PROPOSED REMEDIAL ACTION PLAN
Ozone Industries
Ozone Park, Queens County, New York
Site No. 241033

November 2009

Prepared by:

Division of Environmental Remediation
New York State Department of Environmental Conservation

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SECTION 1: SUMMARY AND PURPOSE OF THE PROPOSED PLAN

The New York State Department of Environmental Conservation (the Department), in consultation with the New York State Department of Health (NYSDOH), is proposing a remedy for the Ozone Industries Site. The presence of hazardous waste has created significant threats to human health and/or the environment that are addressed by this proposed remedy. As more fully described in Sections 3 and 5 of this document, improper handling and storage of drummed solvent material resulted in the disposal of hazardous wastes, including trichloroethene (TCE) and cis-1,2-dichloroethene (cis-1,2 DCE), both volatile organic compounds (VOCs). These wastes have contaminated the groundwater, soil and soil vapor at the site, and have resulted in:

- a significant threat to human health associated with potential exposure to contaminated groundwater and indoor air.
- a significant environmental threat associated with the current and potential impacts of contaminants to the groundwater.

To eliminate or mitigate these threats, the Department proposes to excavate the contaminated shallow soils, construct/operate a soil vapor extraction system, and construct/operate a sub-slab depressurization system in the disposal area. Groundwater monitoring is proposed for the contaminated groundwater plume and institutional controls would be imposed in the form of an environmental easement.

The proposed remedy, discussed in detail in Section 8, is intended to attain the remediation goals identified for this site in Section 6. The remedy must conform with officially promulgated standards and criteria that are directly applicable, or that are relevant and appropriate. The selection of a remedy must also take into consideration guidance, as appropriate. Standards, criteria and guidance are hereafter called SCGs.

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

The Department has issued this PRAP as a component of the Citizen Participation Plan developed pursuant to the New York State Environmental Conservation Law and Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York (6 NYCRR) Part 375. This document is a summary of the information that can be found in greater detail in the July 2009 “Remedial Investigation and Feasibility Study Report“ (RI/FS) and other relevant documents. The public is encouraged to review the project documents, which are available at the following repositories:

New York State Department of Environmental Conservation
Division of Environmental Remediation
12th Floor
625 Broadway
Albany, NY 12233-7016
Attn: John Durnin, Project Manager, (888) 212-9586
Hours: M-F 9 AM to 4 PM

Queens Borough Public Library
Central Library
89-11 Merrick Blvd., Jamaica, NY 11432
Attn: Reference Desk, (718) 990-0700
Hours: M-F 10 AM-9 PM
Sat 10 AM-5:30 PM
Sun 12-5 PM

The Department seeks input from the community on all PRAPs. A public comment period has been set from November 24, 2009 to December 24, 2009 to provide an opportunity for public participation in the remedy selection process. A public meeting is scheduled for December 9, 2009 at the Middle 210 E. Blackwell Middle School beginning at 7:00 PM.

At the meeting, the results of the RI/FS will be presented along with a summary of the proposed remedy. After the presentation, a question-and-answer period will be held, during which verbal or written comments may be submitted on the PRAP. Written comments may also be sent to Mr. Durnin at the above address through December 24, 2009.

The Department may modify the proposed remedy or select another of the alternatives presented in this PRAP, based on new information or public comments. Therefore, the public is encouraged to review and comment on all of the alternatives identified here.

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

SECTION 2: SITE LOCATION AND DESCRIPTION

The Ozone Industries site is located in a mixed commercial/industrial/residential area of the Ozone Park section of Queens, Queens County, New York (Figure 1). The site is located within a block that is bounded by 99th and 100th Streets to the east and west, and by 101st and 103rd Avenues to the north and south. This Class 2 Inactive Hazardous Waste Disposal Site consists of eight bays (totaling 12,000 square feet or approx. 0.25 acres) situated beneath an abandoned, elevated Long Island Railroad (LIRR) (Figure 2). Each bay, approximately 25 feet wide and 60 feet long, is property between the support columns of the elevate LIRR. The bays are owned by the City of New York and leased to various tenants for different uses. Several of these bays were used for storage of spent trichloroethene (TCE) in conjunction with the manufacture of aircraft parts (1948 to 1996). The bays are located across the street from 101-32 101st Street, the location of the former Ozone Industries Facility.

