-site. The final design would also better define the locations and number of wells to be included in the long-term MNA monitoring program.

7.1.3.3: **Contingent Remediation**

A technical assessment of acquired data would be conducted annually. If it is determined that additional remediation is necessary to protect human health and the environment, and in particular to protect the Bowling Green Water District supply wells, an appropriate remediation system would be designed and implemented.

After operating the off-site groundwater remediation system within the NCIA north of Old Country Road for one year, the following procedures and criteria would be used in determining if the off-site groundwater contamination downgradient of Old Country Road needs to be actively remediated:

- Bowling Green Water District supply wells would continue to be monitored twice a month;

- Four (4) early warning monitoring wells (EW 01B, EW 01C, EW 02B, and EW 02C) and nine(9) existing monitoring wells would continue to be monitored on a quarterly basis;

- Nine (9) new monitoring wells will be monitored on a quarterly basis;

- Monitoring results, with a focus on Bowling Green District supply wells and early warning monitoring wells, would be compared with results from the previous sampling events;

- If the monitoring results, especially from Bowling Green District supply wells and early warning monitoring wells, indicate a significant upward trend, all 24 monitoring wells would be re-sampled within 30 days and analyzed for MNA parameters;

- If the re-sampling results indicate a significant increase, all 24 monitoring wells would be re-sampled again within 30 days and analyzed for MNA parameters;

- The NYSDEC, in consultation with the NYSDOH, would evaluate all monitoring data and determine if any active groundwater remediation downgradient of Old Country Road, is required;

- If it is determined that active off-site groundwater remediation is required, it would be implemented in accordance with the following procedure;

- The NYSDEC, in consultation with the NYSDOH, would determine which of the monitoring wells would be converted to treatment wells;

- An active groundwater remediation system for monitoring wells preferred by the NYSDEC and NYSDOH would be proposed to the public in accordance with the 6 NYCRR Part 375 citizen participation requirements; and

- After giving consideration to all public comments, an off-site groundwater remediation system would be selected, designed, constructed and operated;

- If it is determined that active remediation is not required, subsequent sampling of all monitoring wells would be conducted on a quarterly basis until the upward trend is reversed. Once this occurs, long term monitoring would resume.

The capital cost ($230,000) for this alternative includes the installation of nine new groundwater monitoring wells. The calculated present worth cost estimate ($2,326,000) was arrived using the same assumptions as Alternative 2. The cost estimate does not include the cost associated with the implementation of the contingent remedy.

7.1.4: **Alternative 4A: Remediation of Upper Portion of Aquifer (to 125 ft bgs) with In-Well Vapor Stripping/Localized Vapor Treatment**

Present Worth:	*$2,926,000*
Capital Cost:	*$ 964,000*
Annual O&M years 1-7:	*$ 83,000*
Annual O&M years 8-30:	*$ 25,000*
Time to Implement:	*Seven years*

Alternative 4A includes remediating the upper portion (i.e., at depths from the water table to 125 ft bgs) of the off-site groundwater contaminant plumes by implementing in-well vapor stripping, an in-situ remediation technology, and localized off-gas treatment. Alternative 4A would also include all elements as described in Section 7.1.0.

This alternative would further include long-term monitoring of the groundwater plumes, as discussed in Section 7.1.4.2.

7.1.4.1: **In-Well Vapor Stripping**

In-well vapor stripping (also known as in-situ vacuum, vapor, or air stripping) is a demonstrated in-situ physical/chemical treatment alternative for remediating contaminated groundwater, as per EPA's Superfund Innovative Technology Evaluation (SITE) program. This in-well air stripping technology is most applicable to VOCs (such as PCE and TCE). The technology involves the creation of groundwater circulation patterns, or "cells", in the subsurface surrounding specially designed wells and simultaneous aeration within the wells to volatilize VOCs from the circulating groundwater. Contaminated vapors are typically extracted from the wells and treated at the surface, however, unlike conventional groundwater remediation systems, in-well vapor stripping does not require groundwater to be pumped to be treated at the surface. In-well vapor stripping has been used in unconfined and confined aquifers and applied to geologic materials with a range of characteristics. A schematic of the in-well vapor stripping process is shown in Figure 12.

For the NCIA off-site groundwater, Alternative 4A includes the treatment of the contaminated groundwater to a depth of approximately 125 ft bgs via in-well vapor stripping well screened to a maximum depth of 125 ft bgs. This alternative addresses "hot-spot" areas within the off-site contaminant plumes and assumes that natural attenuation would remediate a portion of the off-site groundwater over time. Alternative 4A would include the installation of four (4) circulation/stripping wells (8-in. diameter) to address the off-site groundwater contamination, based on contaminant depths and radii of influence expected to be achieved at each well. Figure 13 shows approximate locations of the stripping wells for Alternative 4A.

As depicted, two different stripping well configurations would be used in Alternative 4A. A total of one 80 ft bgs and three 125 ft bgs wells would be installed within the off-site plumes, at areas of high VOC concentrations. Each well would be mounted flush with the existing ground surface and installed to varying depths, as indicated above. The vertical distances, between the screened intervals in the 80 ft wells and 125 ft wells, are estimated at 20 ft and 55 ft, respectively. Figure 13 also displays the average total VOC concentration contours for groundwater depths of 65-125 ft bgs (from years 1996 – 2000) and the proposed treatment wells, along with approximate radii of influence.

Prior to final design of Alternative 4A, pilot-scale treatability studies should be performed to determine the off-site groundwater remediation time frames and system specifications of the in-well vapor stripping systems. Pilot scale tests would also determine optimal system configurations and design parameters, such as number/location of wells, operating pressures, and flow rates to remove contaminants from the groundwater. The results of a pilot study would also be used to evaluate the airflow distribution and vapor phase treatment approaches. In addition, potential impacts from natural iron and pH in the subsurface could be evaluated. The results of the pilot tests would also be used to better estimate the power requirements of the systems. For this alternative, it was assumed that a total of three in-well vapor stripping pilot tests (i.e., one per off-site contaminant plume) would be conducted.

For cost estimating purposes, it was assumed that the in-well vapor stripping system would run for seven years under Alternative 4A. The actual time frame may differ based on the pilot tests.

7.1.4.2: **Vapor Phase Treatment**

For Alternative 4A, vapors from the in-well vapor stripping processes would be collected from each stripping well and transferred with a vacuum extraction blower to a Granular Activated Carbon (GAC) treatment system within each local vault. The vapors containing VOCs are passed through the GAC medium, adsorbed, and then vented to the atmosphere. The GAC medium would be periodically replaced as its adsorption potential is reached. GAC was selected as the optimal vapor phase treatment option for Alternative 4A based on anticipated flow rates and contaminant concentrations.

7.1.4.3: **System Performance Monitoring**

To confirm that the in-well vapor stripping system described above for Alternative 4A and natural attenuation are achieving remedial objectives, periodic groundwater sampling would be conducted. For cost estimating purposes, it was assumed that groundwater samples would be collected from 13 existing and 9 new monitoring wells in the off-site area and analyzed for VOCs. In addition, periodic monitoring well sampling, as outlined under Alternative 2, would be conducted to ensure that the groundwater treatment system and natural attenuation are remediating the off-site groundwater contaminant plumes. The results of these analyses would be used to determine whether remedial action objectives are being satisfied, and whether changes in system design, configuration, and operation are required. In Alternative 4A, groundwater monitoring is assumed to be conducted quarterly for the first two years after remediation system startup, semi-annually for the next three years and every fifth quarter for years 6-20 (i.e., to cover life of remedial system and thirteen additional years to evaluate natural attenuation). These assumptions were used for cost estimation purposes, however, the actual monitoring schedule would be determined during the design process. The continued need for monitoring would be re-evaluated at any time during the project time frames.

The capital cost ($964,000) for this alternative includes the installation of 9 new groundwater monitoring wells. The calculated present worth cost estimate ($2,926,000) was arrived using the same assumptions as Alternative 2.

7.1.5: **Alternative 4B: Remediation of Upper Portion of Aquifer (to 125 ft bgs) with Groundwater Extraction/Centralized Air Stripping and Vapor Treatment/Effluent Re-Injection**

Present Worth:	*$5,626,000*
Capital Cost:	*$2,954,000*
Annual O&M years 1-2:	*$ 114,000*
Annual O&M years 3-9:	*$ 64,000*
Annual O&M years 9-20:	*$ 14,000*
Time to Implement:	*Nine Years*

Alternative 4B includes the treatment of the contaminated groundwater to a depth of 125 ft bgs via extraction wells. Alternative 4B addresses "hot-spot" areas within the off-site contaminant plumes and assumes that natural attenuation would remediate a portion of the off-site groundwater over time. Alternative 4B would also include all elements as described in Section 7.1.0.

Alternative 4B has been developed to evaluate the feasibility of using a groundwater extraction system to capture the off-site groundwater contamination in the upper portion (i.e., at depths from the water table to 125 ft bgs) of the aquifer and treat it at the surface (i.e., ex-situ) at one centralized treatment plant location. Treatment of the groundwater via air stripping would typically generate an air emission, which would also require treatment to remove vapor phase contaminants. Active source removal and groundwater remediation is completed or in-place or planned at 14 source sites within the NCIA, as previously described.

The objective of groundwater extraction is to draw contaminated groundwater into the capture zone of one or more extraction wells. The flow rate of the extraction well(s) is increased until the capture zone(s) is believed to exceed the contaminated area of concern. The extraction well should ideally be located sufficiently downgradient of the highest contaminated area in the plume so that the majority of the contaminated groundwater would naturally flow into the capture zone. Alternative 4B includes extraction well patterns designed to reduce the VOC concentrations in the off-site groundwater.

7.1.5.1: **Extraction Wells**

Alternative 4B would include the installation of four extraction wells within the contaminant plume. Three 110-ft 6-in diameter steel construction extraction wells with pumping rates of 20 gpm and screened intervals of 90-110 ft bgs and one 80-ft. 6-in diameter steel construction extraction well with a pumping rate of 40 gpm and a screened interval of 60-80 ft bgs would be installed. All extraction wells would be mounted flush with the existing ground surface. This should provide for a maximum treatment depth of about 125 ft bgs. Figure 14 shows a cross-section of a typical extraction well. Figure 15 shows approximate locations of the extraction wells for Alternative 4B. On Figure 15, average total VOC plumes, derived from plume maps for groundwater depths between 65-125 ft bgs, are also shown. The wells were located based on the natural direction of groundwater flow and hydraulic conductivity. The 80-ft extraction well was situated to assist in remediating the elevated VOC levels in the western plume.

An estimate of the remediation time was calculated based on assumptions in aquifer characteristics, well placement, flow rates, and contaminant properties. An estimated time frame for active remediation of 9 years was used for Alternative 4B. Because of the uncertainty in the hydrological parameters (i.e., hydraulic conductivity), the results of this estimation should be confirmed in the design phase, after an aquifer pump

test and a pilot study have been completed. In addition, the pilot study would also help identify potential impacts of the extraction wells on the Bowling Green water supply wells or other remediation systems (i.e., within the NCIA).

7.1.5.2: **Groundwater Treatment and Discharge**

In order to satisfy SCGs, specifically groundwater treatment effluent criteria, the extracted groundwater must be treated to remove groundwater contaminants.

Treatment for Alternative 4B would occur in a central location within the NCIA off-site area, as described above. The exact location and configuration of the central treatment building would be confirmed during the design phase. The central treatment building (approximately 3200 sf) would likely be located to the east of the Bowling Green water supply wells (same location as central treatment building described for other centralized treatment scenarios). The structure size and location shall be confirmed in the final design.

7.1.5.3: **System Performance Monitoring**

For the purposes of this PRAP, it is assumed that the extraction and treatment system for Alternative 4B would operate for nine years. Results of pilot tests should be used to better estimate the Alternative 4B time frame.

In addition, periodic monitoring well sampling, as outlined under Alternative 4A, would be conducted to ensure that the groundwater treatment system and natural attenuation are remediating the off-site groundwater contaminant plumes. The results of these analyses would be used to determine whether remedial action objectives are being satisfied, and whether changes in system design, configuration, and operation are required. The continued need for monitoring would be re-evaluated at any time during the project time frames.

The capital cost ($2,454,000) for this alternative includes the installation of 9 new groundwater monitoring wells. The calculated present worth cost estimate ($5,626,000) was arrived at using the same assumptions as Alternative 2.

7.1.6: **Alternative 5A: Remediation of Upper and Deep Portions of Aquifer (to 200 ft bgs) with In-Well Vapor Stripping/Localized Vapor Treatment**

Present Worth:	*$3,726,000*
Capital Cost:	*$1,290,000*
Annual O&M year 1:	*$ 219,000*
Annual O&M years 2-9:	*$ 100,000*
Annual O&M years 9-20:	*$ 14,000*
Time to Implement:	*Nine Years*

Alternative 5A is very similar to Alternative 4A presented above but utilizes in-well vapor stripping to address contaminated groundwater in both the upper and deep portions of the aquifer. Alternative 5A would also include all elements as described in Section 7.1.0. It addresses "hot-spot" areas within the off-site contaminant plumes and assumes that natural attenuation will remediate a portion of the off-site groundwater

over time. Figure 16 shows approximate locations of the stripping wells for Alternative 5A. Figure 16 shows total VOC contaminant plumes (averaged from depths of 65 – 200 ft bgs) from years 1996-2000. Figure 16 displays treatment well radii of influence and portions of the off-site plumes addressed in Alternative 5A.

Alternative 5A includes the installation of three 140-ft and three 200-ft treatment wells to provide groundwater treatment to about 200 ft bgs.

Vapor Phase Treatment and System Performance Monitoring required for Alternative 4A would also be required for Alternative 5A.

For cost estimating purposes, it is assumed that the in-well vapor stripping system would operate for nine years under Alternative 5A.

Pilot studies and field measurements in the design phase of work would more accurately determine the construction details, system operation period, and placement of each of the in-well vapor stripping wells in Alternative 5A, along with specific groundwater circulation/treatment patterns.

The capital cost ($1,290,000) for this alternative includes the installation of 9 new groundwater monitoring wells. The calculated present worth cost estimate ($3,726,000) was arrived at using the same assumptions as Alternative 2.

7.1.7: **Alternative 5B: Remediation of Upper and Deep Portions of Aquifer (to 200 ft bgs) with Groundwater Extraction/Centralized Air Stripping and Vapor Treatment/Effluent Re-Injection**

Present Worth:	*$5,926,000*
Capital Cost:	*$3,126,000*
Annual O&M years 1--2:	*$ 260,000*
Annual O&M years 3-12:	*$ 144,000*
Annual O&M years 13-20:	*$ 14,000*
Time to Implement:	*Twelve Years*

Alternative 5B is similar to Alternative 4B presented above but includes treatment of the contaminated groundwater in both the upper and deep portions of the aquifer. It addresses "hot-spot" areas within the off-site contaminant plumes and assumes that natural attenuation will remediate a portion of the off-site groundwater over time. Alternative 5B would also include all elements as described in Section 7.1.0.

Figure 17 shows approximate locations of the extraction wells and the centralized treatment structure for Alternative 5B. On Figure 17, average total VOC plumes were derived from contaminant plume maps for groundwater at depths of 65-200 ft bgs. As shown, four extraction wells (one 80-ft well and three 150-ft wells) would be included under Alternative 5B, to provide groundwater treatment to a maximum depth of 200 ft bgs. Details and construction of the extraction wells used in Alternative 5B are as described in Alternative 4B. As in Alternative 4B, the bottom 20 ft of each extraction well would be screened. It is assumed under Alternative 5B that the 150-ft extraction wells would remove groundwater contamination from depths as great as 200 ft bgs. This assumption, and final extraction well details, should be confirmed during pilot studies and in the design phase of work. The central treatment building (approximately 3200

sf) would likely be located to the east of the Bowling Green water supply wells (same location as central treatment building described for other centralized treatment scenarios). The structure size and location shall be confirmed in the final design.

For cost estimating purposes in this PRAP, an estimated time frame for active remediation of 12 years was used for Alternative 5B. This 12-year time frame accounts for the fact that extraction wells would be placed only in "hot spot" areas.

7.1.7.1: **System Performance Monitoring**

The long-term monitoring program included in this alternative is intended to assess the effectiveness of groundwater extraction and treatment and natural attenuation on the contaminant levels in the aquifer over time. The monitoring program for Alternative 5B would be identical to that described for Alternative 4A above.

The capital cost ($2,926,000) for this alternative includes the installation of 9 new groundwater monitoring wells. The calculated present worth cost estimate ($5,926,000) was arrived at using the same assumptions as Alternative 2.

7.1.8: **Alternative 6A: Full Plume Remediation of Upper Portion of Aquifer (to 125 ft bgs) with In-Well Vapor Stripping/Localized Vapor Treatment**

Present Worth:	*$3,826,000*
Capital Cost:	*$1,560,000*
Annual O&M years 1-2:	*$ 197,000*
Annual O&M years 3-5:	*$ 125,000*
Annual O&M years 6-20:	*$ 14,000*
Time to Implement:	*5 years*

Alternative 6A is similar to Alternative 4A presented above (i.e., addresses contamination in the upper portion of the aquifer with in-well vapor stripping) but includes the full capture and treatment of contaminated off-site groundwater to the designated depths to achieve Class GA groundwater criteria. Alternative 6A would also include all elements as described in Section 7.1.0.

Figure 18 shows approximate locations of the stripping wells for Alternative 6A. In addition to 80-ft and 125-ft treatment wells that provide groundwater treatment to about 125 ft bgs, containment stripper wells (installed to 150 ft bgs) would also be employed under this alternative along the southern extent of the contamination (i.e., curtain wall) to achieve remedial objectives. Figure 18 also shows average total VOC contaminant plumes (years 1996-2000) for depths of 65-125 ft bgs and displays treatment well locations and radii of influence and portions of the off-site plumes addressed in Alternative 6A.

Alternative 6A includes the installation of one 80-ft stripper well, three 125-ft stripper wells, and five 150-ft containment wells. Pilot studies and field measurements in the design phase of work would more accurately determine the construction details and placement of each of the in-well vapor stripping wells in Alternative 6A, along with the specific groundwater circulation/treatment patterns.

Prior to the final design of Alternative 6A, pilot-scale treatability studies would be performed to determine the off-site groundwater remediation time frame and specifications of the in-well vapor stripping system. Any potential effects from in-well vapor stripping on the Bowling Green water supply wells or other remediation systems (i.e., within the NCIA) would also be evaluated. For this PRAP, it was assumed that a total of three in-well vapor stripping pilot tests (i.e., one per off-site contaminant plume) would be conducted under Alternative 6A. It was also assumed that a full-time in-well vapor stripping system operator would be required. For the Alternative 6A cost estimate, an operation period of 5 years was assumed.

7.1.8.1: **System Performance Monitoring**

To confirm that the in-well vapor stripping system described above for Alternative 6A is achieving remedial objectives, periodic groundwater sampling would be conducted, in the same fashion as described for Alternative 4A above. The results of these analyses will be used to determine whether remedial action objectives are being satisfied, and whether changes in system design, configuration, and operation are required.

The capital cost ($1,560,000) for this alternative includes the installation of 9 new groundwater monitoring wells. The calculated present worth cost estimate ($3,826,000) was arrived at using the same assumptions as Alternative 2.

7.1.9: **Alternative 6B: Full Plume Remediation of Upper Portion of Aquifer (to 125 ft bgs) with Groundwater Extraction/Centralized Air Stripping and Vapor Treatment/Effluent Re-Injection**

Present Worth:	*$7,726,000*
Capital Cost:	*$4,474,000*
Annual O&M years 1-2:	*$ 475,000*
Annual O&M years 3-7:	*$ 249,000*
Annual O&M years 7-20:	*$ 14,000*
Time to Implement:	*Seven Years*

Alternative 6B is similar to Alternative 4B presented above (i.e., addresses contamination in the upper portion of the aquifer with a pump and treat system) but includes the full capture and treatment of contaminated off-site groundwater to the designated depths to achieve Class GA groundwater criteria. Alternative 6B would also include all elements as described in Section 7.1.0.

Figure 19 shows approximate locations of the extraction wells and the centralized treatment structure for Alternative 6B. On Figure 19, average total VOC plumes were derived from contaminant plume maps for groundwater at depths of 65-125 ft bgs. As shown, twelve extraction wells (one 80-ft well and eleven 110-ft wells) would be included under Alternative 6B to provide groundwater treatment to about 125 ft bgs. Details and construction of the extraction wells used in Alternative 6B are as described in the other extraction and treatment alternatives. The bottom 20 ft of each extraction well would be screened. The central treatment building (approximately 4000 sf) would likely be located to the east of the Bowling Green water supply wells (same location as central treatment building described for other extraction and treatment alternatives). The structure size and location shall be confirmed in the final design.

For cost estimating purposes in this FS, an operation time of 7 years is assumed for Alternative 6B. This estimated remediation time should be confirmed after an aquifer pump test establishes better values for the hydrological parameters.

7.1.9.1: **System Performance Monitoring**

The long-term monitoring program included in this alternative is intended to assess the effectiveness of groundwater extraction and treatment on the contaminant levels in the aquifer over time. Monitoring would consist of system performance monitoring and effluent quality monitoring. For Alternative 6B, during the first three months that the treatment plant is in operation, VOC samples would be collected from the equalization tank and the effluent pipe once per week to evaluate the efficiency and effectiveness of the treatment plant. The effluent sample analysis would be used to demonstrate that all discharge requirements are being met. For the remainder of the project lives of the alternatives, VOC sampling at each of the influent pipes and the single effluent pipe at the treatment plant would be collected once per month. Samples would be analyzed for conventional parameters (e.g., pH, solids, and alkalinity) as well as VOC content.

To confirm that the groundwater extraction/air stripping system described above for Alternative 6B is achieving the remedial objectives, groundwater sampling would be conducted in the same fashion as described for Alternative 4A. The results of these analyses would be used to determine whether remedial action objectives are being satisfied, and whether changes in system design, configuration, and operation are required.

The capital cost ($4,474,000) for this alternative includes the installation of 9 new groundwater monitoring wells. The calculated present worth cost estimate ($7,726,000) was arrived at using the same assumptions as Alternative 2.