The nearest surface water body is Jamaica Bay, approximately 1.5 miles to the south. The nearest water supply is approximately one mile to the northeast. Groundwater generally flows to the south-southwest through the Site (Figure 3) and is approximately 30 feet below the surface.

A silt-sand-gravel urban fill material exists on-site and off-site (0-4 foot depth). Below the fill is naturally occurring light brown medium/coarse grained sandy soil. Bedrock in the area is estimated at a depth of over 500 feet below the surface.

SECTION 3: SITE HISTORY

3.1: Operational/Disposal History

For some period prior to 1998 the Ozone Industries Facility rented, for storage purposes, several bays beneath the LIRR that make up this Class 2 Inactive Hazardous Waste Disposal Site. The bays, typically constructed of cinder block walls and concrete or asphalt floors, were used to store solvents, hydraulic fluids, and scrap metal chips in roll-off containers that resulted from the Ozone Industries manufacturing activities. The facility manufactured aircraft parts including landing gears, hydraulic assemblies, aircraft steering assemblies and flight controls. It is believed that releases of solvents, oil and/or fluids may have occurred in one or more of these bays. The Ozone Industries Facility was sold in 1998.

3.2: Remedial History

In 2002, the Department listed the site as a Class 2 site in the Registry of Inactive Hazardous Waste Disposal Sites in New York. A Class 2 site is a site where hazardous waste presents a significant threat to the public health or the environment and action is required.

Several site investigations took place between 1996 and 2003 which involved the Ozone Industries Site. In 1996, the New York City School Construction Authority conducted a Phase I and Phase II Environmental Site Assessment of the Former Voges Manufacturing Company property located south of 103rd Avenue on 99th Street (currently PS65). The 1996 Phase I Report identified Ozone Industries as having a 2000-gal storage tank that was used to store TCE and reported TCE in the groundwater at the Former Voges Manufacturing Company property. This led to further investigations at and near the Ozone Industries Facility.

Two Environmental Site Assessments, Phase I in 1997and Phase II in 1998, were conducted at the Ozone Industries Facility across the street from the Site (Bays 8-15). These investigations included inspection of existing aboveground storage tanks, underground storage tanks and a depressed area for staging 55-gallon drums. Soil samples were also collected and tested for petroleum related compounds. Some petroleum contamination was detected and a 1000 gallon underground storage tank and 2 open pits were later closed in October 1999. The 1997 Phase I Report also stated that waste TCE was placed in 55-gal drums and stored across the street in areas located underneath the elevated LIRR. No evidence of the use of polychlorinated biphenyls (PCBs) was found.

In the summer of 1999, the Department conducted a Preliminary Site Assessment (PSA) in the vicinity of the Former Voges Manufacturing Company property (103-22 99th Street) and the Ozone Industries Facility (101-132 101st Street) to determine the source of the TCE contamination in the groundwater. Twenty one groundwater sampling points were installed in the sidewalks upgradient and west of the Ozone Industries Facility and in the area of the Former Voges Manufacturing Company property. TCE was found in a majority of the samples at varying concentrations except the upgradient samples did not detect any TCE in the groundwater. The PSA findings indicated there was a source of TCE contamination near the Ozone Industries Facility, possibly from stored drums beneath the elevated LIRR.

The Department conducted further field investigations in June 2001, July 2002, August 2002 and May 2003 to collect additional soil samples, groundwater samples and soil vapor samples. This investigative work expanded on the earlier PSA investigations and included temporary well points, soil borings for piezometers and 19 permanent soil vapor wells. The analysis of soil samples for VOCs did not indicate detectable levels in the majority of the samples. The groundwater sampling results indicated decreasing TCE concentrations with depth and TCE was detected in all the soil vapor samples.

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 Department and Endzone Inc., the successor to Ozone Industries, Inc., entered into a Consent Order on February 5, 2003. The Order obligates the responsible parties to implement a full remedial program.

SECTION 5: SITE CONTAMINATION

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

5.1: Summary of the Remedial Investigation

The purpose of the Remedial Investigation (RI) was to define the nature and extent of any contamination resulting from previous activities at the site. The RI was conducted between October 2004 and January 2008, both on-site and off-site.

The field activities and findings of the investigation are described in the RI report.

The initial phase of the RI work took place soon after the RI Work Plan was approved. Soil borings were installed, finished as monitoring wells, in the area outside the bays to begin to define the TCE plume. Existing off-site monitoring wells, installed prior to this RI work, were also redeveloped for groundwater sampling. The soil from the well borings and the groundwater were sampled for VOCs and screened for physical properties to assess the hydrogeologic conditions. A second round of groundwater samples for VOCs was conducted from all the wells in early 2005 including tests in several wells to assess the permeability of the soils.

With the Site delineated as Bays 8-15 (below the LIRR), a second phase of the RI began after gaining access from the owner, the City of New York. Soil and soil vapor samples were collected and analyzed for VOCs in the 8 bays and from several pre-existing off-Site soil vapor points. As per the RI Work Plan, interim RI data, with recommendations for additional activities, was submitted to the Department. As recommended, the RI/FS Work Plan was amended to conduct additional on-site and off-site investigations to better delineate VOC impacts in subsurface soils and soil vapor. This also included another round of groundwater sampling and analysis for VOCs in 20 wells. Access to the bays for this work was again obtained from the City of New York and the tasks were completed in August 2006.

During the third phase of the RI, an off-site Soil Vapor Intrusion Work Plan was approved to conduct subslab soil vapor and indoor air sampling at adjacent off-site properties. After a significant out reach to adjacent property owners, no access was granted by any owners to do this investigation work. To evaluate the feasibility of a subslab depressurization (SSD) system as part of the site cleanup remedy, a Field Pilot Study was conducted in the bays in early 2008 and the results indicated favorable conditions for an SSD system. Additional interim RI data was submitted to the Department with a recommendation to begin the RI/FS Report. The Final RI/FS Report was submitted in June 2009 and was approved on October 14, 2009.

5.1.1: Standards, Criteria, and Guidance (SCGs)

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

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

2. Soil SCGs are based on the Department's Cleanup Objectives (NYCRR Part 375, Subpart 375-6, Remedial Program Soil Cleanup Objectives.)

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

5.1.2: Nature and Extent of Contamination

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

As described in the RI report, many soil, groundwater and soil vapor samples were collected to characterize the nature and extent of contamination. As seen in Figures 4 through 7, the main category of contaminants that exceeded their SCGs is volatile organic compounds (VOCs). For comparison purposes, where applicable, SCGs are provided for each medium.

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

Figures 4 through 7 summarize the degree of contamination for the contaminants of concern in subsurface soil, groundwater and soil vapor.

The following are the media which were investigated and a summary of the findings of the investigation.

Subsurface Soil

As part of this RI, subsurface soil samples from below the floors of the Site (Bays 8-15) and off-site bays 2, 4, 17, 24 and 28 were analyzed for VOCs. Subsurface soil samples below the sidewalks, both upgradient and downgradient of the Site, were also investigated. Figure 4 presents the subsurface soil sampling results for TCE and cis-1,2 DCE in shallow soil and Figure 5 presents the results from deep soil.

Of the 90 subsurface soil samples collected, all were non-detect or well below the Unrestricted Use Soil Cleanup Objectives including up gradient and down gradient subsurface soil samples except for the shallow soils (0-2 feet deep). These shallow soil samples, collected directly beneath the asphalt or concrete bay floors, are impacted by TCE and may provide a continuing source of contamination for groundwater and soil vapor contamination. TCE was found as high as 150 ppm in the subsurface soil samples beneath the on-site bay floors, with levels of TCE decreasing with depth, generally non-detectable near the groundwater table.

Subsurface soil contamination identified during the RI/FS will be addressed in the remedy selection process.