7.1.10: **Alternative 7A: Full Plume Remediation of Upper and Deep Portions of Aquifer (to 200 ft bgs) with In-Well Vapor Stripping/Localized Vapor Treatment**

Present Worth:	*$5,026,000*
Capital Cost:	*$2,234,000*
Annual O&M years 1-2:	*$ 183,000*
Annual O&M years 3-7:	*$ 133,000*
Annual O&M years 8-20:	*$ 14,000*
Time to Implement:	*Seven Years*

Alternative 7A is similar to Alternative 5A presented above (i.e., addresses contamination in the upper and deep portions of the aquifer with in-well vapor stripping) but includes the full capture and treatment of contaminated off-site groundwater to the designated depths to achieve Class GA groundwater criteria. Alternative 7A would also include all elements as described in Section 7.1.0.

Figure 20 shows approximate locations of the stripping wells for Alternative 7A. Treatment and containment wells (installed to 140 ft, 200 ft, and 225 ft bgs) would be employed under this alternative to achieve remedial objectives. Groundwater upgradient of the Bowling Green water supply wells would be treated to about 200 ft bgs. Figure 20 shows average total VOC contaminant plumes (years 1996-2000) for

depths of 65-200 ft bgs. Figure 20 displays treatment well locations and radii of influence and portions of the off-site plumes addressed in Alternative 7A.

Alternative 7A includes the installation of four 140-ft stripper wells, four 200-ft stripper wells, and five 225-ft containment wells. Pilot studies and field measurements in the design phase of work would more accurately determine the construction details and placement of each of the in-well vapor stripping wells in Alternative 7A, along with the specific groundwater circulation/treatment patterns expected to result.

Prior to the final design of Alternative 7A, pilot-scale treatability studies should be performed to determine the off-site groundwater remediation time frame and specifications of the in-well vapor stripping system. It was assumed that a total of three in-well vapor stripping pilot tests (i.e., one per off-site contaminant plume) would be conducted under Alternative 7A. It was also assumed that a full-time system operator would be needed. For the Alternative 7A cost estimate, a project life of 7 years was assumed.

7.1.10.1: **System Performance Monitoring**

To confirm that the in-well vapor stripping system described above for Alternative 7A is achieving remedial objectives, periodic groundwater sampling would be conducted as outlined in Alternative 4A. The results of these analyses would be used to determine whether remedial action objectives are being satisfied, and whether changes in system design, configuration, and operation are required. The continued need for monitoring would be re-evaluated at any time during the project time frames.

The capital cost ($2,234,000) for this alternative includes the installation of 9 new groundwater monitoring wells. The calculated present worth cost estimate ($5,026,000)was arrived at using the same assumptions as Alternative 2.

7.1.11: **Alternative 7B: Full Plume Remediation of Upper and Deep Portions of Aquifer (to 200 ft bgs) with Groundwater Extraction/Centralized Air Stripping and Vapor Treatment/Effluent Re-Injection**

Present Worth:	*$8,812,000*
Capital Cost:	*$4,877,000*
Annual O&M years 1-2:	*$ 400,000*
Annual O&M years 3-10:	*$ 320,000*
Annual O&M years 11-20:	*$ 14,000*
Time to Implement:	*Ten Years*

Alternative 7B is similar to Alternative 5B presented above (i.e., addresses contamination in the upper and deep portions of the aquifer with a pump and treat system) but includes the full capture and treatment of contaminated off-site groundwater to the designated depths to achieve Class GA groundwater criteria. Alternative 7B would also include all elements as described in Section 7.1.0.

Figure 21 shows approximate locations of the extraction wells and the centralized treatment structure for Alternative 7B. On Figure 21, average total VOC plumes were derived from contaminant plume maps for groundwater at depths of 65-200 ft bgs. As shown, thirteen extraction wells (one 80-ft well and twelve 150-ft wells) are included under Alternative 7B to provide groundwater treatment to about 200 ft bgs. Details and construction of the extraction wells used in Alternative 7B are as described in the other extraction and

treatment alternatives. The bottom 20 ft of each extraction well would be screened. It is assumed under Alternative 7B that the 150 ft extraction wells would remove groundwater contaminants from depths as great as 200 ft bgs. This assumption, and final extraction well details, should be confirmed during pilot studies and in the final design phase of work. The central treatment building (approximately 4000 sf) would likely be located to the east of the Bowling Green water supply wells (same location as central treatment building described for other pump and treat alternatives). The structure size and location shall be confirmed in the final design.

As for the other groundwater extraction/air stripping scenarios presented, aquifer pump tests and pilot studies (i.e., one per plume) in the design phase of work would more accurately determine the construction details and placement of each of the extraction wells and recharge wells in Alternative 7B.

The treatability/pilot studies would help to evaluate the ability of the treatment processes to meet discharge requirements near the treatment building. Pilot studies can also help determine re-injection schedules and potential impacts of re-injection on the Bowling Green water supply wells or other remediation systems (i.e., within the NCIA). If discharge limitations are not satisfied, polishing via carbon adsorption may be necessary. The treated effluent will be periodically monitored to ensure that discharge limits are met.

For cost estimating purposes in this PRAP, a project life of 10 years is assumed for Alternative 7B. Although overall flow rates and numbers of extraction wells are similar to the Alternative 6B scenario, a longer project life was assumed for Alternative 7B since greater quantities of contaminated groundwater are addressed. This estimated remediation time should be confirmed after an aquifer pump test establishes better values for the hydrological parameters.

7.1.11.1: **System Performance Monitoring**

The long-term monitoring program included in this alternative is intended to assess the effectiveness of groundwater extraction and treatment on the contaminant levels in the aquifer over time. Monitoring would consist of system performance monitoring and effluent quality monitoring. For Alternative 7B, during the first three months that the treatment plant is in operation, VOC samples would be collected from the equalization tank and the effluent pipe once per week to evaluate the efficiency and effectiveness of the treatment plant. The effluent sample analysis would be used to demonstrate that all discharge requirements are being met. For the remainder of the project lives of the alternatives, VOC sampling at each of the influent pipes and the single effluent pipe at the treatment plant would be collected once per month. Samples will be analyzed for conventional parameters (e.g., pH, solids, and alkalinity) as well as VOC content.

To confirm that the groundwater extraction/air stripping system described above for Alternative 7B is achieving the remedial objectives, groundwater sampling would be conducted in the same fashion as described for Alternative 4A. The results of these analyses would be used to determine whether remedial action objectives are being satisfied, and whether changes in system design, configuration, and operation are required. The continued need for monitoring would be re-evaluated at any time during the project time frames.

The capital cost ($4,877,000) for this alternative includes the installation of 9 new groundwater monitoring wells. The calculated present worth cost estimate ($8,812,000) was arrived at using same assumptions as Alternative 2.

7.1.12: **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**

Present Worth:	*$6,500,000*
Capital Cost:	*$3,500,000*
Annual O&M years 1-7:	*$ 200,000*
Annual O&M years 8-20:	*$ 15,000*
Time to Implement:	*Seven Years*

Alternative 8 is similar to Alternative 7A presented above (i.e., it addresses contamination in the upper and deep portions of the aquifer with in-well vapor stripping) but includes the full capture and treatment of contaminated off-site groundwater to greater designated depths to achieve Class GA groundwater standards. Alternative 8 would also include all elements as described in Section 7.1.0.

Figure 22 shows approximate locations of the stripping wells for Alternative 8. Treatment and containment wells (installed to 140 ft, 225 ft and 250 ft bgs) would be employed under this alternative to achieve remedial objectives. Figure 22 shows average total VOC contaminant plumes (years 1996-2000) for depths of 65-200 ft bgs. Figure 22 also displays treatment well locations and radii of influence and portions of the off-site plumes addressed in Alternative 8.

Under this alternative, the groundwater contaminant plume would be treated in-situ using a series of groundwater circulation wells (also referred to as in-well stripping systems) to capture and circulate groundwater within the aquifer. The figure shows approximate locations of the stripping wells. Stripping wells (installed to 140 ft, 225 ft, and 250 ft bgs) would be employed under this alternative to achieve remedial objectives. Groundwater upgradient of the Bowling Green water supply wells will be treated to about 225 ft bgs.

Alternative 8 includes the treatment of the contaminated off-site groundwater via eleven in-well vapor stripping wells. This includes the installation of three 140-ft stripper wells, four 225-ft stripper wells, and four 250-ft containment wells. Pilot studies and field measurements in the design phase of work would more accurately determine the construction details, radii of influence and optimum placement of each of the in-well vapor stripping wells, along with the specific groundwater circulation/treatment patterns expected to result. In-well vapor stripping treatment systems can be designed to recirculate treated water, thus avoiding a decrease in groundwater levels in the areas being treated.

The groundwater circulation well system creates in-situ vertical groundwater circulation cells by drawing groundwater from an aquifer formation through one screen section of a double-screened well and discharging it through the second screen section. While groundwater circulates in and out of the stripping cell, no groundwater is removed from the ground. The upward groundwater flow experienced within a cell is achieved via an air-lift effect using a blower. Bubbling air within a cell creates a hydrostatic head gradient along the well bore which drives aerated water out of the upper well screen while simultaneously drawing groundwater in through the lower screen. The density gradient between the well bore fluid (air and water mixture) with the formation water creates the driving force for groundwater circulation. The air would capture the VOC contamination. For illustrative purposes, a schematic diagram of the Density Driven Convection (DDC) type in-well stripping system is included in Figure 12.

The wellhead of each well would be connected to a vacuum blower, which would collect the air from the air-groundwater mixture by providing a negative pressure in the section of the well above the upper screen. One vacuum blower would be required for each of the three well systems. The blower would direct the air to a granulated activated carbon (GAC) filtration system, which would remove the VOCs from the air. The air would then be discharged into the atmosphere.

Prior to the final design, pilot-scale treatability studies should be performed to determine the off-site groundwater remediation time frame and specifications of the in-well vapor stripping system. It was assumed that a total of three in-well vapor stripping pilot tests (i.e., one per off-site contaminant plume) would be conducted. It was also assumed that a full-time system operator would be needed. A project life of seven years was assumed.

If, for engineering or economic reasons, in-situ treatment should prove to be less practical, ex-situ treatment (treatment at the surface, possibly at a centralized location) would be substituted without impairing the overall effectiveness of treatment system. The central treatment building (approximately 4000 sf) would likely be located to the east of the Bowling Green water supply wells (same location as central treatment building described for other pump and treat alternatives). The structure size and location would be confirmed in the final design.

7.1.12.1: **System Performance Monitoring**

To confirm that the in-well vapor stripping described above for Alternative 8 is achieving remedial objectives, periodic groundwater sampling would be conducted as outlined in Alternative 4A. The results of these analyses would be used to determine whether remedial action objectives are being satisfied, and whether changes in system design, configuration, and operation are required. The continued need for monitoring would be re-evaluated at any time during the project time frame.

The capital cost ($3,500,000) for this alternative includes the installation of 9 new groundwater monitoring wells. The calculated present worth cost estimate ($6,500,000) was arrived at using the same assumptions as Alternative 2.

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 follows.

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.

Institutional control measures included in all Alternatives (1, 2, 3, 4A, 4B, 5A, 5B, 6A, 6B, 7A, 7B and 8) would protect human health by preventing human contact with the contaminants that would remain in the off-site groundwater. While the potential for human exposure to the contaminants in the groundwater would

remain, treatment of the groundwater (i.e., air stripping and GAC adsorption) by the Bowling Green Water District prior to distribution into the public water supply system would prevent exposure to groundwater contaminants. In Alternatives 2 and 3, the off-site contamination may continue to impact the surrounding environment through the groundwater. Protection of human health would be provided through institutional controls. Alternative 3 would provide protection of human health and the environment by institutional controls combined with the option of active remediation should assessment of the groundwater monitoring data show that this is necessary. Alternatives 4A, 4B, 5A, 5B, 6A, 6B, 7A , 7B and 8 would all offer varying degrees of protection of human health and the environment through active remediation of off-site groundwater contamination.

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 NYSDEC has determined to be applicable on a case-specific basis.

Removal of the contaminant source at the sites will prevent further release of contamination into the groundwater. NYSDEC believes that once all individual site remedies discussed above are implemented, all the sources of groundwater contamination will be eliminated and further migration of the contaminant plumes will be controlled.

Since Alternative 1 does not include an active remedial measure or long-term monitoring for off-site groundwater, it is unlikely that NYSDEC Class GA groundwater standards would be achieved. Alternative 2 also does not provide for any active remedial measure, however, Alternative 2 includes long-term monitoring which would enable NYSDEC to determine if Class GA standards are achieved within a reasonable time frame. Alternative 3 provides for implementation of an active groundwater remedial measure if groundwater monitoring indicates that active remediation is required. Alternative 3 would also provide data to assess the extent of attenuation due to natural processes such as bio-degradation, dispersion, dilution, sorption and volatilization. Alternatives 4A, 4B, 5A, 5B, 6A, 6B, 7A, 7B and 8 all provide for active groundwater treatment and would therefore comply with NYSDEC Class GA groundwater standards within a reasonable time frame. Alternatives 6A, 6B, 7A ,7B and 8 would comply with NYSDEC Class GA groundwater standards earlier than Alternatives 4A, 4B, 5A and 5B. Alternative 8 would offer the most rapid and complete compliance with NYSDEC Class GA groundwater standards.

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.

Alternatives 1 and 2 would take the longest time to meet the remedial goals because of their lack of active remediation. The estimated implementation time to meet the remedial goals under Alternative 3 would be nine years if active remediation was implemented. Alternatives 4A and 4B have and estimated implementation time of seven and nine years, respectively. Alternatives 5A and 5B would also meet the remedial goals within a reasonable time frame, with estimated implementation times of 9 and 12 years, respectively. Alternatives 6A

and 6B would meet the remedial goals in a timely fashion, with implementation times of 5 and 7 years, respectively, and Alternatives 7A, 7B and 8 would reach the remedial goals within a time frame of 7 and 10 years, respectively.

Alternatives 1 and 2 would have no impact on workers or the community since there would be no construction required. Alternative 3 would have an impact on workers or the community only if the contingency were implemented. Alternatives 4A, 4B, 5A, 5B, 6A, 6B, 7A, 7B and 8 would have some impact on workers and the public during construction. These alternatives would have a significant impact on the immediate residential areas where the off-site remedies are to be constructed.

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.

Alternative 1 would rely on institutional controls and assumed natural attenuation for long term effectiveness. Without monitoring to determine the extent of natural attenuation, it would be difficult to assess the adequacy of the institutional controls. Therefore, Alternative 1 would provide poor long term effectiveness. Alternatives 2 and 3 would provide long term monitoring in addition to institutional controls. Alternative 3, however, would provide a mechanism for requiring additional groundwater controls should the long term monitoring show active remediation to be necessary. This approach would ensure long term effectiveness. Like Alternative 3, all the remaining Alternatives (4A through 8) would provide long term effectiveness through active remediation. Alternatives 5A and 5B and 7A and 7B, which allow for treatment to about 125-200 ft bgs, and Alternative 8, which provides treatment to a depth of 225 ft bgs, are likely to provide better long term effectiveness than Alternatives 4A and 4B and 6A and 6B, which provide active remediation to shallower depths.

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.

Alternatives 1 and 2 would provide no reduction of the toxicity, mobility or volume of the contaminant plumes. Alternative 3 would provide a reduction of all three factors if the contingent remedy was implemented. Alternatives 4A and 4B would provide good reduction in toxicity and volume, with some reduction in mobility. Alternatives 5A and 5B would improve on 4A and 4B in all three categories. Alternatives 6A and 6B would provide better mobility reduction that 4A and 4B, combined with volume and toxicity reductions comparable to those achieved in 4A and 4B. Alternatives 7A, 7B and 8 would provide the most reduction of mobility, toxicity and volume of contaminated groundwater.

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.

All of the options considered would be technically and administratively feasible. Of the active options, it is likely that Alternatives 4A, 5A, 6A and 7A and 8 are more easily implemented than 4B, 5B, 6B and 7B. This is because Alternatives 4B, 5B, 6B and 7B require centralized, above ground extraction and treatment systems, and a network of piping from the treatment wells to the centralized treatment facilities, which are not required for Alternatives 4A, 5A, 6A, 7A and 8. Vendor availability may effect the implementability of options 4A, 5A, 6A, 7A and 8. Alternative 8, however, allows for an alternative approach in the event that these difficulties arise. In addition, implementation of Alternatives, 4A, 4B, 5A, 5B, 6A, 6B, 7A, 7B and 8 would require the location of extraction wells, treatment wells and treatment facilities within the densely populated residential neighborhood.

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 6.

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 NYSDEC 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 SELECTED REMEDY

Based on the results of the RI/FS, and the evaluation presented in Section 7, the NYSDEC has selected 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 as the remedy for OU3 - Off-site Groundwater that has migrated from the NCIA sites. The elements of this remedy are described at the end of this section.

Alternative 8 has been selected because, as described below, it satisfies the threshold criteria and provides the best balance of the primary balancing criteria described in Section 7.2. It will achieve the remediation goals for the NCIA sites by creating the conditions needed to restore groundwater quality to the extent practicable.

8.1: Application of the Selection Criteria

NYSDEC believes that once all individual site remedies discussed in Section 7 of the ROD are implemented, all the sources of groundwater contamination will be eliminated over a period of time and further migration of the contaminant plumes beyond Old Country Road will be controlled. To address the remainder of the off-site groundwater plumes originating from the NCIA, NYSDEC has selected 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. The selected remedy, discussed in detail in Section 7 of this document, in conjunction with the completed and planned on-site soil and groundwater remedies within the NCIA discussed above, will attain the remediation goals over a reasonable period of time.

This selection is based on the evaluation of the alternatives developed for OU3 of the NCIA sites.

Alternative 1: No Further Action was eliminated since it would not be protective of human health, and would therefore not meet the threshold criteria. Because Alternative 2 does not provide for any active remedial measure, compliance with New York State SCGs is poor, consequently, Alternative 2 is only minimally compliant with the threshold criteria. Alternative 2 is therefore also eliminated from further consideration.

Alternative 3, which provides for no immediate substantive remedial actions, while allowing for future remediation through contingency, provides poor short term effectiveness. Alternatives 4A, 4B, 6A and 6B would not address the full depth of the contaminant plumes, leaving the remaining (deep) groundwater affected by the plume to be remediated only by natural attenuation. Similarly, Alternatives 5A and 5B do not provide sufficient areal coverage. These alternatives, therefore, provide only limited short term effectiveness.

Alternatives 7A, 7B and 8 provide the maximum short term effectiveness.

Alternative 3 would provide adequate long term effectiveness, if necessary, through the activation of the contingency. Alternatives 4A, 4B, 5A, 5B, 6A and 6B would provide some long term effectiveness, however, the limited areas or depths covered by these options would prevent them from achieving full long term effectiveness. Better long term effectiveness would be provided by Alternatives 7A, 7B and 8. Because the information provided by the off-site groundwater monitoring wells shows high levels of contamination at depths of at least 200 ft bgs, and because the western plume probably has little effect on contaminant concentrations in the Bowling Green water supply wells, Alternative 8 provides the best long term effectiveness. Alternative 8 provides for greater treatment depths than the Alternatives 7A and 7B, while providing fewer shallow treatment wells for the western plume.

Similarly, Alternatives 7A, 7B and 8 would provide good reduction of the toxicity, mobility and volume of the contaminant plumes, with Alternative 8 again being the best choice.

All of the options considered would be technically and administratively feasible to implement. Of the active remedial options, it is likely that Alternatives 4A, 5A, 6A, 7A and 8 are more easily implemented than 4B, 5B, 6B and 7B. This is because Alternatives 4B, 5B, 6B and 7B require centralized, above ground extraction and treatment systems, and a network of piping from the treatment wells to the centralized treatment facilities, which are not required for Alternatives 4A, 5A, 6A, 7A and 8. Vendor availability may effect the implementability of Alternatives 4A, 5A, 6A, 7A and 8. Alternative 8 provides the flexibility to adopt a conventional, centralized treatment system should vendor availability prove to present an obstacle.

Costs for the alternatives are provided in Table 6. In general, the costs of each alternative are proportional to the degree to which the other balancing criteria are facilitated. Alternative 8 was considered to be the most appropriate alternative.

The estimated present worth of the selected remedy is $6,500,000. The cost to construct the remedy is estimated at $3,500,000 and the estimated average annual operation, maintenance and monitoring costs is $200,000 for the first seven years, and $15,000 for the following twenty three years.

8.2: Elements of the Selected Remedy

The elements of the selected remedy are as follows:

- A remedial design program to verify the components of the conceptual design and provide the details necessary for the construction, operation, and maintenance and monitoring of the remedial program. Any uncertainties identified during the RI/FS process will be resolved;

- Installation of one 225-ft vapor stripping well with ancillary systems, for the purpose of a pilot study to determine the radius of influence, and the number of additional stripping wells needed;

- Based on the pilot test data, the effectiveness of the in-well vapor stripping system will be evaluated. If, for engineering or economic reasons, in-situ treatment should prove to be less practical, ex-situ extraction and treatment (treatment at the surface, possibly at a centralized location) will be substituted without impairing the overall effectiveness of treatment system;

- Based on the results of the pilot test, design and installation of three additional 225-ft vapor stripping wells, four 200-ft vapor stripping wells, and three 140-ft vapor stripping wells, plus their ancillary systems. The actual number and locations of these wells will be determined by the pilot test results. The wells will be placed approximately as shown in Figure 22, subject to revision due to the results of the pilot test, the final design parameters and access restrictions;

- Operation and maintenance of the treatment system until the remediation goals are achieved or the NYSDEC and NYSDOH determine that further operation of the treatment system is not necessary;

- Continued monitoring of two (2) existing Bowling Green Water District supply wells, located directly downgradient of the NCIA;

- Installation of nine (9) new monitoring wells at locations downgradient of Old Country Road;

- Implementation of a long term groundwater monitoring program requiring quarterly sampling of nine (9) new and thirteen (13) existing groundwater monitoring wells for the first two years and periodically thereafter, and;

- Institutional controls in the form of existing use restrictions limiting the use of groundwater as a potable or process water without necessary water quality treatment as determined by the NCDH from the affected areas.