Groundwater

Access with drilling equipment in each bay was difficult and prohibited the installation of monitoring wells inside the bays. All wells and related groundwater samples associated with the bays are just outside and adjacent to the bays. Groundwater is approximately 30 feet below the surface and generally flows to the south-southwest (Figure 3).

Groundwater sampling was conducted near and in the vicinity of the Site as early as 1999, prior to the RI. Then, in January 2005 to August 2006, as part of the RI, four rounds of groundwater sampling took place at 20 monitoring wells. The TCE levels detected in the groundwater in 2006 were generally lower than those detected in 2005 and considerably lower than those detected in 2002 and 2003. Figure 6 and Figure 6A depict TCE in groundwater over time. The applicable SCG (Class GA groundwater criteria) for TCE is 5 ppb.

In June 1999, the highest level of TCE in the groundwater was 22,000 ppb found just south of the Site along 100th Street. The highest TCE level in the most recent August 2006 groundwater sample was 260 ppb located along 99th Street. The August 2006 groundwater sample adjacent to the Site (near Bay 7) had TCE at 7 ppb, slightly above the SCG for TCE.

Downgradient groundwater wells near 103rd Avenue, sampled in August 2006, had TCE concentrations ranging between 8.3 ppb and 74 ppb. TCE was also detected in the upgradient well along 101st Avenue in April 2005 (23 ppb) and in August 2006 (8 ppb).

The groundwater sampling results indicated decreasing TCE concentrations with depth with the highest concentrations at the groundwater/soil interface. Generally, three areas were found to have the highest concentrations of TCE in the groundwater: near Bays 14-20; near the intersection of 103rd Avenue and 99th Street; and on 98th street south of 103rd Avenue.

Groundwater contamination identified during the RI/FS will be addressed in the remedy selection process.

Soil Vapor/Sub-Slab Vapor

The RI included soil vapor samples collected from beneath the Site and off-site in 2005 and 2006. All samples, analyzed for VOCs, were collected between the depths of 4 and 8 feet below ground surface (bgs). Soil vapor sampling was also conducted in the vicinity of the Site before the RI began, as early as 2002. The analytical results of TCE and cis-1,2 DCE in soil vapor for all samples from 2002 to 2006 are presented in Figure 7. The results were used to delineate the source area and evaluate the potential for exposures via soil vapor intrusion. A concerted effort was made to obtain off-site indoor air and subslab vapor data but access has not been granted by property owners.

The 2006 on-site soil vapor sample analyses found elevated subslab TCE contaminant levels in all eight bays, as high as 675,000 ug/m^3 (Bay 8). The 2006 off-site soil vapor samples were collected in the sidewalks outside the bays and covered an area from 101st Avenue to below 103rd Avenue. The TCE soil vapor concentrations near 101st Avenue ranged from 252 ug/m^3 to 5,960 ug/m^3. South of the Site, Bay 24 and Bay 28 were sampled (near 103rd Avenue). Bay 24 had TCE at 94,900 ug/m^3 but Bay 28 was non-detect. Another four locations were sampled for soil vapor on 103rd Avenue and south toward Liberty Avenue and the all the 2006 results for TCE and cis-1,2 DCE were non-detect.

Soil vapor contamination identified during the RI/FS will be addressed in the remedy selection process.

5.2: Interim Remedial Measures

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

5.3: Summary of Human Exposure Pathways:

This section describes the types of human exposures that may present added health risks to persons at or around the site. A more detailed discussion of the human exposure pathways can be found in Section 4.0 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.

On-site soil, groundwater and soil vapor are contaminated with volatile organic compounds, mainly trichloroethene. Off-site groundwater and soil vapor are also contaminated with site-related compounds. Contact exposure with contaminated soil is not expected since it is located beneath the building. Ingestion of contaminated groundwater is a potential exposure concern, however this pathway is not complete because the area is served by public water and, as noted in Section 2, the nearest water supply is one mile upgradient (northeast) of the site.

On-site inhalation exposure via soil vapor intrusion is a potential exposure pathway. Indoor air sampling was not performed, therefore this exposure pathway cannot be verified. However, the potential for this exposure to occur is reduced by the frequent ventilation of the building through opening bay doors. Off-site inhalation exposure via soil vapor intrusion is also a potential exposure pathway. This potential exposure pathway has not been investigated due to access limitations in off-site properties. Additional investigation of this potential exposure pathway is recommended.

5.4: Summary of Environmental Assessment

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

The following environmental exposure pathways and ecological risks have been identified:

Site contamination has impacted the groundwater resource in the overburden aquifer. The surrounding land use is a mixed commercial/industrial/residential area and there are no environmental resources affected other then the groundwater.

SECTION 6: <u>SUMMARY OF THE REMEDIATION GOALS</u>

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

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

- exposures of persons at or around the site to VOCs including TCE and its degradation product (cis-1,2 DCE) in contaminated groundwater and subsurface soil;

- the release of contaminants from soil into groundwater that may create exceedances of groundwater quality standards; and

- the release of contaminants from soil vapor into indoor air through vapor intrusion.

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

- ambient groundwater quality standards and

- soil SCGs based on Part 375, Subpart 375-6.8.

SECTION 7: <u>SUMMARY OF THE EVALUATION OF ALTERNATIVES</u>

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 Ozone Industries Site were identified, screened and evaluated in the FS report which is available at the document repositories established for this site.

A summary of the remedial alternatives that were considered for this site is discussed below. The present worth represents the amount of money invested in the current year that would be sufficient to cover all present and future costs associated with the alternative. This enables the costs of remedial alternatives to be compared on a common basis. As a convention, a time frame of 30 years is used to evaluate present worth costs for alternatives with an indefinite duration. This does not imply that operation, maintenance, or monitoring would cease after 30 years if remediation goals are not achieved.

7.1: Description of Remedial Alternatives

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

Alternative 1: No Action

Present Worth: *$0*

Capital Cost: *$0*

Annual Costs:

(Years 1-30): *$0*

The No Action Alternative is evaluated as a procedural requirement and as a basis for comparison. It requires continued monitoring only, allowing the site to remain in an unremediated state. This alternative would leave the site in its present condition and would not provide any additional protection to human health or the environment.

Alternative 2

Remediate All Contaminated Media to Pre-Release Conditions, Vapor Intrusion Mitigation and Institutional Controls

Present Worth: *$23,500,000*

Capital Cost: *$22,000,000*

Annual Costs:

(Years 1-10): *$200,000*

For the purpose of this evaluation, pre-release conditions are defined as soil cleanup objectives in Subpart 375-6.8 for unrestricted use and groundwater SCGs for chlorinated VOCs. To achieve this would involve large scale soil excavation, chemical oxidation treatment of the groundwater and a groundwater pump and treatment system. Institutional controls and off-site vapor intrusion mitigation would also be required.

Soil Excavation: Under this alternative all on-site and off-site soils located beneath the elevated LIRR structure between 101st Avenue and 103rd Avenue, which exceed SCGs, would be excavated and transported off-site for disposal. The maximum footprint of the excavation would be approximately 60 feet by 725 feet (43,500 square feet). To remove TCE-contaminated soil below the LIRR foundation and footings, removal of all structures, including the elevated railway would be required. All tenants and possibly some adjacent property owners would be relocated for two years or more.

Active Groundwater Remediation: Comprehensive soil excavation would remove the source of contaminated soil above the water table, but a groundwater cleanup would also be necessary to achieve pre-release groundwater conditions. Following excavation, an in-place (in-situ) chemical oxidation treatment system and groundwater pump and treatment system would actively remediate the groundwater beneath the Site (Bays 8-15).

In-situ chemical oxidation is a technology used to treat VOCs in the soil and groundwater. The process injects a chemical oxidant into the subsurface via injection wells or an infiltration gallery. The method of injection and depth of injection is determined by location of the contamination. As the chemical oxidant comes into contact with the contaminant, an oxidation reaction occurs that breaks down the contaminant into relatively benign compounds such as carbon dioxide and water. Several chemical oxidants are commercially available. At this site, the chemical oxidant would be applied through 15 injection wells screened from 30 to 50 feet bgs to target TCE. Prior to the full implementation of this technology, laboratory and on-site pilot scale studies would be conducted to more clearly define design parameters.