SECTION 9: HIGHLIGHTS OF COMMUNITY PARTICIPATION

As part of the remedial investigation process, a number of Citizen Participation activities were undertaken to inform and educate the public about conditions at the NCIA sites and the potential remedial alternatives. The following public participation activities were conducted for the sites:

- Repositories for documents pertaining to the NCIA sites were established.

- A public contact list, which included nearby property owners, elected officials, local media and other interested parties, was established.

- A public meeting was held on June 12, 2003 to present and receive comment on the PRAP.

- The period during which the public comments on the PRAP were received was originally from May 29, 2003 through June 30, 2003. This comment period was later extended to July 30, 2003.

- Public information meetings regarding the entire New Cassel Industrial Area were held in May 1995, January 1996, May 1996, October 1996, May 1997, December 1997, May 1998, December 1998, May 1999, September 1999, February 2000, May 2000, January 2001, December 2001 and December 2002.

- A responsiveness summary (Appendix A) was prepared to address the comments received during the public comment period for the PRAP.

Table 1 Summary of Remedial History and Enforcement Status			
Sites Located in Western part of the New Cassel Industrial Area			
Site Number	**Site Name and Location**	**Operable Unit 01 Soil/Source**	**Operable Unit 02 Groundwater**
1-30-043A	IMC Magnetics Site 570 Main Street	SVE has been remediating the on-site soil since Oct. 1997. ROD was issued in Jan. 1998. PRP has performed the investigation and remediation.	ROD was issued in Mar. 2000. In-situ oxidation is the selected remedy. The system was installed in December 2001, and is operating. RI/FS and RD/RA were conducted by the PRP.
1-30-043B	Atlas Graphics Site 567 Main Street	NYSDEC conducted the RI/FS using SSF money. ROD was issued in Feb. 2000. AS/SVE is selected to remediate on-site soil and groundwater. Design and construction of the AS/SVE is being implemented by the PRP. RD/RA consent order was signed by the PRP in Sep. 2000. AS/SVE has been operating since October 2000.	On-site groundwater was addressed under operable unit 01. AS/SVE has been operating since October 2000.
1-30-043P	118-130 Swalm St Site 118-130 Swalm St	FRI/FS consent order was signed by the PRP in Oct. 1998. The original FRI/FS was completed during Summer 2000, with additional work carried out in the summer of 2002. ROD expected September 2003.	On-site groundwater is being addressed under operable unit 01.
1-30-043S	299 Main St Site 299 Main St	FRI/FS consent order was signed by the PRP in May 1999. The RI was completed fall 2001. An IRM requiring soil removal and AS/SVE is scheduled to be completed by August 2003.	On-site groundwater is being addressed under operable unit 01.

Table 1 (cont.) Summary of Remedial History and Enforcement Status			
Sites Located in Central and Eastern parts of the New Cassel Industrial Area			
Site Number	**Site Name and Location**	**Operable Unit 01 Soil/Source**	**Operable Unit 02 Groundwater**
1-30-043C	Tishcon Corp. Site 125 State Street	Contamination sources were removed in Oct. 1997 as an IRM. ROD was issued in Jan. 1998. Remediation conducted in Spring 1999. Site is reclassified to a Class 4 in May 2000. PRP completed the investigation and remediation.	No remediation was necessary.
1-30-043D	Arkwin Industries Site 648,656,662,&670 Main Street 66 Brooklyn Ave	Contaminated soil was excavated in June 1997 as part an IRM. A no further action ROD was issued in Jan. 1998	NYSDEC conducted the RI/FS with SSF money. The RI was completed during Summer 1999. A ROD (AS/SVE) was issued in Dec. 1999. The PRP installed the AS/SVE system in December 2002. The system is currently operating.
1-30-043E	Tishcon Corp. Site 30-36 New York Ave 30-33 Brooklyn Ave	An IRM was completed in Nov. 1997 which removed soil contamination. NYSDEC issued ROD in Jan. 1998. AS/SVE has been in operation since Jan. 2000. The PRP completed the investigation and the remediation.	AS/SVE on-site has been in operation since Jan. 2000. Focused RI/FS for off-site groundwater was finalized in Sept. 1999. ROD for off-site groundwater was issued in Mar. 2000. Selected remedy consisted of installation of AS/SVE. The AS/SVE system is scheduled to be installed in the spring of 2003.
1-30-043H	Utility Manufacturing/Wonder King Site 700-712 Main Street	On-site soils investigation completed in May 1998. An AS/SVE IRM was installed in November 2001, and is currently operating. A ROD for this site, requiring continued operation of the AS/SVE system and no further action, was signed in March 2003.	PRP refused to undertake an off-site groundwater RI/FS. NYSDEC is awaiting State funds to start the RI/FS.

Table 1 (cont.) Summary of Remedial History and Enforcement Status			
Sites Located in Central and Eastern parts of the New Cassel Industrial Area			
Site Number	**Site Name and Location**	**Operable Unit 01 Soil/Source**	**Operable Unit 02 Groundwater**
1-30-043K	Former LAKA Industries Site 62 Kinkel Street	RI finalized in May 1999. ROD was issued in Feb. 2000. Selected remedy consists of excavating the cesspool and removing source area. The State, using SSF money, completed the investigation and remediation.	No remediation was necessary.
1-30-043I	Former Autoline Automotive Site 101 Frost Street	State Funded RI/FS completed in 1998. Remediation set forth by the ROD that was issued in Mar. 2000 involved excavation, off-site disposal, and utilizing SVE. The PRP signed an RD/RA consent order in January 2003.	ROD issued in Mar. 2000 required AS/SVE and an in-well vapor stripping system. The PRP signed an RD/RA consent order in January 2003.
1-30-043L	89 Frost Street Site 89 Frost Street	State Funded RI/FS completed in 1998. Remediation set forth by the ROD that was issued in Mar. 2000 required SVE. The PRP signed an RD/RA consent order in January 2003.	See site no. 1-30-043I.
1-30-043M	Former Applied Fluidics Site 770 Main Street	.State Funded RI/FS completed in 1998. The ROD that was issued in Mar. 2000 required no action.	See site no. 1-30-043I.
1-30-043U	36 Sylvester Street Site 36 Sylvester Street	RI/FS consent order signed in March 2000. An IRM to remove contaminated material was carried out in May 2002. A no further action ROD was signed in March 2003.	No remediation was necessary.

Table 1 (cont.) Summary of Remedial History and Enforcement Status			
Sites Located in Central and Eastern parts of the New Cassel Industrial Area			
Site Number	**Site Name and Location**	**Operable Unit 01 Soil/Source**	**Operable Unit 02 Groundwater**
1-30-043V	Tishcon Corp. Site 29 New York Ave	RI/FS Consent Order signed in March 1999. RI report submitted in Dec. 1999 and an IRM to clean up the cesspool was completed in Aug. 2000. A ROD (no further action) was signed in March 2002.	No remediation was necessary.

Table 2
Nature and Extent of VOC Groundwater Contamination

Western Plume
1996 - 2000 Data

Contaminant of Concern	Range of Detected Concentration North of Old Country Road (ppb)				Range of Detected Concentration South of Old Country Road (ppb)				SCGs (ppb)
	50-99 ft	100-124 ft	125-200 ft	200+ ft	50-99 ft	100-124 ft	125-200 ft	200+ft.	
Trichloroethylene	2 j-73	2 j-8 j	-	-	ND	ND	ND	-	5
Tetrachloroethylene	1 j-96	1 j-4 j	-	-	1 j	ND	ND	-	5
Trichloroethane	1 j-52	3 j	-	-	1 j-2 j	2 j	2 j	-	5
Total VOC's*	1-207	1-38	-	-	1-3	ND	1-3	-	100

Eastern and Central Plumes
1996 - 2000 Data

Contaminant of Concern	Range of Detected Concentration (ppb) North of Old Country Road				Range of Detected Concentration (ppb) South of Old Country Road				SCGS (ppb)
	50-99 ft	100-124 ft	125-200 ft	200+ ft	50-99ft.	100-124 ft	125-200 ft	200+ft.	
Trichloroethylene	2 j-31	42-100	ND	ND	2 j	ND	41-220	9-10	5
Tetrachloroethylene	1 j-160	43-150	52	ND	3 j-11	ND	10-1100 d	-	5
Trichloroethane	2 j-26000 d	3 j-64	ND	ND	1 j-97	ND	6 j-85	-	5
Total VOC's*	2-29227	95-331	58.5	ND	1-158	ND	75.7-1400.6	9-10	

j - Estimated concentration; compound present below quantitation level
d - Concentration recovered from diluted sample
ND - signifies that contaminant was not detected
All depths are below grade surface.
* Total VOCs include chlorinated and non-chlorinated compounds that are listed in the Table

Table 3
Early Warning Monitoring Wells - Sampling Results
EW1B Shallow Well at 164 ft bgs - Flower and Iris Streets

Sampling Date	Contaminant (ppb)					
	PCE	TCE	cis 1,2-DCE	1,1,1-TCA	Vinyl Chloride	TVOC
June 1997	459	216	380	147	ND	1291
Nov. 1997	N/A	N/A	N/A	N/A	N/A	N/A
Nov. 1998	487	197	138	133	ND	1060
April 1999	620	75	63	51	ND	836
Aug. 1999	750	90	ND	56	ND	1002
Jan. 2000	1100 d	150	1 j	85	ND	1401
May 2000	287	140	71	58	<0.5	611
Sept. 2000	986	138	<0.5	67	<0.5	1327
Sept. 2001	630	66	58	40	ND	839
Jan. 2002	1000	120	87	59	ND	1337
April 2002	780	91	64	52	ND	1037
July 2002	640	67	44	41	ND	840
Oct. 2002	ND	830	68	59	ND	1024

j - Estimated concentration; compound present below quantitation level
d - Concentration recovered from diluted sample
N/A - Due to equipment difficulties, sampling of this well was not conducted in November 1997.
ND - signifies that contaminant was not detected
* Total VOCs include chlorinated and non-chlorinated compounds that are listed in the Table

Due to the lack of a standby contractor, sampling was not conducted by the NYSDEC between November 1997 and November 1998.

Table 3 (contd.)
Early Warning Monitoring Wells - Sampling Results
EW1C Deep Well at 516 ft bgs - Flower and Iris Streets

Sampling Date	Contaminant (ppb)					
	PCE	TCE	cis 1,2-DCE	1,1,1-TCA	Vinyl Chloride	TVOC
June 1997	12	ND	3	1	ND	18
Nov. 1997	<0.5	3	<0.5	<0.5	<0.5	3
May 1998	1	6	<0.5	<0.5	<0.5	7
Nov. 1998	ND	9	ND	ND	ND	9
April 1999	ND	ND	ND	ND	ND	ND
Aug. 1999	ND	10	ND	ND	ND	10
Jan. 2000	ND	10	ND	ND	ND	10
May 2000	<0.5	7	<0.5	<0.5	<0.5	7
Sept. 2000	<0.5	9	<0.5	<0.5	<0.5	9
Sept. 2001	ND	12	ND	ND	ND	12
Jan. 2002	0.6	13	ND	ND	ND	13.6
April 2002	5	15	ND	ND	ND	20
July 2002	ND	13	ND	ND	ND	13
Oct. 2002	ND	18	ND	ND	ND	20.5

j - Estimated concentration; compound present below quantitation level
d - Concentration recovered from diluted sample
N/A - Due to equipment difficulties, sampling of this well was not conducted in November 1997.
ND - signifies that contaminant was not detected
* Total VOCs include chlorinated and non-chlorinated compounds that are listed in the Table

Due to the lack of a standby contractor, sampling was not conducted by the NYSDEC between November 1997 and November 1998.

Table 3 (contd.)
Early Warning Monitoring Wells - Sampling Results
EW2B Shallow Well at 142 ft bgs - Aster street

Sampling Date	Contaminant (ppb)					
	PCE	TCE	cis 1,2-DCE	1,1,1-TCA	Vinyl Chloride	TVOC
June 1997	10	79	25	4	ND	169
Nov. 1997	N/A	N/A	N/A	N/A	N/A	N/A
May 1998	28	166	41	13	72	396
Nov. 1998	65	373	79	7	200	757
April 1999	31	220	ND	ND	130	446
Aug. 1999	20	130	ND	ND	53	245
Jan. 2000	10	41	ND	8	6 j	76
May 2000	15	101	15	5	35	221
Sept. 2000	22	130	23	13	50	300
Sept. 2001	20	140	36	85	51	532
Jan. 2002	21	130	25	16	32	261
April 2002	17	100	19	8	245	209
July 2002	21	84	18	5	29	181
Oct. 2002	17	98	19	4	32	182

j - Estimated concentration; compound present below quantitation level
d - Concentration recovered from diluted sample
N/A - Due to equipment difficulties, sampling of this well was not conducted in November 1997.
ND - signifies that contaminant was not detected
* Total VOCs include chlorinated and non-chlorinated compounds that are listed in the Table

Due to the lack of a standby contractor, sampling was not conducted by the NYSDEC between November 1997 and November 1998.

Table 3 (contd.)
Early Warning Monitoring Wells - Sampling Results
EW2C Deep Well at 514 ft bgs - Aster Street

Sampling Date	Contaminant (ppb)					
	PCE	TCE	cis 1,2-DCE	1,1,1-TCA	Vinyl Chloride	TVOC
June 1997	ND	ND	ND	ND	ND	2
Nov. 1997	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
May 1998	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nov. 1998	ND	1	ND	ND	ND	1
April 1999	ND	ND	ND	ND	ND	ND
Aug. 1999	ND	ND	ND	ND	ND	ND
Jan. 2000	ND	ND	ND	ND	ND	ND
May 2000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Sept. 2000	<0.5	<0.5	<0.5	<0.5	<0.5	<0..5
Sept. 2001	ND	ND	ND	ND	ND	ND
Jan. 2002	ND	ND	ND	ND	ND	ND
April 2002	ND	ND	ND	ND	ND	ND
July 2002	1	ND	ND	ND	ND	1
Oct. 2002	ND	ND	ND	ND	ND	ND

j - Estimated concentration; compound present below quantitation level
d - Concentration recovered from diluted sample
N/A - Due to equipment difficulties, sampling of this well was not conducted in November 1997.
ND - signifies that contaminant was not detected
* Total VOCs include chlorinated and non-chlorinated compounds that are listed in the Table

Due to the lack of a standby contractor, sampling was not conducted by the NYSDEC between November 1997 and November 1998.

Table 4
Monitoring Wells - Sampling Results

MW-1 (90 ft bgs)						
Sampling Date	Contaminant (ppb)					
	PCE	TCE	cis- 1,2 DCE	1,1,1-TCA	Vinyl Chloride	TVOC
Nov. 2001	4	21	1	8	ND	53
Jan. 2002	3	16	1	4	ND	34
April 2002	9	52	3	10	ND	105
July 2002	9	55	3	10	ND	106
Oct. 2002	13	79	5	15	ND	169

MW-2 (130 ft bgs)						
Sampling Date	Contaminant (ppb)					
	PCE	TCE	cis- 1,2 DCE	1,1,1-TCA	Vinyl Chloride	TVOC
Nov. 2001	49	580	48	230	ND	1598
Jan. 2002	53	500	35	220	ND	1393
April 2002	52	450	42	210	ND	1382
July 2002	26	190	17	75	ND	552
Oct. 2002	50	360	39	140	ND	1113

MW-3 (150 ft bgs)						
Sampling Date	Contaminant (ppb)					
	PCE	TCE	cis- 1,2 DCE	1,1,1-TCA	Vinyl Chloride	TVOC
Nov. 2001	67	1200	54	350	ND	2822
Jan. 2002	74	1000	40	350	ND	2490
April 2002	28	490	25	160	ND	1273
July 2002	70	920	40	270	ND	2190
Oct. 2002	22	322	21	107	ND	823

ND - signifies that contaminant was not detected

Table 4 (contd.)
Monitoring Wells - Sampling Results

MW-4 (200 ft bgs)						
Sampling Date	Contaminant (ppb)					
	PCE	TCE	cis- 1,2 DCE	1,1,1-TCA	Vinyl Chloride	TVOC
Nov. 2001	150	1000	82	350	ND	3015
Jan. 2002	130	790	64	280	ND	2301
April 2002	38	550	43	180	ND	1576
July 2002	77	4809	38	170	ND	1496
Oct. 2002	130	895	44	320	ND	2652

MW-5 (90 ft bgs)						
Sampling Date	Contaminant (ppb)					
	PCE	TCE	cis- 1,2 DCE	1,1,1-TCA	Vinyl Chloride	TVOC
Nov. 2001	4	3	ND	15	ND	34
Jan. 2002	16	2	0.5	15	ND	46
April 2002	25	2	1	4	ND	36
July 2002	19	1	6	3	ND	31
Oct. 2002	9	7	12	7	ND	45

MW-6 (130 ft bgs)						
Sampling Date	Contaminant (ppb)					
	PCE	TCE	cis- 1,2 DCE	1,1,1-TCA	Vinyl Chloride	TVOC
Nov. 2001	80	93	22	240	ND	761
Jan. 2002	37	54	13	80	ND	301
April 2002	68	43	9	96	ND	351
July 2002	47	51	9	90	ND	330
Oct. 2002	60	59	21	122	ND	428

ND - signifies that contaminant was not detected

Table 4 (contd.)
Monitoring Wells - Sampling Results

MW-7 (110 ft bgs)						
Sampling Date	**Contaminant (ppb)**					
	PCE	**TCE**	**cis- 1,2 DCE**	**1,1,1-TCA**	**Vinyl Chloride**	**TVOC**
Nov. 2001	5	2	23	ND	ND	31
Jan. 2002	6	2	18	0.5	ND	29
April 2002	4	3	15	0.6	ND	24
July 2002	6	8	18	2	ND	40
Oct. 2002	ND	4	22	0.5	ND	28

MW-8 (140 ft bgs)						
Sampling Date	**Contaminant (ppb)**					
	PCE	**TCE**	**cis- 1,2 DCE**	**1,1,1-TCA**	**Vinyl Chloride**	**TVOC**
Nov. 2001	1	1	2	1	ND	6
Jan 2002	1	2	2	1	ND	9
April 2002	1	ND	2	1	ND	7
July 2002	1	1	2	ND	ND	5
Oct. 2002	2	2	4	1	ND	13

MW-9 (300 ft bgs)						
Sampling Date	**Contaminant (ppb)**					
	PCE	**TCE**	**cis- 1,2 DCE**	**1,1,1-TCA**	**Vinyl Chloride**	**TVOC**
July 2002	1	15	1	2	ND	20
Oct 2002	1	21	1	2	ND	27

ND - signifies that contaminant was not detected

Table 5
Bowling Green Water Supply Wells
Maximum Annual Concentration (ppb)

WELL #1 (Screened from 480 to 530 ft bgs)

Date	PCE	TCE	cis 1,2- DCE	1,1,1-TCA	Vinyl Chloride	TVOC
1992	2	13	1	2	<0.5	20.5
1993	1	3	<0.5	1	<0.5	6.5
1994	4	11	2	5	<0.5	26.5
1995	5	26	2	5.5	<0.5	44.0
1996	7	26	2	8	<0.5	52.5
1997	6	30	2	9	<0.5	61.0
1998	6	31	2	9	<0.5	66.0
1999	7	51	2	8	<0.5	86.0
2000	14	43	1	7	<0.5	87.0
2001	20	79	8	8	<0.5	136.0
2002	26	65	1	5	<0.5	117.0

WELL #2 (screened from 520 to 570 ft bgs)

Date	PCE	TCE	cis 1,2- DCE	1,1,1-TCA	Vinyl Chloride	TVOC
1992	<0.5	9	<0.5	<0.5	<0.5	9.0
1993	0.5	10	<0.5	<0.5	<0.5	11.5
1994	1	13	<0.5	<0.5	<0.5	14.5
1995	1	20	<0.5	1	<0.5	23.0
1996	2	21	1	1	<0.5	25.5
1997	1	24	<0.5	1	<0.5	27.0
1998	3	42	1	1	<0.5	47.5
1999	4	33	1	2	<0.5	40.0
2000	3	34	1	1	<0.5	39.5
2001	8	62	32	3	<0.5	106
2002	9	55	1	2	<0.5	69

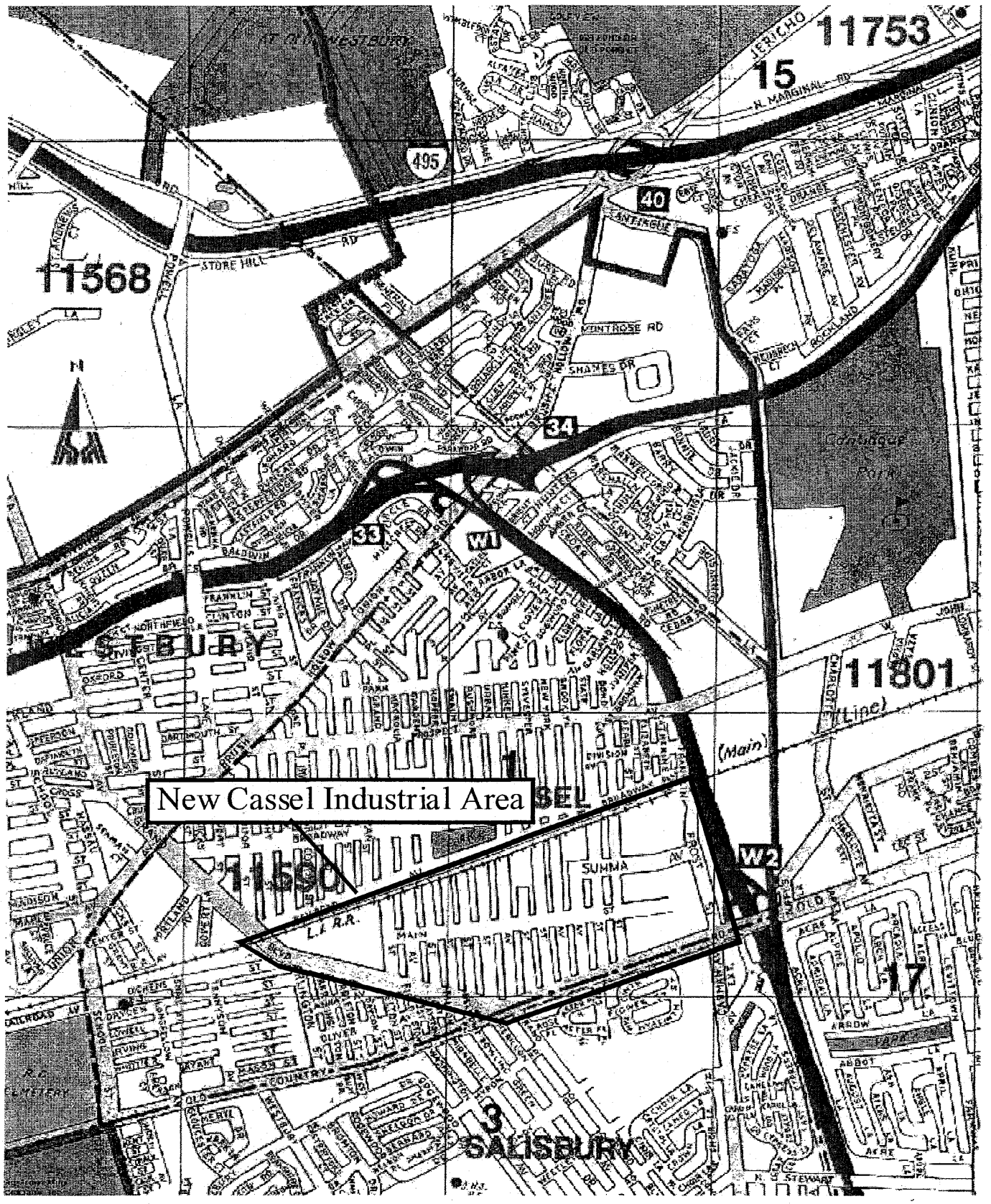
TVOCs include chlorinated and non-chlorinated compounds that are listed in the Table

Table 6
Comparison of Alternative Cost

Remedial Alternative	Time To Implement (years)	Total Present Worth ($)	Capital Cost ($)
1. No Further Action	30	1,500,000	0
2. Long Term Monitoring	30	2,326,000	230,000
3. Monitored Natural Attenuation, Assessment, and Contingent Remediation	30	2,326,000	230,000
4A. Remediation of Upper Portion of Aquifer (to 125 ft bgs) with In-Well Vapor Stripping/Localized Vapor Treatment	7	2,926,000	964,000
4B. Remediation of Upper Portion of Aquifer (to 125 ft bgs) with Groundwater Extraction/Centralized Air Stripping & Vapor Treatment/Effluent Re-Injection	9	5,626,000	2,954,000
5A. Remediation of Upper & Deep Portions of Aquifer (to 200 ft bgs) with In-Well Vapor Stripping/Localized Vapor Treatment	9	3,726,000	1,290,000
5B. Remediation of Upper & Deep Portions of Aquifer (to 200 ft bgs) with Groundwater Extraction/Centralized Air Stripping & Vapor Treatment/Effluent Re-Injection	12	5,926,000	3,126,000
6A. Full Plume Remediation of Upper Portion of Aquifer (to 125 ft bgs) with In-Well Vapor Stripping/Localized Vapor Treatment	5	3,826,000	1,560,000
6B. Full Plume Remediation of Upper Portion of Aquifer (to 125 ft bgs) with Groundwater Extraction/Centralized Air Stripping & Vapor Treatment/Effluent Re-Injection	7	7,726,000	4,474,000
7A. Full Plume Remediation of Upper & Deep Portions of Aquifer (to 200 ft bgs) with In-Well Vapor Stripping/Localized Vapor Treatment	7	5,026,000	2,234,000
7B. Full Plume Remediation of Upper & Deep Portions of Aquifer (to 200 ft bgs) with Groundwater Extraction/Centralized Air Stripping and Vapor Treatment/Effluent Re-Injection	10	8,812,000	4,877,000
8. Full Plume Remediation of Upper and Deep Portions of the Aquifer (to 225 ft bgs) with In-well Vapor Stripping/Localized Vapor Treatment.	7	6,500,000	3,500,000

Note: Please refer to Section 7 for detailed information on Present Worth, Operation/Maintenance and Time to Implement.

Figure 1 - Site Location Map
New Cassel Industrial Area



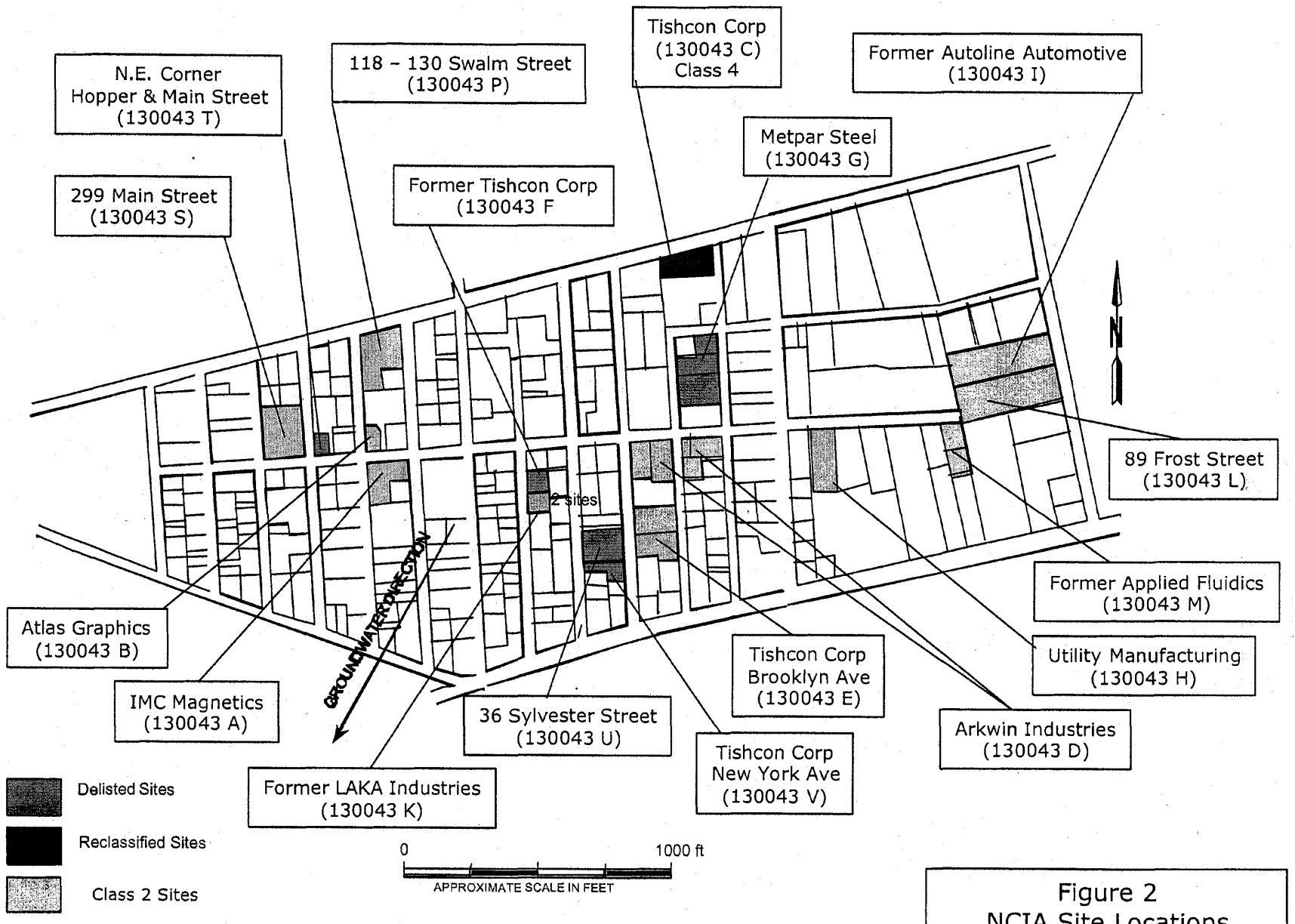


Figure 2
NCIA Site Locations
June 2003
New Cassel Industrial Area

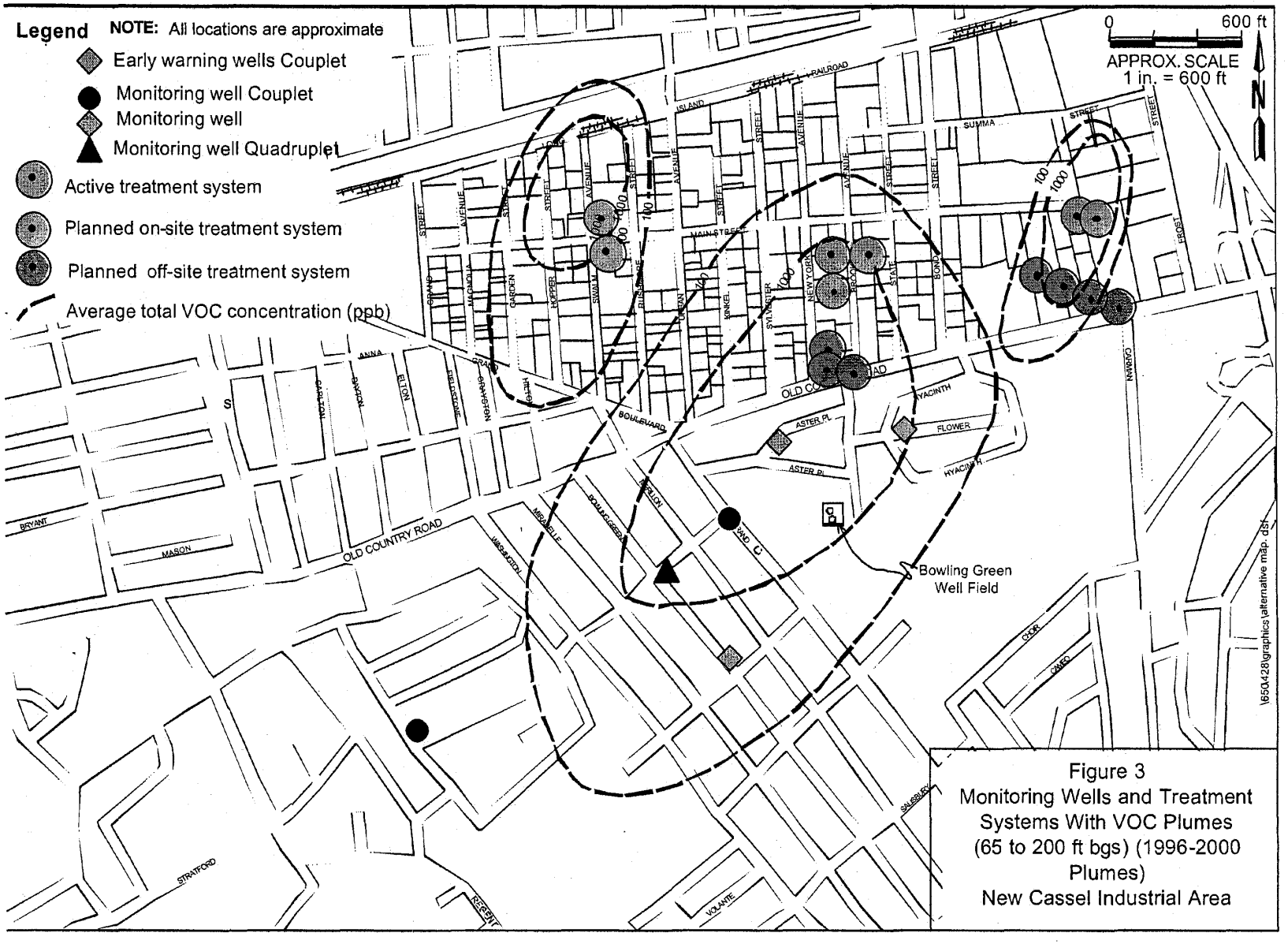


Figure 3
Monitoring Wells and Treatment Systems With VOC Plumes (65 to 200 ft bgs) (1996-2000 Plumes)
New Cassel Industrial Area

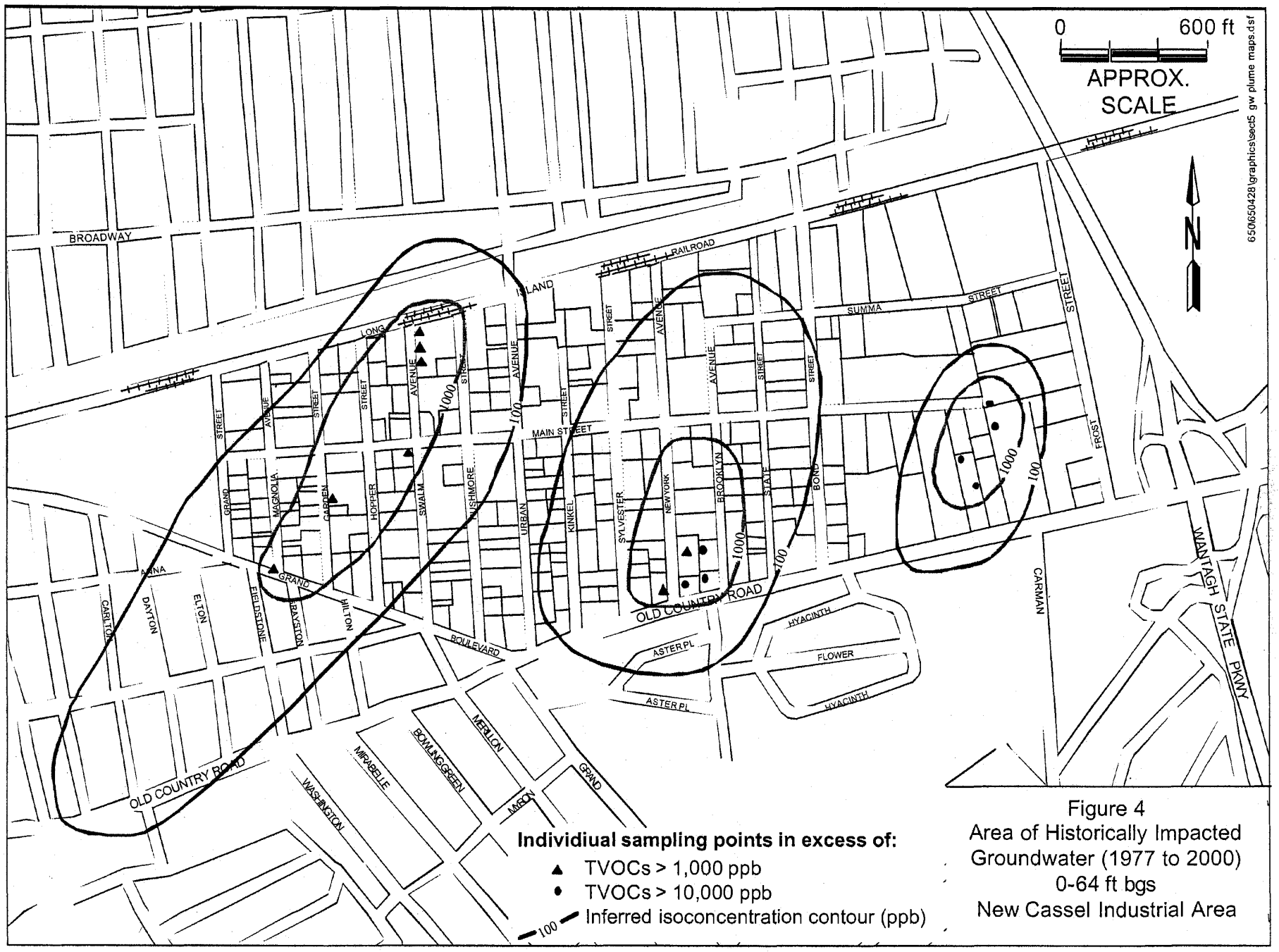


Figure 4
Area of Historically Impacted Groundwater (1977 to 2000)
0-64 ft bgs
New Cassel Industrial Area

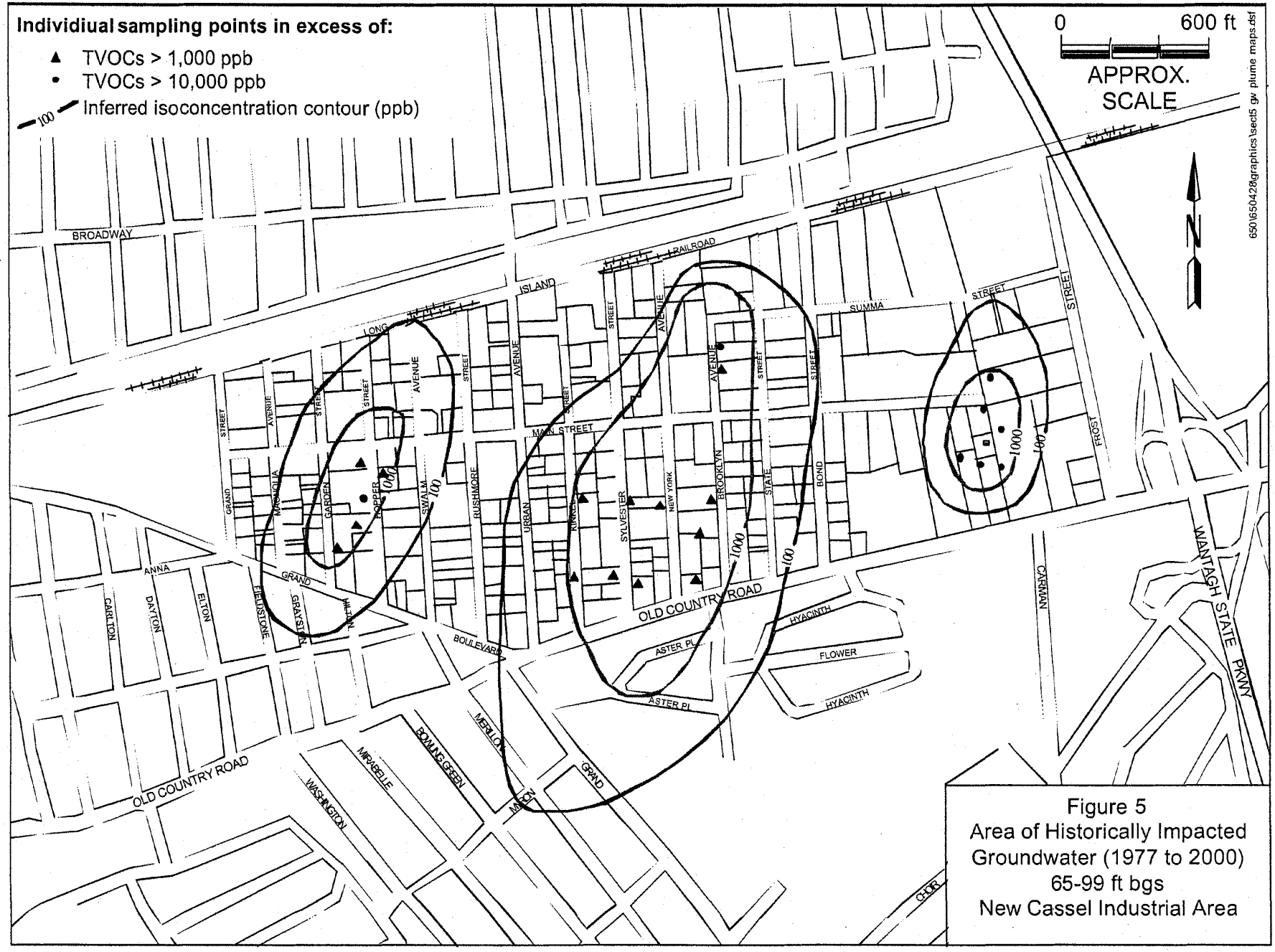


Figure 5
Area of Historically Impacted Groundwater (1977 to 2000)
65-99 ft bgs
New Cassel Industrial Area

Figure 6
Area of Historically Impacted Groundwater (1977 to 2000)
100-124 ft bgs
New Cassel Industrial Area

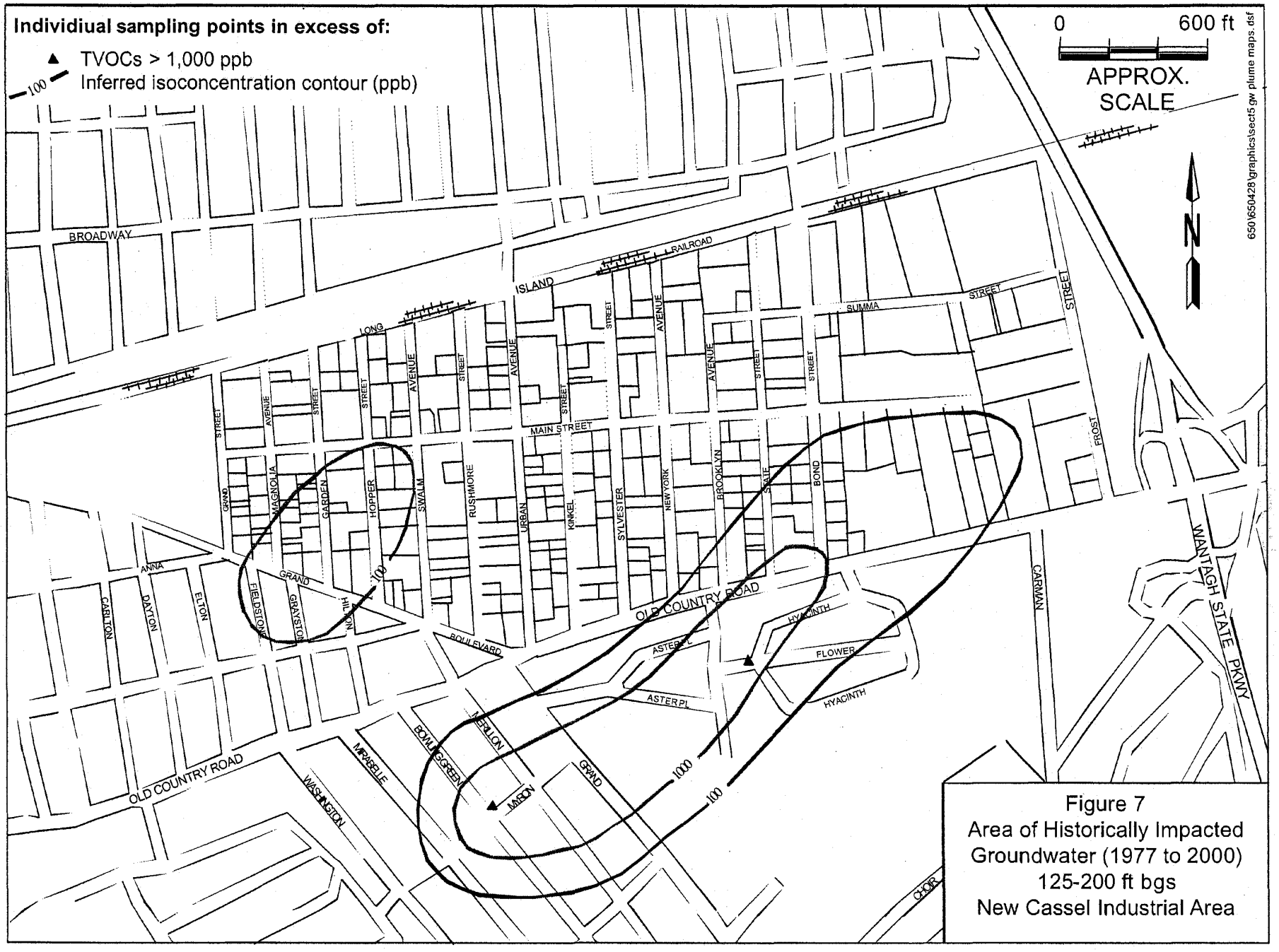


Figure 7
Area of Historically Impacted Groundwater (1977 to 2000)
125-200 ft bgs
New Cassel Industrial Area