The groundwater extraction and treatment system would remove any VOCs mobilized by the chemical injections. This system would consist of approximately 6 pumping wells that would pull the TCE-contaminated groundwater up to the surface and into a treatment system, where it would be cleaned. The clean water would then be returned to the ground or to a public sewer.

Vapor Intrusion Mitigation: With the comprehensive excavation of soil and the active groundwater treatment system, additional on-site active measures to achieve pre-release conditions for soil vapor would not be necessary. However, off-site adjacent structures (residential, commercial) and off-site adjacent bays potentially impacted by Site contaminants would be investigated if access to the properties can be gained. The investigations for vapor intrusion would include basements, crawl spaces and living spaces. Based on the results of off-site vapor/air sampling, soil vapor mitigation systems would be installed, if required.

Institutional Controls: Until remedial goals have been achieved and to ensure that any future construction does not damage the chemical oxidation treatment system and the groundwater pump and treatment system, institutional controls, in cooperation with the City of New York as the property owner, would be enacted in the form of an environmental easement.

The time to design the remedy would be about one year; to construct the remedy would require two years plus a year to gain access to all the bays. The time to meet all the pre-release goals could take approximately 10 years.

Alternative 3

Soil Excavation, Soil Vapor Extraction System, Subslab Depressurization System, Monitoring of Groundwater, Vapor Intrusion Mitigation and Institutional Controls

Present Worth: $2,200,000

Capital Cost: $1,500,000

Annual Costs:

(Years 1-2) SVE, SSD, Groundwater Monitoring: *$210,000*

(Years 3-5) SSD, :Groundwater Monitoring *$100,000*

(Years 6-10) SSD, Groundwater Monitoring (minimal): *$10,000*

Alternative 3 includes soil excavation, a Soil Vapor Extraction (SVE) System, a Subslab Depressurization (SSD) System, groundwater monitoring, vapor intrusion mitigation and institutional controls.

Soil Excavation: Under this alternative all on-site soils located in the top 0-2 feet in Bays 8-15, which exceed the SCGs, would be excavated and transported off-site for disposal. Each bay is approximately 60 feet x 25 feet or 1,500 square feet in area and the total footprint of the excavation for 8 bays would be 12,000 square feet. Approximately 1,000 cubic yards of soil would be removed and clean backfill would replace the excavated contaminated soil (Figure 8). ~~Just~~ Prior to this soil excavation, as a pre-design investigation, the extent of contaminated soil beneath the 8 bays would be better defined through additional soil sampling. The sample results would also be used to characterize the soil for removal to a permitted disposal facility and provide additional data to determine if future use restrictions are needed at the site (i.e. to determine if remaining soil would exceed Part 375 Unrestricted Use SCGs).

Soil Vapor Extraction: Soil vapor extraction (SVE) is an in-situ technology used to treat volatile organic compounds (VOCs) in soil. The process physically removes contaminants from the soil by applying a vacuum to a SVE well that has been installed into the vadose zone (the area below the ground but above the water table). The vacuum draws air through the soil matrix which carries the VOCs from the soil to the SVE well. The air extracted from the SVE wells is then run through an activated carbon treatment canister to remove the VOCs before the air is discharged to the atmosphere.

At this site 24 SVE wells would be installed below Bays 8-15 (Figure 9) in the vadose zone and screened between 4 feet and 30 feet below the ground surface. At this point, the top shallow soils (source of contamination) would have already been removed and backfilled with clean soil. Although the RI sampling results have shown that the soil at depth below the bays is not highly contaminated, the SVE system would be effective as a “polishing” technique. Also, by design, the radius of influence of each SVE well’s vacuum would draw soil vapor from the entire volume of soil beneath the Site (above the groundwater table). The air containing VOCs extracted from the SVE wells would then be treated using activated carbon.