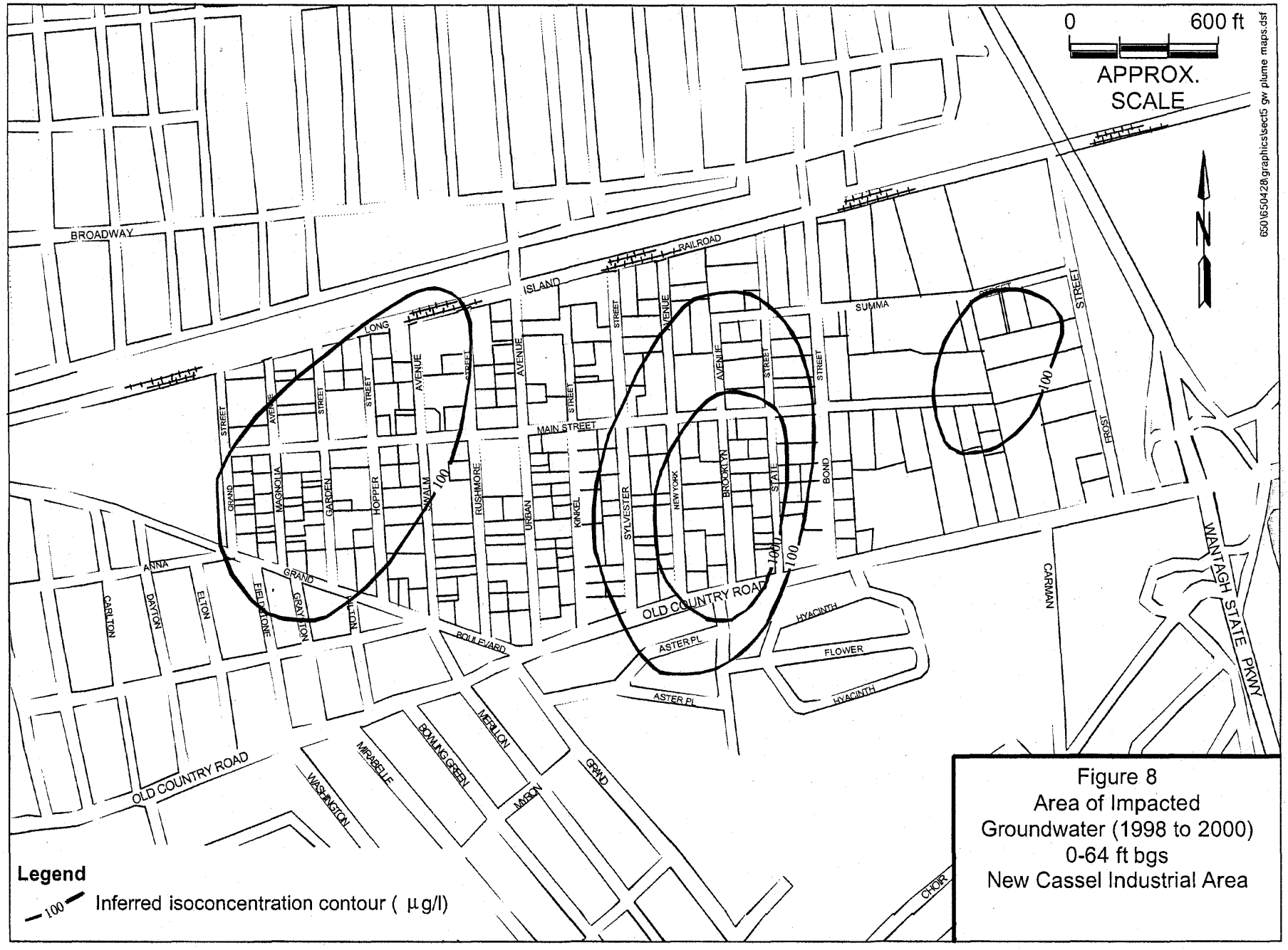
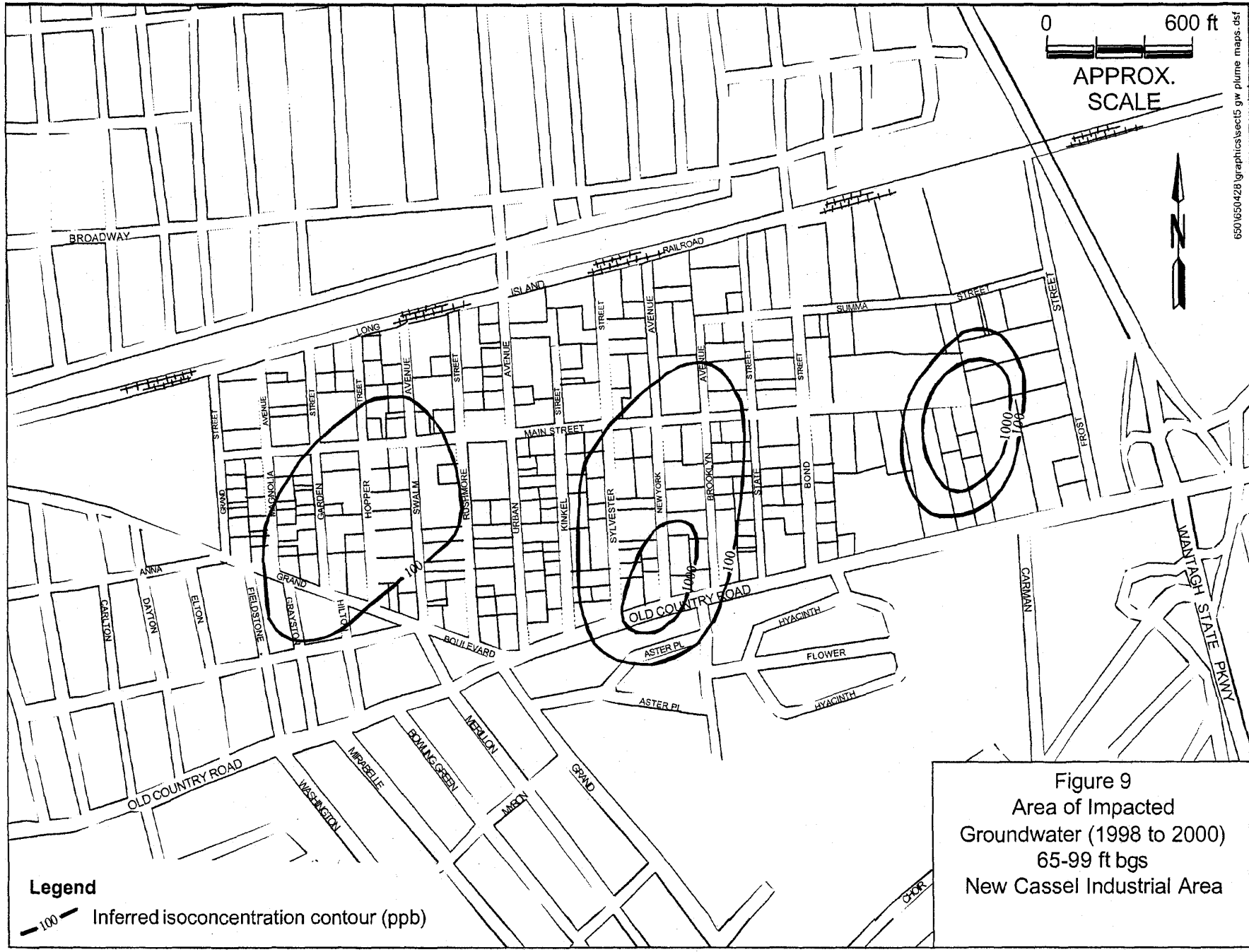


Figure 8
Area of Impacted
Groundwater (1998 to 2000)
0-64 ft bgs
New Cassel Industrial Area


0
600 ft
APPROX. SCALE
N
BROADWAY
RAILROAD
LONG ISLAND
SUMMA STREET
MAIN STREET
OLD COUNTRY ROAD
ASTER PL
HYACINTH
FLOWER
BOULEVARD
WANTAGH STATE PKWY
CARMAN
FROST
BOND
BROOKLYN
STATE
NEW YORK
SYLVESTER
KINKEL
URBAN
ROSSMORE
SWALM
HOPPER
GARDEN
MAGNOLIA
GRAND
ANNA
GARTON
DAYTON
NOLTON
FIELDSTONE
FOREST
HILLTOP
MERILON
BOWLING GREEN
MIRABELLE
WASHINGTON
LYNDON
CHOR
100
1000
Legend
Inferred isoconcentration contour (ppb)
Figure 9
Area of Impacted
Groundwater (1998 to 2000)
65-99 ft bgs
New Cassel Industrial Area
6501650428\graphics\sect5 gw plume maps.dsf

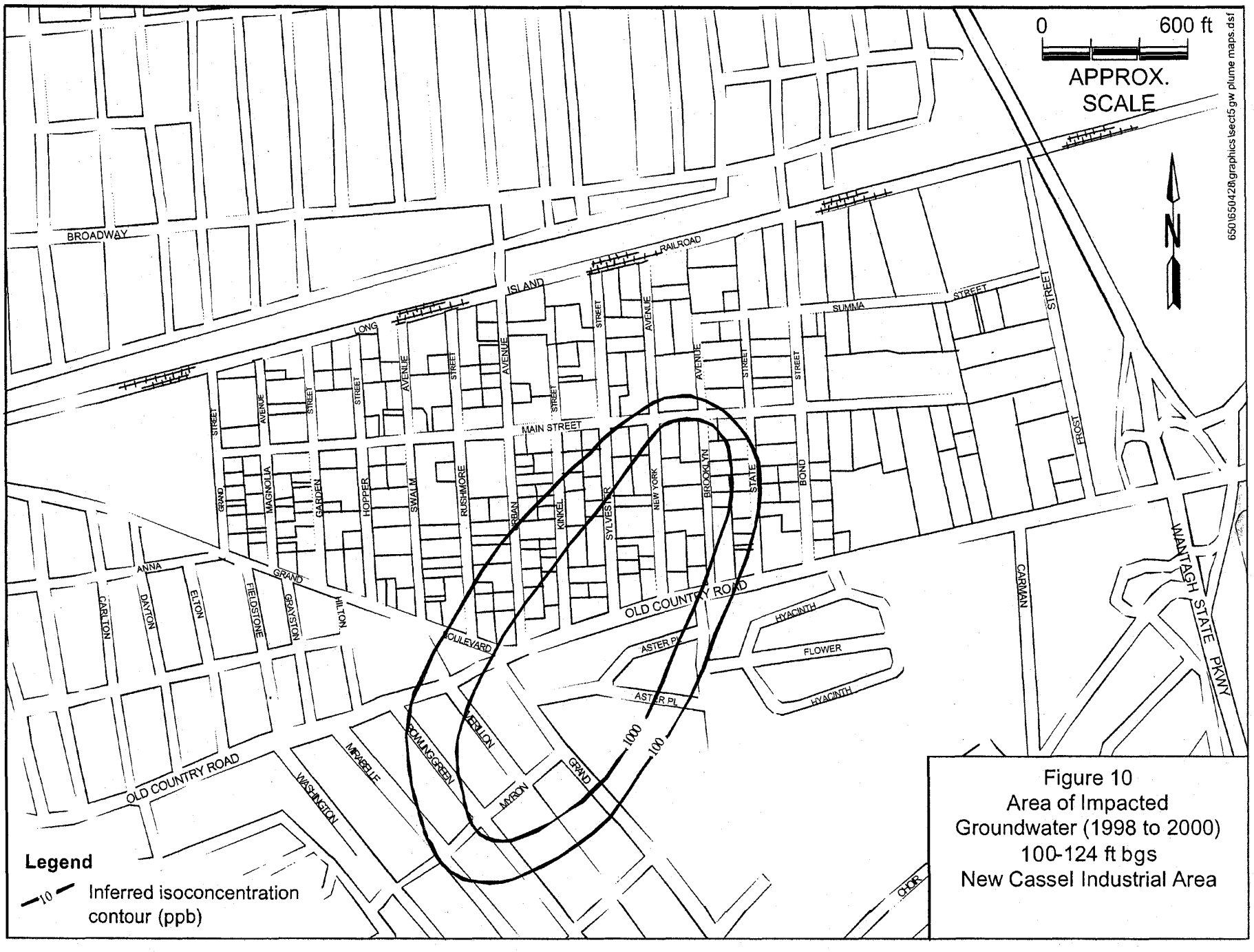


Figure 10
Area of Impacted Groundwater (1998 to 2000)
100-124 ft bgs
New Cassel Industrial Area

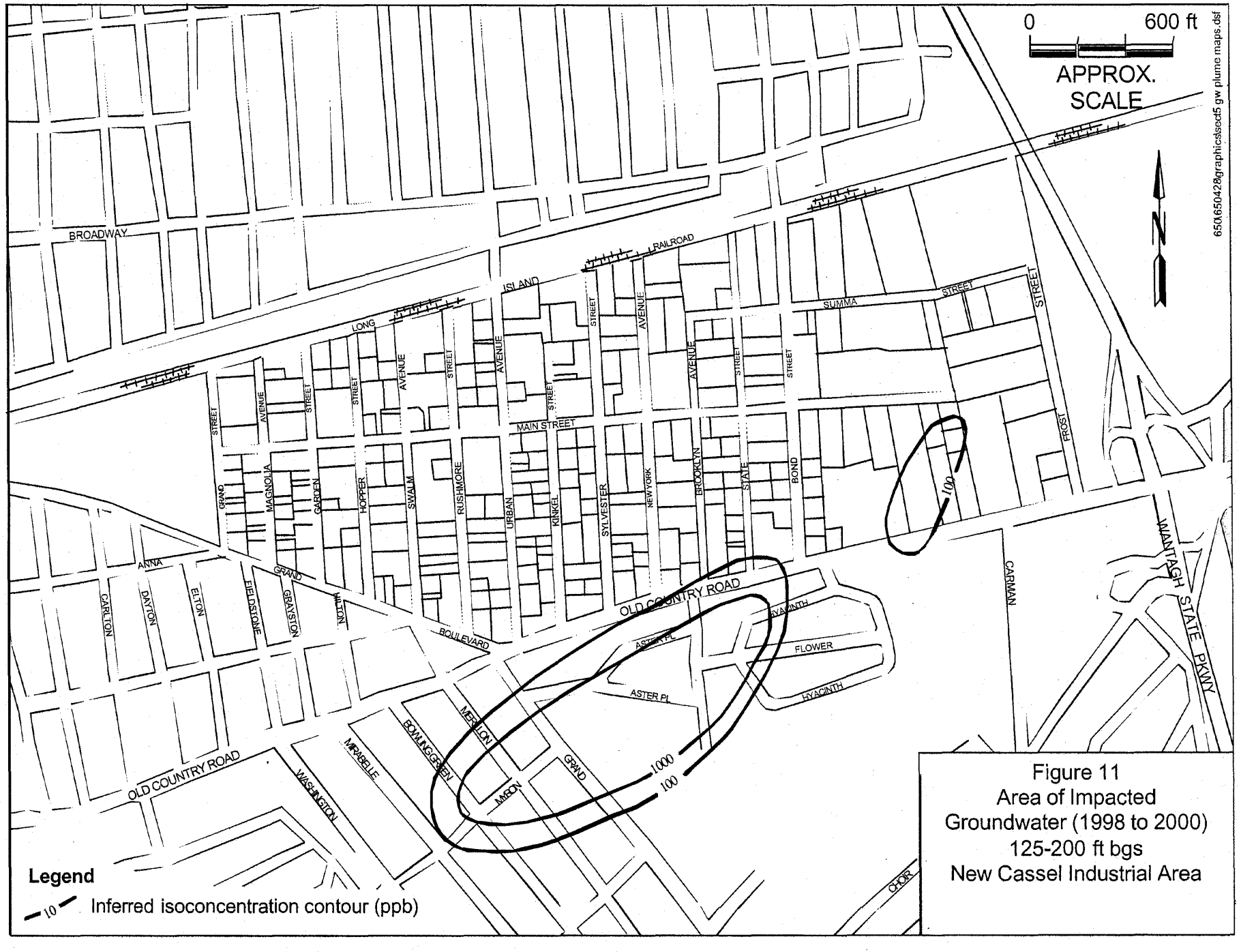
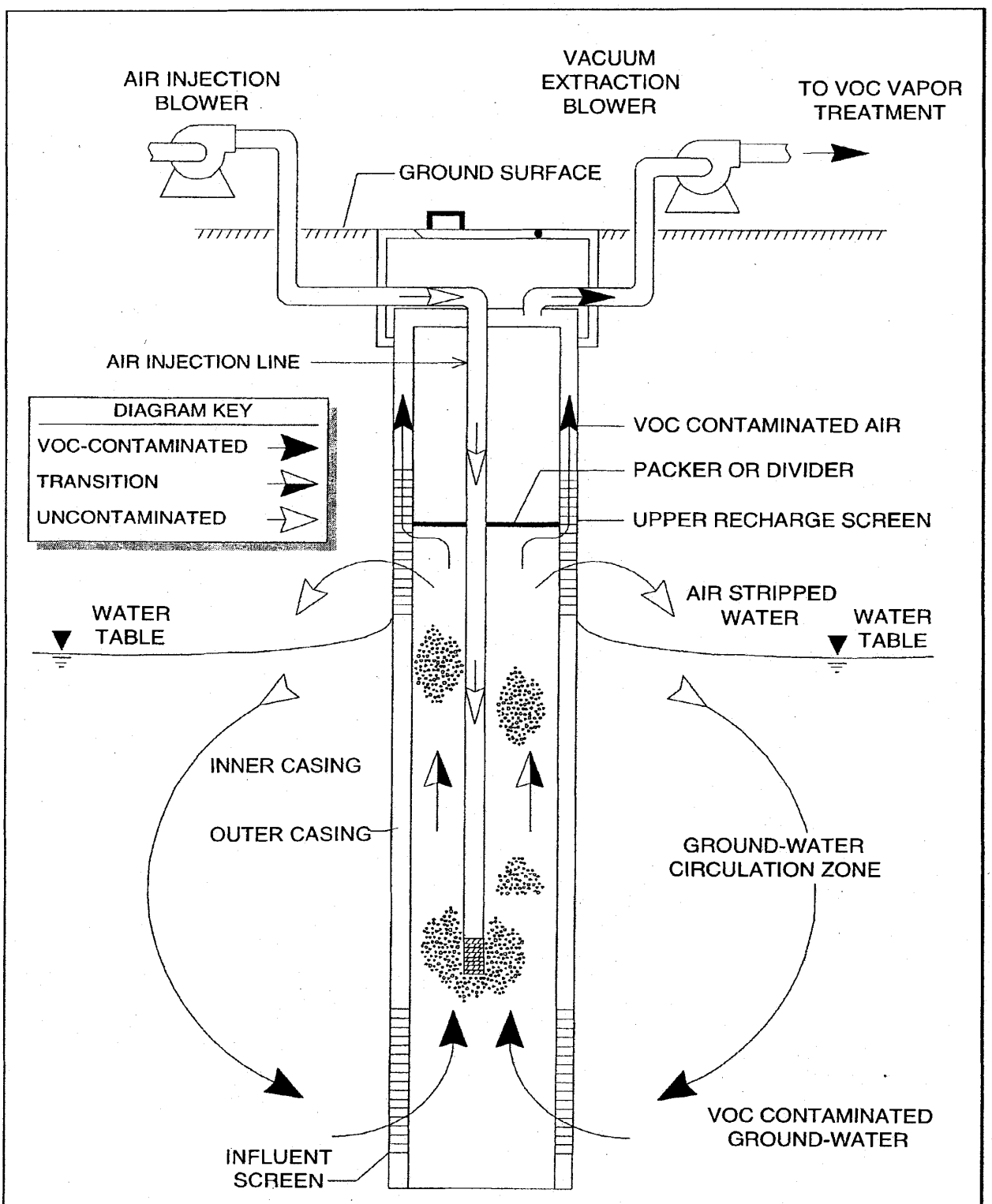


Figure 11
Area of Impacted Groundwater (1998 to 2000)
125-200 ft bgs
New Cassel Industrial Area



Source: GWRTAC, 1997.

In-Well Vapor Stripping Process **New Cassel Industrial Area** **Figure 12**

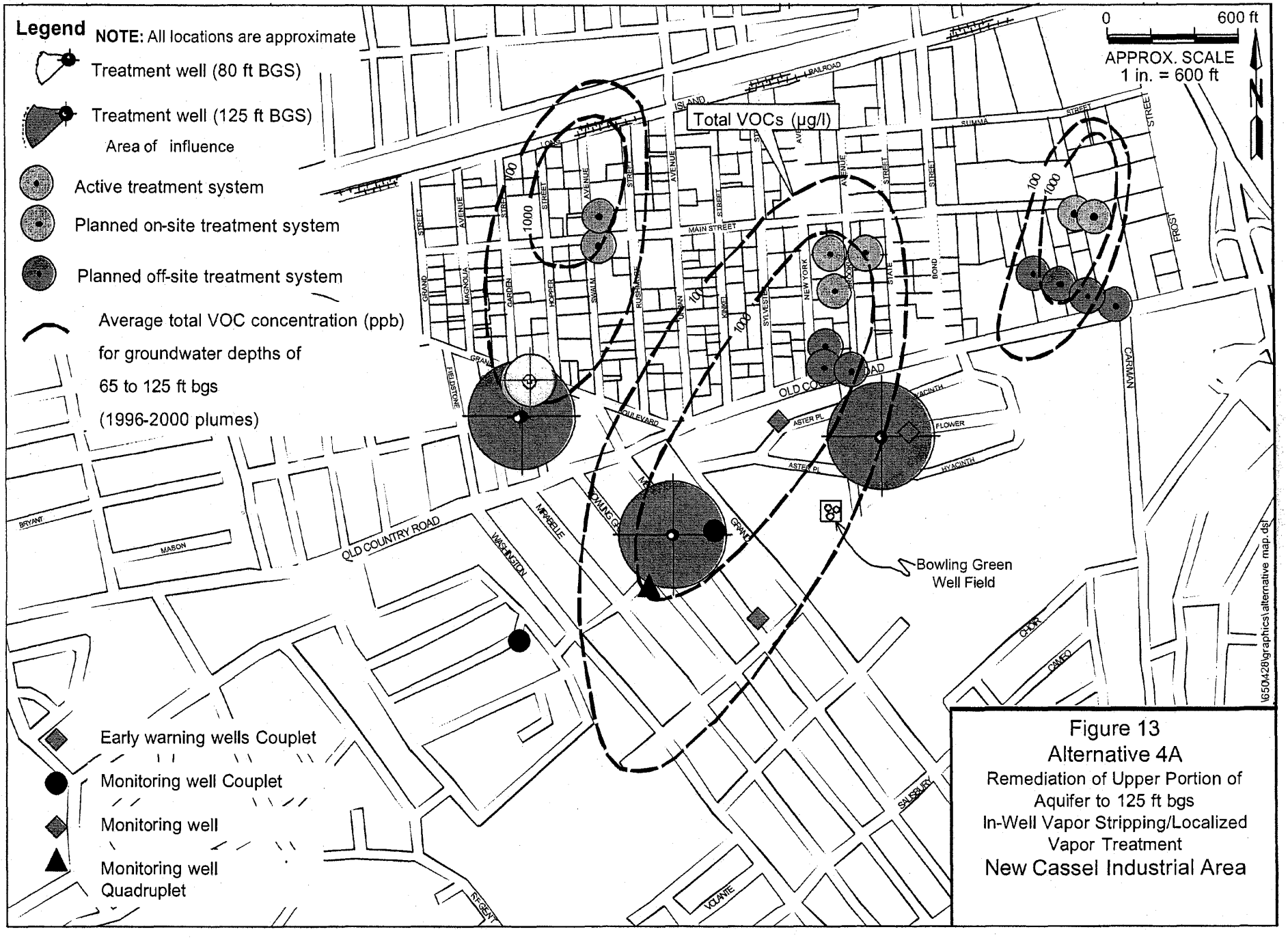


Figure 13
Alternative 4A
Remediation of Upper Portion of
Aquifer to 125 ft bgs
In-Well Vapor Stripping/Localized
Vapor Treatment
New Cassel Industrial Area

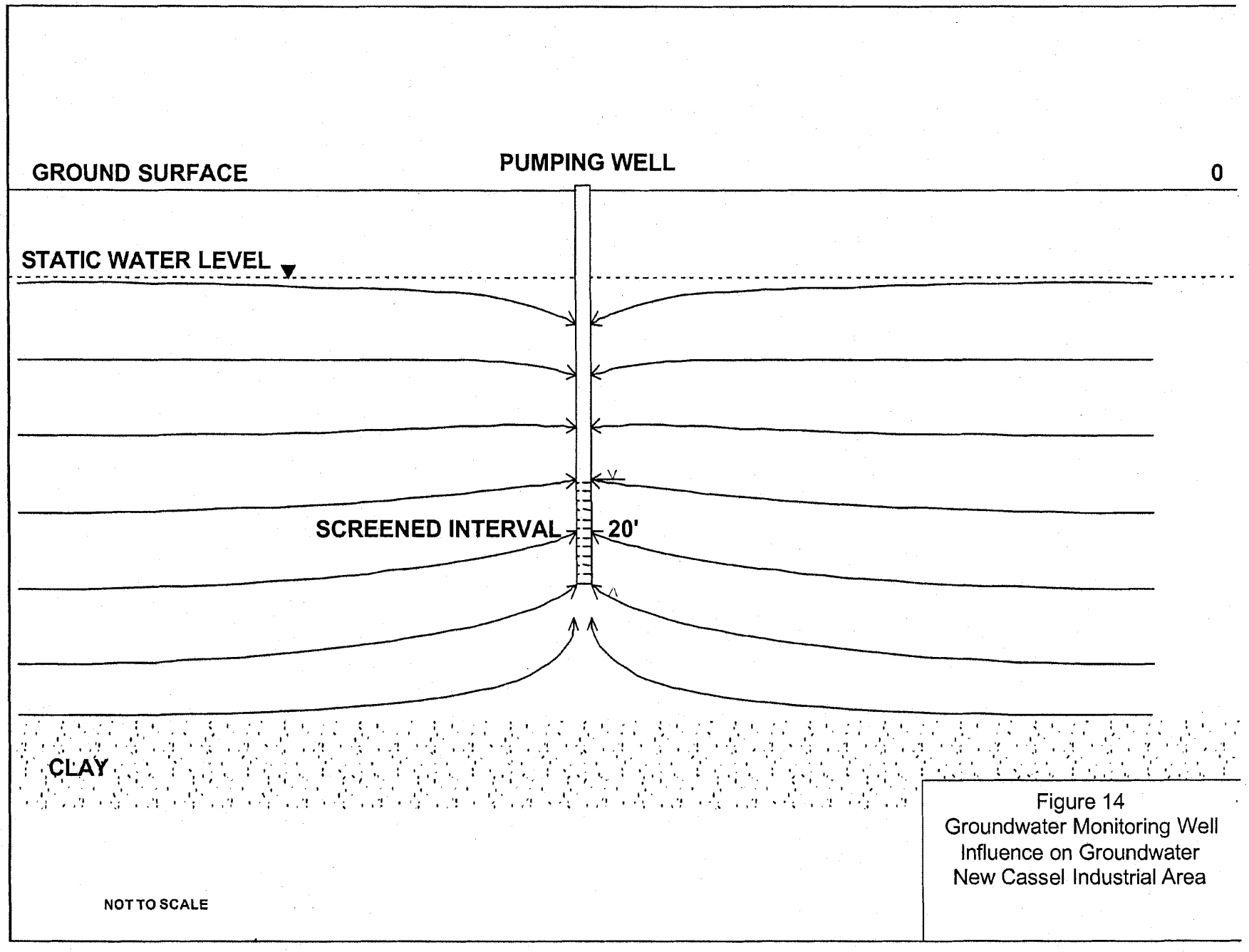


Figure 14
Groundwater Monitoring Well
Influence on Groundwater
New Cassel Industrial Area

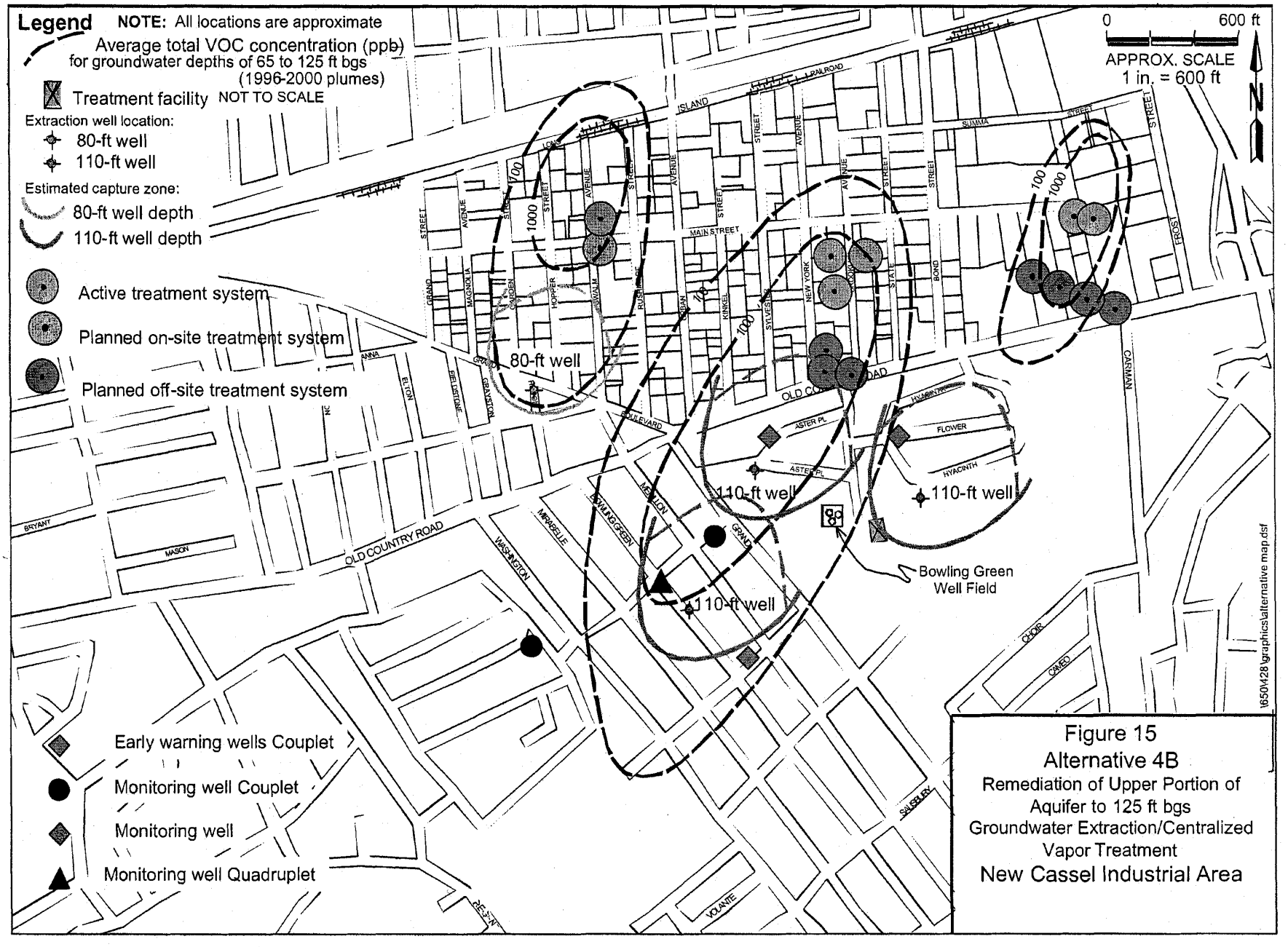


Figure 15
Alternative 4B
Remediation of Upper Portion of Aquifer to 125 ft bgs
Groundwater Extraction/Centralized Vapor Treatment
New Cassel Industrial Area


Legend
NOTE: All locations are approximate
Treatment well (140 ft BGS)
Treatment well (200 ft BGS)
Area of influence
Active treatment system
Planned on-site treatment system
Planned off-site treatment system
Average total VOC concentration (ppb) for groundwater depths of 65 to 125 ft bgs (1996-2000 plumes)
0
600 ft
APPROX. SCALE
1 in. = 600 ft
N
Bowling Green
Well Field
OLD COUNTRY ROAD
Early warning wells Couplet
Monitoring well Couplet
Monitoring well
Monitoring well Quadruplet
Figure 16
Alternative 5A
Remediation of Upper and Deep Portion of Aquifer to 200 ft bgs
In-Well Vapor Stripping/Localized Vapor Treatment
New Cassel Industrial Area

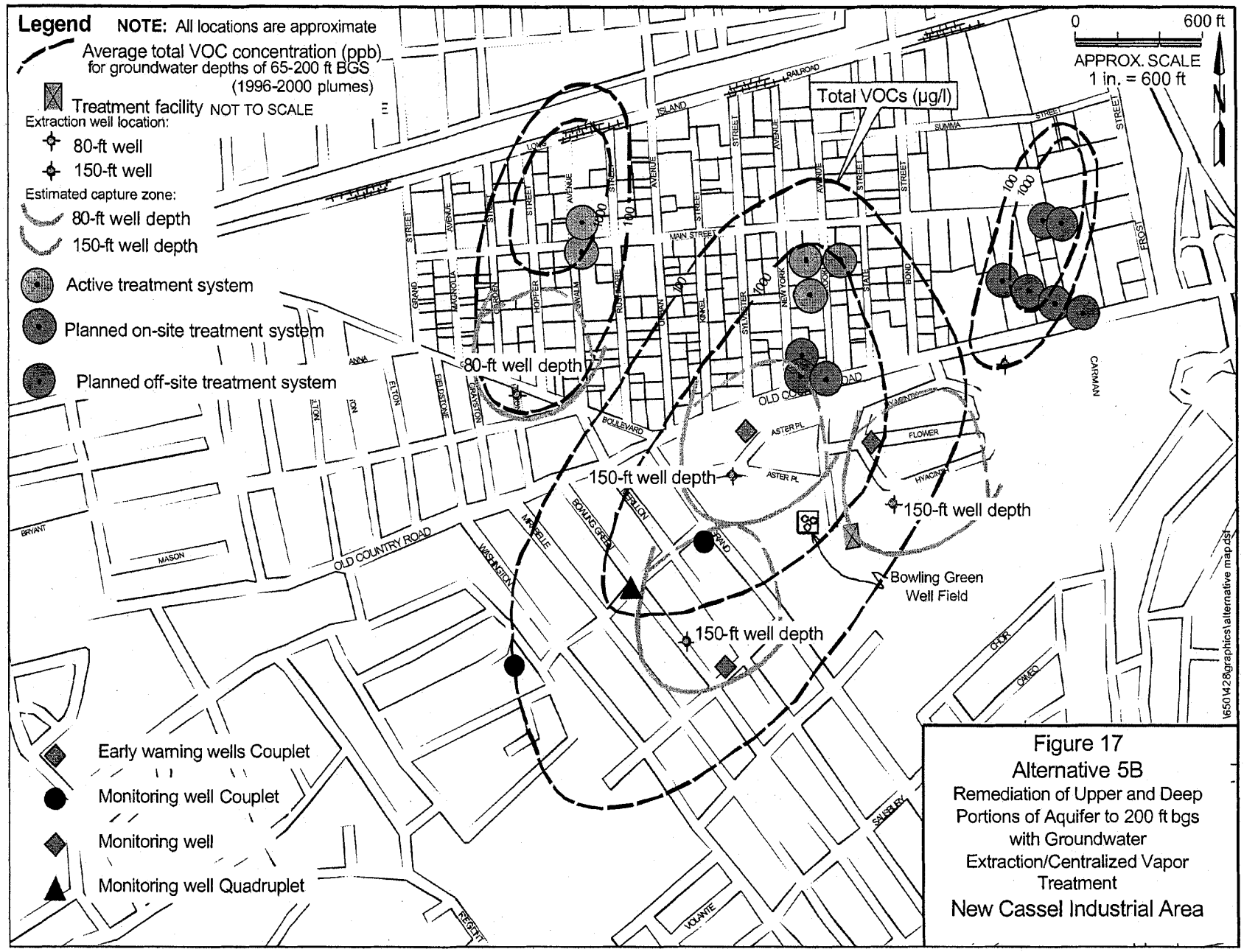


Figure 17
Alternative 5B
Remediation of Upper and Deep Portions of Aquifer to 200 ft bgs with Groundwater Extraction/Centralized Vapor Treatment
New Cassel Industrial Area

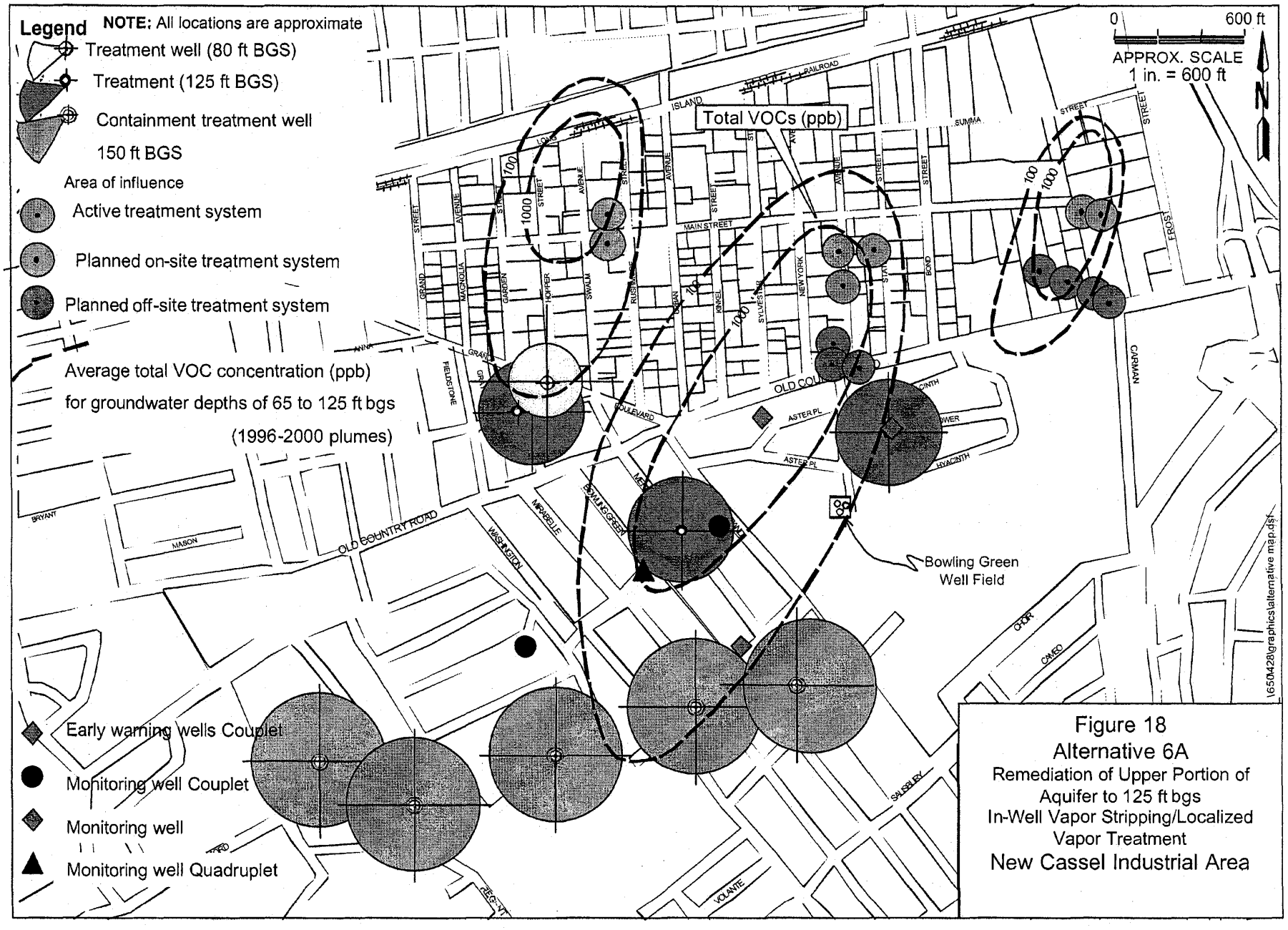


Figure 18
Alternative 6A
Remediation of Upper Portion of Aquifer to 125 ft bgs
In-Well Vapor Stripping/Localized Vapor Treatment
New Cassel Industrial Area