Sub-slab Depressurization: Subslab depressurization (SSD) is a piping system that would prevent vapor entry in residential or commercial buildings by reducing the air pressure beneath the slab. The SSD would actively create the pressure differential between the building’s interior and exterior. Using a small fan, vapor would be drawn from below the building and vented through pipes to the atmosphere above the structure where it is quickly diluted. This active SSD system would be installed below the floors in each bay (Figure 10). Treatment of the vapors may be required and would be evaluated during the design phase.

Groundwater Monitoring: The natural attenuation of the groundwater includes processes that work towards site clean up and include a variety of physical, chemical, or biological processes that, under favorable conditions, act without human intervention to reduce the concentration and mobility of contaminants in groundwater. The groundwater at the Ozone Industries Site would be monitored to verify that the VOC concentrations in groundwater are decreasing.

Vapor Intrusion Mitigation: With on-site source removal attained via soil excavation and with active SVE and SSD systems in place, no additional on-site measures to mitigate vapor intrusion would be necessary. However, off-site adjacent structures (residential, commercial) and off-site adjacent bays potentially impacted by Site contaminants would be investigated if access to the properties can be gained. The investigations for vapor intrusion would include basements, crawl spaces and living spaces. Based on the results of off-site vapor/air sampling, soil vapor mitigation systems would be installed, if required.

Institutional Controls: Until remedial goals have been achieved and to ensure that any future construction does not damage the SVE system/SSD system, institutional controls, in cooperation with the City of New York as the property owner, would be enacted in the form of an environmental easement.

The time to design and plan the remedy would be 6 months to one year. The time to implement the remedy would be 3 to 9 months and the bays could be reoccupied once the excavation work was complete. Operation of the SVE system would be on the order of several years to treat the VOCs in the subsurface soil and achieve the Department's soil cleanup objectives (NYCRR Part 375, Subpart 375-6). The active SSD equipment would remain in place indefinitely.

Alternative 4

Soil Excavation, Soil Vapor Extraction System, Subslab Depressurization System, Air Sparge Groundwater Treatment, Monitoring of Groundwater, Vapor Intrusion Mitigation and Institutional Controls

Present Worth: *$2,600,000*

Capital Cost: *$1,800,000*

Annual Costs:

(Years 1-2) SVE, SSD, AS: *$270,000*

(Years 3-5) SSD, Groundwater Monitoring : *$100,000*

(Years 6-10) SSD, Groundwater Monitoring (minimal): *$10,000*

Alternative 4 is the same as Alternative 3 except Alternative 4 incorporates Air Sparging (AS) as an active groundwater treatment system.

Air Sparging: Air sparging is an in-place technology used to treat groundwater contaminated with volatile organic compounds (VOCs). The process physically removes contaminants from the groundwater by injecting air into a well that has been installed into the groundwater. As the injected air rises through the groundwater it volatilizes the VOCs from the groundwater into the injected air. The

VOCs are carried with the injected air into the vadose zone (the area below the ground surface but above the water table) where a soil vapor extraction (SVE) system is used to remove the injected air. The SVE system pulls a vacuum on wells that have been installed into the vadose zone to remove the VOCs along with the air introduced by the sparging process. The air extracted from the SVE wells is then run through activated carbon which removes VOCs from the air before it is discharged to the atmosphere.

At this site, air injection wells would be installed in the portion of the site to be treated to a depth of approximately 40 feet, which is 10 feet below the water table. To capture the volatilized contaminants, 24 SVE wells would be installed in the vadose zone at a depth of approximately 30 below ground surface. The air containing VOCs extracted from the SVE wells would be treated with activated carbon.

The time to design and plan the remedy would be several months more than Alternative 3 or 8 months to 14 months. The time to implement the remedy would be 4 to 10 months and the bays could be reoccupied once the excavation work was complete. The time to operate the SVE and SSD systems would be the same as Alternative 3.

7.2 Evaluation of Remedial Alternatives

The criteria to which potential remedial alternatives are compared are defined in 6 NYCRR Part 375, which governs the remediation of inactive hazardous waste disposal sites in New York. A detailed discussion of the evaluation criteria and comparative analysis is included in the FS report.

The first two evaluation criteria are termed “threshold criteria” and must be satisfied in order for an alternative to be considered for selection.