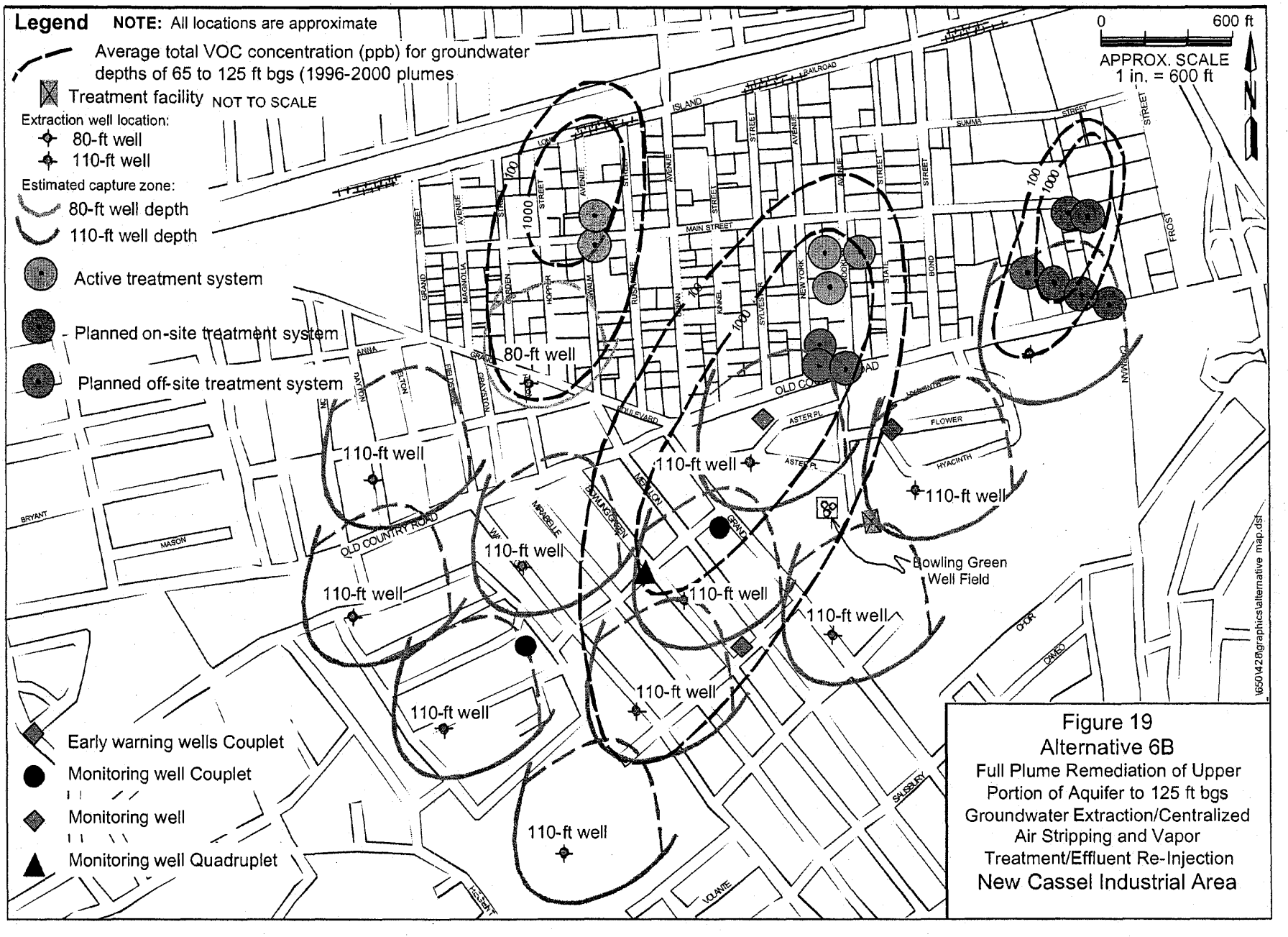


Figure 19
Alternative 6B
Full Plume Remediation of Upper Portion of Aquifer to 125 ft bgs
Groundwater Extraction/Centralized Air Stripping and Vapor Treatment/Effluent Re-Injection
New Cassel Industrial Area

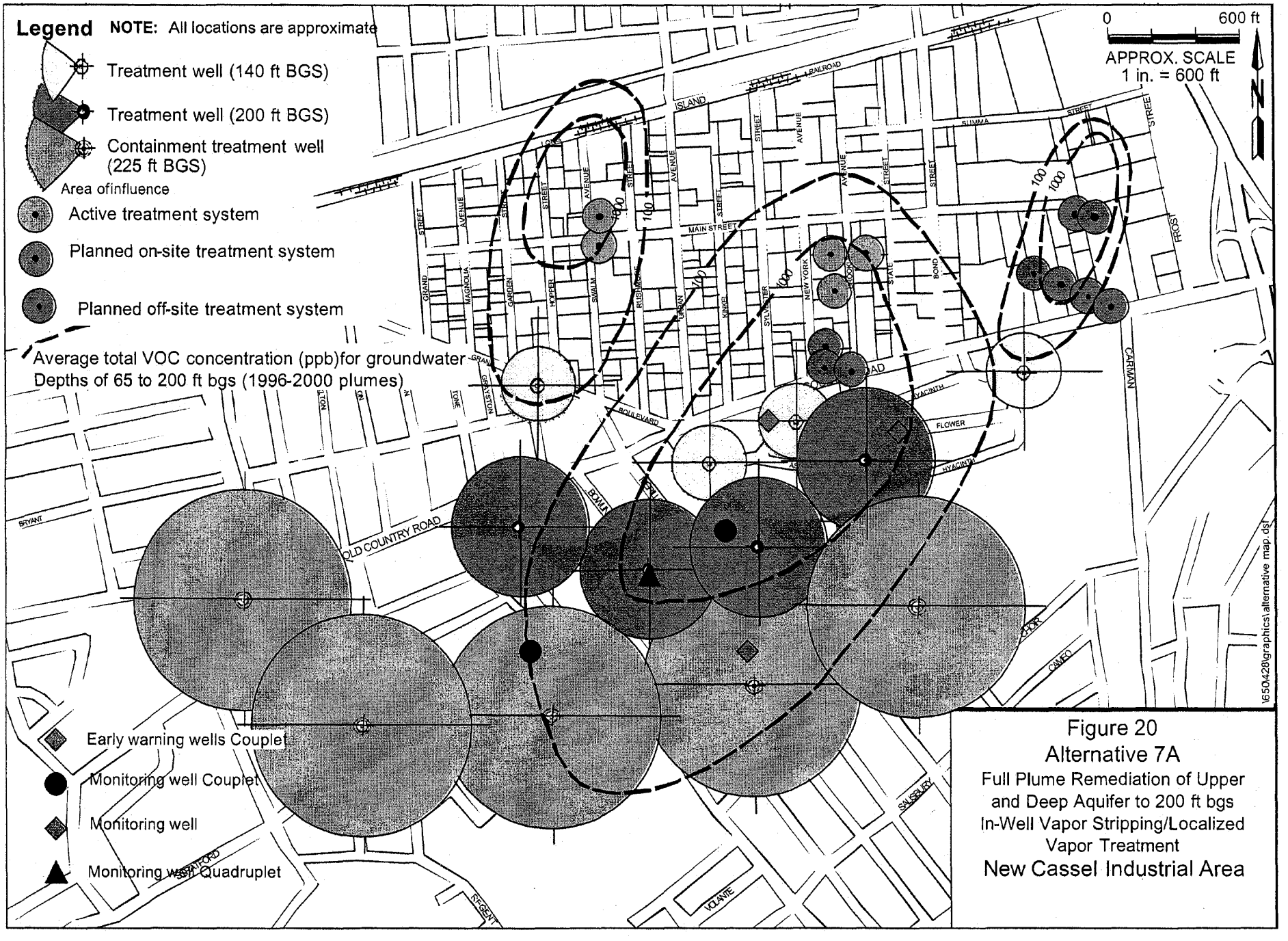


Figure 20
Alternative 7A
Full Plume Remediation of Upper and Deep Aquifer to 200 ft bgs
In-Well Vapor Stripping/Localized Vapor Treatment
New Cassel Industrial Area

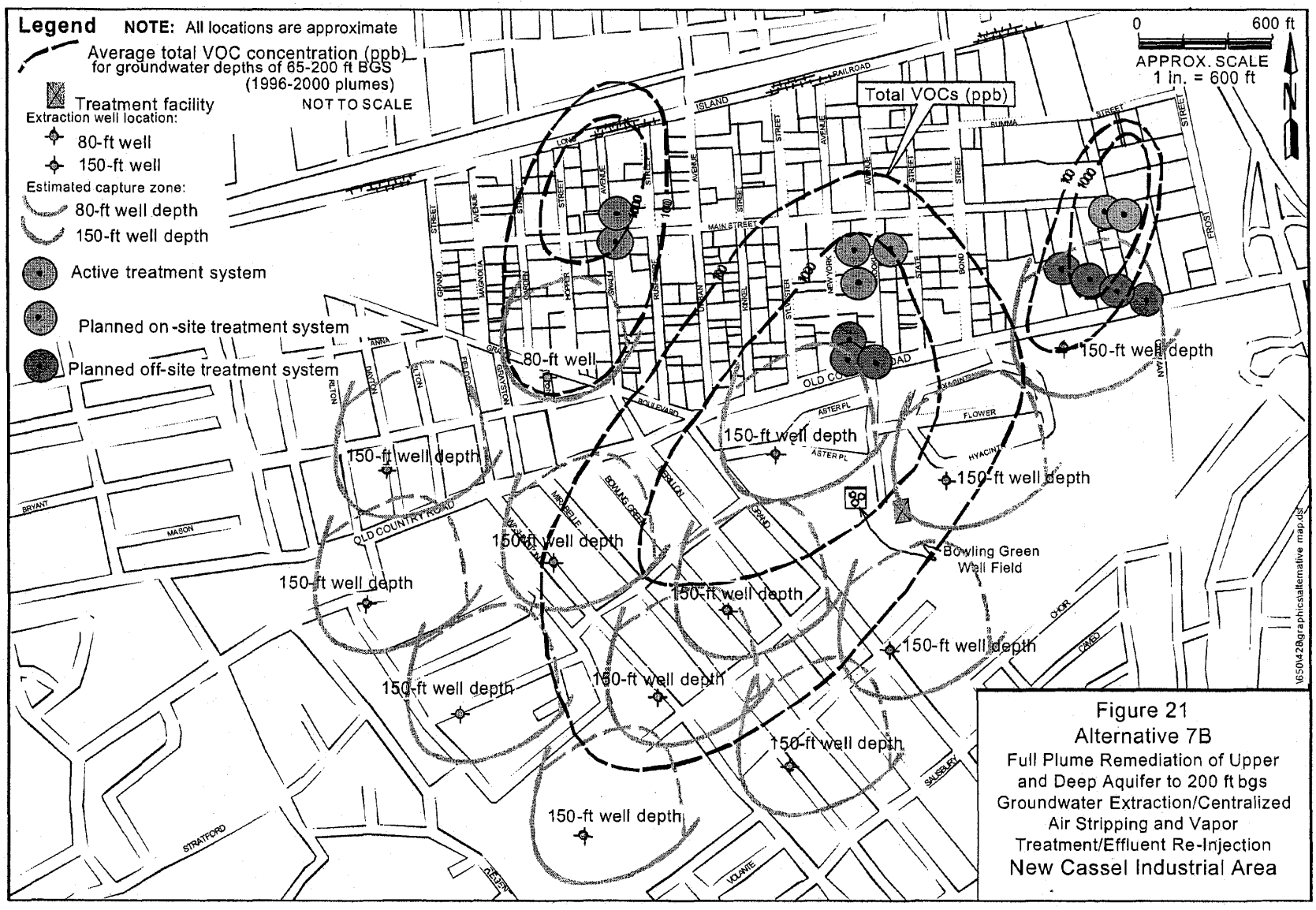


Figure 21
Alternative 7B
Full Plume Remediation of Upper and Deep Aquifer to 200 ft bgs
Groundwater Extraction/Centralized Air Stripping and Vapor Treatment/Effluent Re-Injection
New Cassel Industrial Area

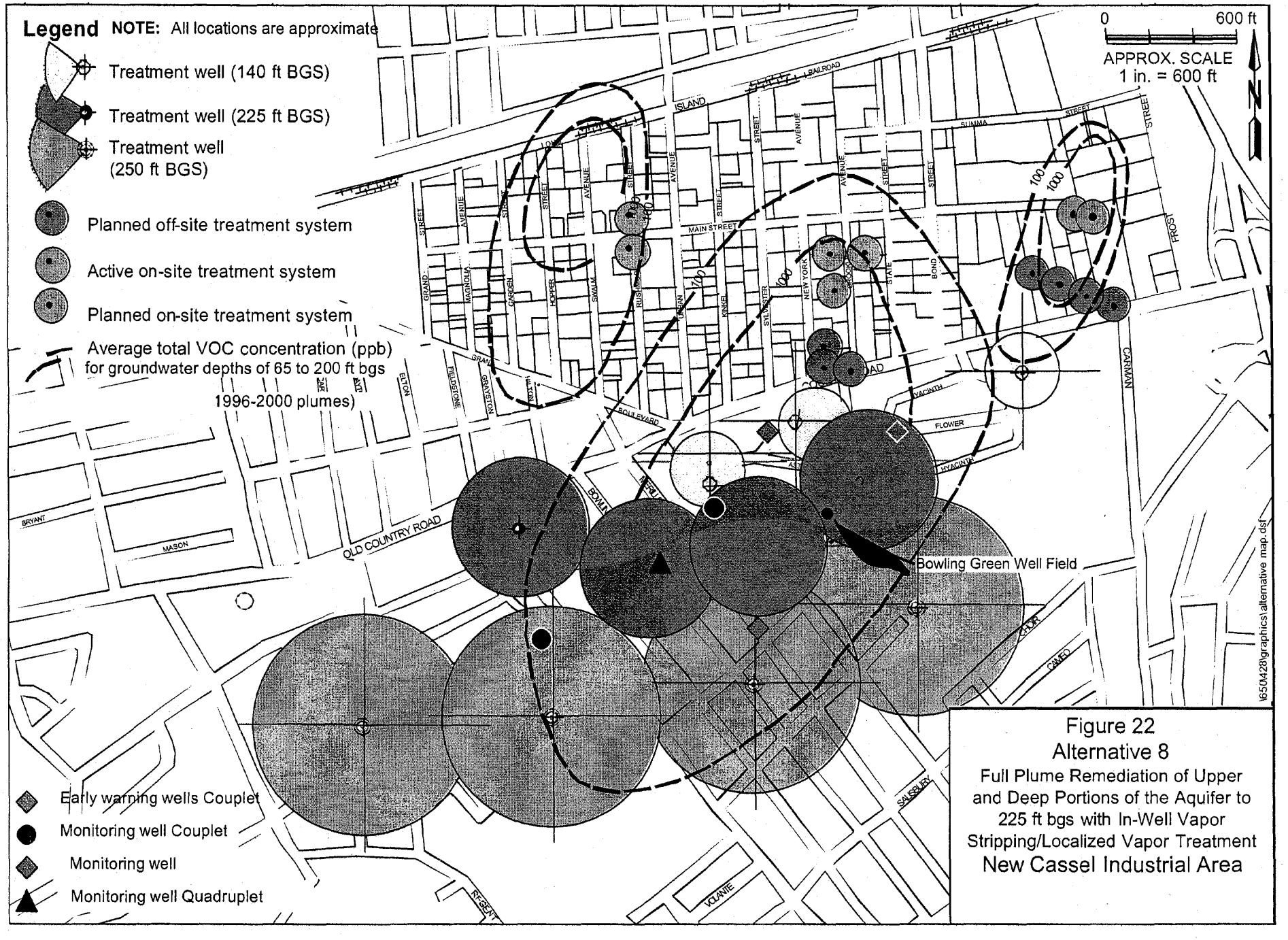


Figure 22
Alternative 8
Full Plume Remediation of Upper and Deep Portions of the Aquifer to 225 ft bgs with In-Well Vapor Stripping/Localized Vapor Treatment
New Cassel Industrial Area

APPENDIX A

Responsiveness Summary

RESPONSIVENESS SUMMARY

New Cassel Industrial Area Inactive Hazardous Waste Disposal Sites
Town of North Hempstead, Nassau County, New York
Operable Unit No. 03 - Off-site Groundwater South of the NCIA
Site Nos.: 1-30-043A, 1-30-043B, 1-30-043C, 1-30-043D, 1-30-043E, 1-30-043H, 1-30-043I, 1-30-043K, 1-30-043L, 1-30-043M, 1-30-043P, 1-30-043S, 1-30-043U & 1-30-043V
October 2003

The Proposed Remedial Action Plan (PRAP) for the New Cassel Industrial Area sites, Operable Unit No. 03 - Off-site Groundwater, was prepared by the New York State Department of Environmental Conservation (NYSDEC) in consultation with the New York State Department of Health (NYSDOH) and was issued to the document repositories on May 29, 2003. The PRAP outlined the remedial measure proposed for the contaminated groundwater migrating from the New Cassel Industrial Area sites.

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

A public meeting was held on June 12, 2003, which included a presentation of the Remedial Investigation (RI) and the Feasibility Study (FS) as well as a discussion of the proposed remedy. The meeting provided an opportunity for citizens to discuss their concerns, ask questions and comment on the proposed remedy. These comments have become part of the Administrative Record for the NCIA sites. The public comment period for the PRAP ended June 30, 2003, however, the comment period was extended to accommodate requests from interested parties, until July 30, 2003.

This responsiveness summary responds to all questions and comments raised during the public comment period. In addition to comments received at the June 12, 2003 meeting, four letters conveying comments on the PRAP were received, from which specific questions were derived. Copies of these letters are attached. The following are the comments received, with the NYSDEC's responses:

COMMENT 1: Why not let the treatment on the Bowling Green water supply wells perform the treatment of the off-site groundwater instead of installing a separate remedial system?

The cost of installation of a replacement potable well within the Bowling Green water district at an alternate site along with potential transmission of water back to the Bowling Green well field site would be considerably cheaper than installation of area wide treatment and the associated operation and maintenance costs.

RESPONSE 1: This would necessitate perpetual operation and maintenance of the Bowling Green water supply treatment system at the water supply wells, with attendant costs. Additionally, while human health would be protected by the treatment system, this approach would not address the groundwater contamination outside the radii of influence of the Bowling Green water supply wells and hence would not mitigate

the environmental threat posed by contravention of groundwater standards in a sole source aquifer. The NYSDEC and NYSDOH are opposed to using public water supply wells as remedial treatment systems for contaminated groundwater.

The suggested approach would leave a significant contaminant plume in a sole source aquifer untreated. Additionally, the Town of Hempstead has indicated that there exists a shortage of suitable locations for water supply wells in the area in question and on Long Island in general. The Bowling Green water district is currently searching for ways to increase total capacity, and all currently active water supply wells are needed.

COMMENT 2: The lower portions of the Glacial and the upper Magothy have a lot of silt and clay lenses in them. Will the proposed remedy work here? Where else has this technology been used?

RESPONSE 2: The selected remedy will work in this environment given careful selection of treatment well locations and screening intervals. A pilot test will be run on the first well to be installed to ensure that the selected treatment is working properly. This treatment technology has been used at other sites, including the Brookhaven National Laboratories and General Instruments sites located on Long Island.

COMMENT 3: Is the DEC going to use a tracer during the pilot testing phase?

RESPONSE 3: This will be determined during the design of the treatment system.

COMMENT 4: Is the DEC considering groundwater remediation for the NCIA sites at depths of greater than 225 feet?

RESPONSE 4: The information currently available does not indicate significant contaminant reservoirs at depths of greater than 225 feet bgs. Therefore, such treatment is not currently anticipated.

COMMENT 5: When did the comment period start for this PRAP?

RESPONSE 5: The comment period began on May 29, 2003 and ran through July 30, 2003.

COMMENT 6: Was the installation of new water supply wells considered for the Water District at a new location as an alternative to the existing supply and then using the treatment of the existing water supply wells as a remedy?

RESPONSE 6: Installation of new water supply wells in the New Cassel area is difficult and cost prohibitive due to the lack of suitable locations, the prevalence of contamination in

the Upper Glacial and Magothy aquifers, and construction costs. The current water supply wells are not ideally situated for the purposes of remediation, nor is their construction optimized for this usage.

COMMENT 7: Other than VOCs has anything else such as pesticides been tested for in the groundwater during the investigation?

RESPONSE 7: Pesticides, metals and semi-volatiles have been tested for in several sampling locations. Some metal and semi-volatile contamination was found within the NCIA, however, these do not make a significant contribution to the off-site groundwater contamination.

COMMENT 8: How often are the Bowling Green water supply wells sampled?

RESPONSE 8: The water supply wells are sampled on a monthly basis.

COMMENT 9: The PRAP draws conclusions by using historic data while ignoring current groundwater monitoring data. Groundwater acquired after issuance of the September 2000 Remedial Investigation Report and Focused Feasibility Study is not used in generating the plume maps.

RESPONSE 9: Groundwater data has been acquired on a quarterly basis for thirteen monitoring wells located downgradient of the NCIA for the time interval between issuance of the Remedial Investigation Report and Focused Feasibility Study in September 2000 and July of 2003. The data for the period up to October 2002 is presented in Table 4 of the PRAP. Additionally, the Bowling Green water supply wells are monitored on a monthly basis. In addition, data acquired from individual site investigations during the period in question was reviewed before issuance of the PRAP. It was determined that the plume maps were not materially affected by the new data.

COMMENT 10: To date, the NYSDEC has not demonstrated that the eastern plume commingles with the central plume and contaminates the Bowling Green water supply wells.

RESPONSE 10: The path of the eastern plume lies within the radius of the cone of influence of the Bowling Green water supply wells. The eastern plume reached concentrations of greater than 10,000 ppb of total VOCs. Given the high contaminant levels reached by the eastern and central plumes and the intersection of the eastern and central plume's path with the cone of influence of the production wells it is evident that contaminants from the two plumes commingle near the production wells and that both the eastern and central plumes make a major contribution to the contamination found in the production wells.

COMMENT 11: If the basis of presuming that the eastern plume commingles with the central plume and contaminates the Bowling Green water supply wells is its geographic location (upgradient) and the regional groundwater flow direction (SW), then the General Instrument site, located northwest of the eastern plume must be considered as contributing to the NCIA sites off-site "regional" plume.

RESPONSE 11: The General Instruments site is located northeast, not northwest of the eastern plume. Ongoing groundwater investigations downgradient of the General Instrument site indicate that the General Instruments plume does not intersect the NCIA sites off-site "regional" plume.

COMMENT 12: A review of NYSDEC requirements in similar cases of groundwater contamination on Long Island indicates that the NYSDEC is taking a unique approach to the NCIA. The proposal to install a treatment system to address area wide groundwater contamination is not consistent with the NYSDECs formerly established precedent of frequently deferring treatment of large defined plumes in favor of "hot spot" treatment unless the plume is an immediate threat to a potable supply well.

RESPONSE 12: The Bowling Green water supply wells have clearly been affected by the NCIA sites off-site groundwater plume. The NYSDEC and NYSDOH do not consider indefinite treatment of the Bowling Green water supply wells in lieu of active groundwater remediation practicable. Moreover, there is a potential for contaminant levels to rise above the capacity of the current treatment system, resulting in a serious loss of capacity for the Bowling Green water district if left unremediated.

COMMENT 13: A PRP's recently completed monitoring well installation and groundwater sampling data indicates that plume mapping should be done based on a shorter and more current timeframe. Further, it would be more accurate and useful to plot data from the same geologic units or from a shorter vertical horizon.

RESPONSE 13: As described in the RI and summarized in section 5 of the PRAP, the RI effort included over 1,850 groundwater samples collected since 1996 from over 100 separate locations. Several rounds of sampling were conducted in which large numbers of samples were taken within a short timeframe, most recently in January 2000. Groundwater monitoring has continued after issuance of the RI with quarterly sampling of 13 groundwater monitoring wells. The locations and screening intervals for the 13 wells were chosen to coincide with high levels of groundwater contamination based on hydropunch data. There are only two generally recognized geological units involved: the Upper Glacial and the Magothy. Although in theory the groundwater could be plotted for shorter vertical horizons, the number of monitoring wells, hydropunch points and volume of samples required to make plume maps based on such shorter vertical horizons would be economically prohibitive.

COMMENT 14: It appears that the proposed area wide groundwater treatment system will treat groundwater to a maximum depth of 250 ft bgs. It was noted during the PRAP public meeting that MW-9 was installed to a depth of 300 ft bgs and that it contained total VOCs of 27 ppb. Since the current proposal does not address the deeper impact, at this time prior to finalizing the PRAP, additional investigation should be conducted so that a second investigation is not needed after remediation of the groundwater above 250 ft bgs begins.

RESPONSE 14: Although the concentrations found in MW-9 are above groundwater standards, the NYSDEC does not believe it would be cost effective to treat the groundwater downgradient of the NCIA to this depth. Treatment depths up to 250 ft bgs will ultimately result in lower contaminant levels at 300 ft bgs, as treated water from shallower depths enters the cone of depression of the Bowling Green water supply wells. Groundwater monitoring will be continued to assure that the treatment system has been effective.

COMMENT 15: The NYSDEC asserts that circulation wells driven by density driven convection (DDC) type in-well stripping systems are the appropriate circulation models to be used below 100 feet submergence. The DDC wells are not appropriate for this application. Note that the circulation well technology recommended by the NYSDEC consultant and mandated by NYSDEC's ROD for the Frost Street sites called for the use of a submersible pump supporting a UVB in-well stripping system. The NYSDEC's PRAP including the DDC system indicates either a change in treatment recommendation or a loss of faith in UVB.

RESPONSE 15: The NCIA sites Off-site Groundwater ROD selects in-well vapor stripping, and does not make a determination between UVB and DDC systems. During the design phase, a determination will be made as to the exact method to be employed. If during the pilot test it is shown that the in-well vapor stripping process is not effective, ex-situ extraction and treatment will be substituted. The ROD for the Frost Street sites only specified in-well vapor stripping and did not specify DDC or UVB. The Frost Street sites ROD included an alternative with a description of a DDC system. The PRP's consultant had proposed a UVB system in their Remedial Design work plan for the Frost Street sites. Therefore, the DEC did not express a preference for UVB over DDC in the Frost Street Sites ROD.

COMMENT 16: The NYSDEC PRAP Figure 22 shows the DDC wells at a depth of 250 feet below grade and with a radius of influence (ROI) of more than 500 ft. Review of literature on circulation well hydraulics indicated that this ROI would occur on only rare occasions and that the actual radius of influence may be closer to 250 or 300 ft. With this smaller radius it is likely that many more DDC wells would be required to provide the required area coverage.

RESPONSE 16: The radius of influence for the treatment wells was derived from vendor estimates. A pilot test will be conducted on the first well installation to determine whether the

projected ROI is accurate. The final number and location of wells to be installed will depend on the results of the pilot test.

COMMENT 17: The PRAP proposed DDC system relies on air compressors to drive air down to a depth of treatment. The more economical operation is to utilize a traditional rotary vane air compressor.

RESPONSE 17: During the design phase, various variables will be evaluated.

COMMENT 18: The reference to the Utility Manufacturing site on page 15, column 2, paragraph 2, should be deleted since the Utility site is not located north of Main Street.

RESPONSE 18: The NYSDEC concurs and the appropriate change has been made in the Record of Decision.

COMMENT 19: What method of monitoring will be employed during the pilot tests to confirm that the circulation cells displayed on Figure 12 have been achieved.

RESPONSE 19: Monitoring methods will be determined prior to the pilot tests.

COMMENT 20: The decision on a final remedial work plan should be postponed until all area wide contributions are assessed.

RESPONSE 20: The NYSDEC believes that sufficient groundwater data has been acquired. Further delay in implementation of active remediation of the groundwater contamination plume from the NCIA would allow the plume to migrate further downgradient and would allow the plume to continue to impact the Bowling Green water supply wells.

COMMENT 21: On page 10 of the PRAP, the NYSDEC indicates that the area of the 36 Sylvester street site is approximately one acre. That is incorrect. The site is 0.4591 acres.

RESPONSE 21: The NYSDEC concurs and the appropriate change has been made in the Record of Decision.

CA RICH CONSULTANTS, INC.
CERTIFIED GROUND-WATER AND
ENVIRONMENTAL SPECIALISTS
e-mail: eweinstock@carichinc.com
website: www.carichinc.com

June 26, 2003

NYSDEC
Division of Hazardous Waste Remediation
625 Broadway
Albany, New York 12233-7015

Attention: Joseph Jones

Re: **PRAP for the New Cassel Industrial Area**
OU-3 – Off-Site Groundwater

Dear Mr. Jones:

On behalf of Utility Manufacturing, we have reviewed the above-referenced PRAP and offer the following comments.

It is our experience that most of the New Cassel area has extensive silt and clay layers at depths of 50 to 100 feet below grade. Does the NYSDEC have any case histories they can share with us where the selected technology – in-well vapor stripping – has been successfully applied in similar geologic environments. Furthermore, what method of monitoring will be employed during the pilot tests to confirm that the circulation cells displayed on Figure 12 of the document have been achieved? If the circulation cells cannot be achieved, will this still be considered a viable technology?

The reference to the Utility Manufacturing site on page 15, column 2, paragraph 2, should be deleted since Utility is not located north of Main Street.

If there are any questions regarding this letter, please do not hesitate to call our office.

Sincerely,

CA RICH CONSULTANTS, INC.

Eric A. Weinstock
Associate

cc: Audie Kranz
Miriam Villani, Esq.

Users\Eric\Docs\Utility\Off-site prap comments

NEW YORK STATE LEGISLATIVE COMMISSION ON WATER RESOURCE NEEDS OF NEW YORK STATE AND LONG ISLAND

ASSEMBLYMAN
THOMAS P. DiNAPOLI
Co-Chair

RICHARD D. MORSE
Executive Director

July 30, 2003

Joseph Jones, Project Manager
NYSDEC Central Office
625 Broadway, 11th Floor
Albany, NY 12233-7015

Re: New Cassel Industrial Area, Site 1-30-043
Proposed Remedial Action Plan, May 2003

Dear Mr. Jones,

I attempted to review the Proposed Remedial Plan for the off-site groundwater contamination migrating from the New Cassel Industrial site, at the Town Clerk's office in the Town of North Hempstead. However the staff person in the Town's document repository had no record of receiving this document. In spite of being unable to review the plan, I would like to submit the following general comments.

The overall process that DEC has followed to address the multiple sites located in this area, has resulted in considerable progress in addressing many of the long-standing problems that have plagued the New Cassel community. DEC staff is to be commended for their efforts on this project.

Based on information presented at a number of public meetings, significant off-site groundwater contamination still remains and will not be remediated by the systems already in place. It is essential that installation of an active remedial system to address the off-site groundwater contamination proceed as quickly as possible, in order to minimize damage to the aquifer and protect near by public supply wells. If an agreement cannot be reach with the responsible parties to undertake this work, then DEC should proceed, using State Superfund monies as soon as these funds become available.

I thank you for the opportunity to submit these comments. I will continue to follow the progress in cleaning up the contamination associated with the New Cassel Industrial Area.

Yours truly,

Rosemary Konatich
Senior Environmental Analyst

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Agency 4, 5th Floor
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WALDEN ASSOCIATES, INC.

ENVIRONMENTAL CONSULTANTS
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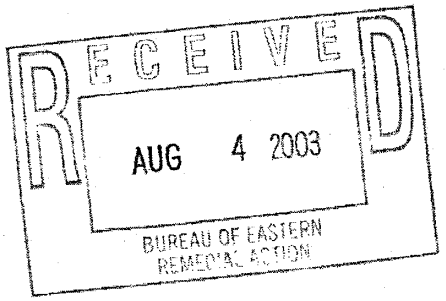
EMAIL: INQUIRIES@WALDEN-ASSOC.COM

CERTIFIED MAIL # 7001 1940 0002 8037 6196

July 31, 2003



Mr. Joseph Jones
Project Manager
NYSDEC Central Office
625 Broadway, 11th Floor
Albany, New York 12233-7015

Re: Public Comments on New Cassel Industrial Area Site #1-30-043
OU3 Off Site Groundwater Proposed Remedial Action Plan

Dear Mr. Jones:

In response to the May 28th release of the New Cassel Industrial Area (NCIA) Site Number 1-30-043 OU3 Off Site Groundwater Proposed Remedial Action Plan (PRAP) Walden has prepared the following comments on behalf of Next Millennium Realty, LLC and 101 Frost Street Associates. The initial comments are general followed by more specific issues that should be addressed prior to a final decision on remediation.

General Comments

The PRAP contemplates an area wide groundwater remedial plan based on a limited area wide study and draws conclusions by using historic data while ignoring current groundwater monitoring data. To date, the NYSDEC has not demonstrated that the Eastern plume commingles with the Central plume and contaminates the Bowling Green Supply Wells. To date, there is no mapped data supporting this assumed linkage, only postulation supported by the figures presented in the PRAP that were created using data from five years ago. If the basis of presuming that the Eastern plume commingles with

the Central plume and contaminates the Bowling Green Supply Well is its geographic location (up gradient) and the regional groundwater flow direction (SW), then the General Instrument site (GI), located northwest of the Eastern plume, must be considered as contributing to the NCIA off site "regional" plume. The GI plume includes high PCE (>1000 ppb) concentrations in deep groundwater (>350 ft BG). NYSDEC must review its conclusions and include current groundwater data to justify its conclusions.

The GI property, located on the east side of Wantagh State Parkway has a substantial groundwater PCE plume which has been detected at depths ranging to greater than 350 feet below grade. Walden further notes the public records regarding investigative work on the GI plume indicates that the plume is not delineated to the southwest and south. This plume is primarily comprised of PCE and its by-products, which are the same constituents of the NCIA eastern and central plumes. Based on the southwesterly groundwater flow direction relied upon by the NYSDEC, the depth and the PCE concentration of the GI plume it is reasonable for NYSDEC to include the GI plume in its area wide study and remedial plan considerations. Clearly the NYSDEC must consider the potential for deep PCE contaminated groundwater being drawn to the west and under the Wantagh State Parkway by the far reaching influence of the Bowling Green public supply wells and the natural area flow gradient. Walden suggests that a groundwater map covering a wider area be drawn at varying depths to 500 plus feet below grade and include all General Instruments groundwater data. The decision on a final remedial work plan would be postponed until all areawide contributions are assessed.

A review of NYSDEC requirements in similar cases of groundwater contamination on Long Island indicates that the NYSDEC is taking a unique approach to the NCIA. The proposal to install a treatment system to address area wide groundwater contamination is not consistent with the NYSDECs formerly established precedent of frequently deferring treatment of large defined plumes in favor of "hot spot" treatment unless the plume is an immediate threat to a potable supply well. It was clearly stated in LMS's September

2000 Feasibility Study that groundwater in the area does not pose a threat of exposure to any populations, as the Bowling Green wells have both air stripping and GAC treatment acting on all pumped potable water. If the NYSDEC has additional information refuting LMS's findings, such as the presence of another supply well in the area or groundwater-modeling data that shows that the Eastern Plume is a threat to the Bowling Green Supply Well, Walden requests a copy of that data. If the NYSDEC does not have additional data that supports the area wide remediation plan, it appears that the NYSDEC's PRAP for off site groundwater at NCIA is a departure from its approach on similar projects. Note that responsible parties for the Frost Street sites have signed a consent order and are currently investigating and planning for remedial pilot testing and on site remediation work and that these plans should be coordinated with the most recent NYSDEC analysis and data associated with area wide groundwater contamination.

It was noted during the PRAP public meeting that the use of the Bowling Green potable well field as the primary treatment system is not considered to be an appropriate use of a potable well and this seems to be the justification for the area wide aquifer restoration approach. Walden believes that the cost of installation of a replacement potable well within the Bowling Green Water District at an alternate site along with potential transmission of water back to the Bowling Green well field site would be considerably cheaper than installation of area wide treatment and the associated operation and maintenance costs. Walden believes that a new well could be located and drilled and put into use with Bowling Green for less than $2,000,000 including land acquisition. Has NYSDEC considered an approach like this in its areawide off site groundwater plan?

Specific Comments on Alternate 8

The plume designation map which is used to show the extent of contamination and the layout of treatment wells is based on the average total VOCs recorded in study related monitoring wells from 1996 through 2000 and covers a depth horizon of 65 – 200 feet

below grade. Walden's recently completed monitoring well installation and groundwater sampling data indicates that plume mapping should be done based on a shorter and more current timeframe (*i.e.* all data collected from the year 2000 or data collected from a single event). Further, it would be more accurate and useful to plot data from the same geologic units or from a shorter vertical horizon (*i.e.* 65 – 85 feet below grade or 120 – 140 feet below grade), as is standard hydrogeologic practice. Walden's current groundwater data should be considered before a final PRAP is formulated, as the current remedial proposal is based on outdated data. LMS's contract to perform the off site RI/FS work concluded September 2000. NYSDEC's conclusions based on LMS's work are dated and current data does not support the plume mapping presented in the PRAP.

It appears that the proposed area wide groundwater treatment system will treat groundwater to a maximum depth of 250 feet below grade. This depth is indicated as the maximum depth of circulation well placement. It was noted during the PRAP public meeting that MW-9 was installed to a depth of 300 feet BG and that it contained total VOC's of 27 ppb. NYSDEC further indicated that this level of contamination was above Class GA groundwater standards (the stated treatment goal) and would require treatment. Since the current proposal does not address the deeper impact, at this time prior to finalizing the PRAP, additional investigation should be conducted so that a second investigation is not needed after remediation of the groundwater above 250 ft below grade begins.

The NYSDEC asserts that circulation wells driven by density driven convection (DDC) type in-well stripping systems are the appropriate circulation models to be used below 100 feet of submergence. Based on extensive research of both the hydraulics and the mechanical limitation of DDC wells, Walden's professional engineering opinion is that the DDC wells are not appropriate for this application. Note that the circulation well technology recommended by the NYSDEC consultant (LMS), and mandated by NYSDEC's ROD for the Frost Street sites called for the use of a submersible pump

supporting a UVB in-well stripping system. The NYSDEC's PRAP including the DDC system indicates either a change in treatment recommendation or a loss of faith in UVB.

The NYSDEC PRAP Figure 22 (DDC wells) shows the DDC wells at a depth of 250 feet below grade and with a radius of influence of more than 500 feet. Walden questions how this number was obtained. Review of literature on circulation well hydraulics indicates that this ROI would occur on only rare occasions and that the actual radius of influence may be closer to 250 to 300 feet as the maximum range. With this smaller radius it is likely that many more DDC wells would be required to provide the required area coverage. Walden constructed a modified DDC well layout in which an ROI of 250 feet was used and the total number of required treatment wells increased from 5 to 10. The increase in the number of treatment wells would then increase the estimated capital costs of alternative 8 by at least 100%, while the O&M cost would also increase approximately 100%. If Alternative 8 was selected with any consideration for its cost, these revised costs must be added to the scheme to ensure that it remains the most appropriate alternative.

The PRAP proposed DDC system relies on air compressors to drive air down to a depth of treatment. The more economical operation is to utilize a traditional rotary vane air compressor, which is the only type of compressor that can be utilized for this application and does not work when the required discharge pressure exceeds 30 psi. The DDC system relies on use of both an air compressor to drive air to a depth of treatment and a vacuum blower to remove contaminated air from the well. Use of two pneumatic machines would require an unreasonable amount of consumption of electricity over the life of the system.

In summary, Walden strongly recommends that NYSDEC delay adoption of a final remedial action plan for the off site groundwater plumes south of Old Country Road until more data on the dynamics of the plume and potential contributions of still unmapped

areas are considered. There is no need for the perception of a "belt and suspenders" approach to cleanup of an area where various remedial measures have already been in effect for 7 years. Walden would be available at NYSDEC's request to discuss these issues or aid in any way. Please feel free to call us if you should have any questions regarding these comments.

Very Truly Yours;

Walden Associates Inc.
Environmental Consultants

Joseph M. Heaney III, PE
Principal

Cc: F. Werfel
M. Rubin, Esq.

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August 25, 2003

CHARLOTTE BIBLOW
PARTNER
DIRECT DIAL: (516) 227-0686
DIRECT FAX: (516) 336-2266
cbiblow@farrellfritz.com

OUR FILE NUMBER
16606-100

VIA CERTIFIED MAIL - RRR

Mr. Joseph G. Jones
Project Manager
New York State Department of Environmental Conservation
625 Broadway, 11th Floor
Albany, New York 12233-7015

Re: **Grand Machinery, 36 Sylvester Street**
Site # 1-30-043U, New Castle Industrial Area

Dear Mr. Jones:

We represent Grand Machinery Exchange, the owner of the 36 Sylvester Street site mentioned above. We are writing to advise you of an error in the most recent Proposed Remedial Action Plan ("PRAP"). On page 10 of that document, you indicate that the 36 Sylvester Street site is approximately one acre. That is incorrect. The site is 0.4591 acres (20,000 square feet). Attached is a listing of the property from the Nassau County Assessor's Office which documents the size of the property. In addition, the reports previously submitted to the Department indicate that it is 20,000 square feet. Furthermore in figure two of the PRAP, you have the 36 Sylvester Street site as being a Class 2 site. That is also incorrect. As indicated in the PRAP, pursuant to a Record On Decision issued in March 2003, that site has now been delisted. Accordingly I would appreciate you updating your figure to indicate the correct status of the property.

Thank you for your attention to this matter.

Very truly yours,

Charlotte Biblow

Charlotte Biblow

CB/sd
Enc.
cc: Chittibabu Vasudevan, PhD, PE (w/enc.)
Alali Tamuno, Esq. (w/enc.)
Paul Merandi (w/enc.)

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HEL

NASSAU COUNTY
LONG ISLAND NY

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Address Section,Block,Lot

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- ▶ Parcel Data
- Residential
- Commercial
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11077 00210

36 SYLVESTER ST

K

Ret

Parcel

Property Location	36 SYLVESTER ST
Parcel ID	11077 00210
Classification	COMMERCIAL
Land Use Code	4-Light Manufacturing, Small Factory Bld
Land Area (acres)	.4591
School District	WESTBURY UFSD
Municipality	NORTH HEMPSTEAD

APPENDIX B

Administrative Record

Administrative Record

New Cassel Industrial Area Inactive Hazardous Waste Disposal Sites
Town of North Hempstead, Nassau County, New York
Operable Unit No. 03 - Off-site Groundwater South of the NCIA
Site Nos.: 1-30-043A, 1-30-043B, 1-30-043C, 1-30-043D, 1-30-043E, 1-30-043H, 1-30-043I, 1-30-043K, 1-30-043L, 1-30-043M, 1-30-043P, 1-30-043S, 1-30-043U & 1-30-043V, October 2003

1. Record of Decision-Metpar Steel, Inc., Site No. 130043G, January 1997

2. Record of Decision-Former Tishcon, Site No. 130043F, January 1997

3. Record of Decision-Tishcon Corporation, 30-36 New York Avenue and 31-33 Brooklyn Avenue, Site No. 130043E, Operable Unit 01-Soil Removal, January 1998

4. Record of Decision-IMC Magnetics, Site No. 130043A, Operable Unit 01-Soils, January 1998

5. Record of Decision-Tishcon Corporation 125 State Street, Site No. 130043C, January 1998

6. Record of Decision-Arkwin Industries Site, Site No. 130043D, Operable Unit 01-Soil, January 1998

7. Record of Decision-Arkwin Industries Site, Site No. 130043D, Operable Unit 02-Groundwater, December 1999

8. Record of Decision-Northeast Corner of Hopper & Main Street, Site No. 130043T, February 2000

9. Record of Decision-Former LAKA Industries, Inc., Site No. 130043K, Operable Unit 01-On-Site Soil and Groundwater, February 2000

10. Record of Decision-Atlas Graphics, Site No. 130043B, Operable Unit 01, Operable Unit 01- On-Site Soil and Groundwater, February 2000

11. Record of Decision-Former Autoline Automotive, Site No. 1-30-043I, Operable Unit 01-Soil, March 2000

12. Record of Decision-IMC Magnetics, Site No. 130043A, Operable Unit 02-On-Site Groundwater, March 2000

13. Record of Decision-Tishcon @ Brooklyn Avenue, Site No. 130043E, Operable Unit 02-Off-site Groundwater, March 2000

14. Record of Decision-89 Frost Street, Site No. 130043L, Operable Unit 01-Soil, March 2000

15. Record of Decision-Former Applied Fluidics, Site No. 130043M, Operable Unit 01-Soil, March 2000

16. Record of Decision-Tishcon @ 29 New York Avenue, Site No. 130043V, March 2002

17. Record of Decision-36 Sylvester Street, Site No. 130043U, March 2003

18. Proposed Remedial Action Plan for the New Cassel Industrial Area sites, dated May 2003, prepared by the NYSDEC.

19. New York State Superfund Contract, Site Investigation Report, New Cassel Industrial Area Site, Work Assignment No. D002676-2.2, Lawler, Matusky and Skelly Engineers, February, 1995.

20. Multisite PSA Report, New Cassel Industrial Area Site, Work Assignment No. D002676-2.2, Lawler, Matusky and Skelly Engineers, March, 1996.

21. Comprehensive Citizen Participation Plan, New Cassel Industrial Area Site, Site ID: 1-30-043, New York State Department of Environmental Conservation, November 1995.

22. Focused Remedial Investigation Report for the 118-130 Swalm Street Site, No. 130043P, Fanning, Phillips and Molnar, May 1999

23. New Cassel Industrial Area Offsite Groundwater Remedial Investigation/Feasibility Study (RI/FS) Report, Volumes I, II and III, Lawler, Matusky and Skelly Engineers, September 2000.