1. Protection of Human Health and the Environment. This criterion is an overall evaluation of each alternative’s ability to protect public health and the environment.

2. Compliance with New York State Standards, Criteria, and Guidance (SCGs). Compliance with SCGs addresses whether a remedy will meet environmental laws, regulations, and other standards and criteria. In addition, this criterion includes the consideration of guidance which the Department has determined to be applicable on a case-specific basis.

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

3. Short-term Effectiveness. The potential short-term adverse impacts of the remedial action upon the community, the workers, and the environment during the construction and/or implementation are evaluated. The length of time needed to achieve the remedial objectives is also estimated and compared against the other alternatives.

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

5. Reduction of Toxicity, Mobility or Volume. Preference is given to alternatives that permanently and

significantly reduce the toxicity, mobility or volume of the wastes at the site.

6. Implementability. The technical and administrative feasibility of implementing each alternative are evaluated. Technical feasibility includes the difficulties associated with the construction of the remedy and the ability to monitor its effectiveness. For administrative feasibility, the availability of the necessary personnel and materials is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, institutional controls, and so forth.

7. Cost-Effectivness. Capital costs and annual operation, maintenance, and monitoring costs are estimated for each alternative and compared on a present worth basis. Although cost-effectiveness is the last balancing criterion evaluated, where two or more alternatives have met the requirements of the other criteria, it can be used as the basis for the final decision. The costs for each alternative are presented in Table 1.

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

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

SECTION 8: SUMMARY OF THE PROPOSED REMEDY

The Department is proposing Alternative 3, Soil Excavation, SVE system, SSD system, Groundwater monitoring, Vapor Intrusion Mitigation and Institutional Controls as the remedy for this site. The elements of this remedy are shown in Figures 8-10 and described at the end of this section.

The proposed remedy is based on the results of the RI and the evaluation of alternatives presented in the FS.

Alternative 3 is being proposed because, as described below, it satisfies the threshold criteria and provides the best balance of the primary balancing criteria described in Section 7.2. It would achieve the remediation goals for the site by removing the shallow soils beneath Bays 8-15 that are the source of the contaminated soil vapor and groundwater contamination. The SVE system would remove the VOC mass present in remaining deeper soils which, although less than the unrestricted use soil cleanup goals, might still contribute to contaminated soil vapor and groundwater contamination. Alternative 3 would be implemented without undue disruption of the community and it would create the conditions needed to restore groundwater quality via natural attenuation. Alternative 2 (Remediate to Pre-Release Conditions) and Alternative 4 (Alternative 3 plus Air Sparge) would also comply with the threshold selection criteria.

Alternative 1 (No Action) would not meet the remedial action objectives for sub-surface soil or groundwater and would leave the groundwater and on-site and off-site soil vapor in its present condition. Alternative 1 would not provide any additional protection to human health or the environment and would not meet the threshold criteria.

Because Alternatives 2, 3 and 4 satisfy the threshold criteria, the five balancing criteria are particularly important in selecting a final remedy for the site. Alternative 1 is not acceptable and will not be evaluated in the following five balancing criteria.

Short-term Effectiveness

Short-term, Alternatives 3 and 4 would be more effective than Alternative 2. By the time a city block of the elevated LIRR structure was removed, up to 50,000 cubic yards of soil was excavated and a pump and treatment system was in place (Alternative 2), Alternative 3 and 4 would be completed with the SVE/AS systems up and running. Also, the groundwater extraction and treatment system for Alternative 2 is inherently a slow (many years) cleanup process and would not be effective short-term.

Alternative 4 (SVE, AS) would be as effective as Alternative 3 (SVE) but only if the TCE and cis-1,2 DCE concentrations in the groundwater are significantly high. The AS system would sparge the VOCs from the groundwater which would then be captured up by the SVE system. However, the 2006 groundwater sample results for TCE were between 7 ppb (near Bay 12) and 110 ppb (near Bay 17) and the results for cis-1,2 DCE were non-detect and 14 ppb for the same locations. With the groundwater SCG for TCE and cis-1,2 DCE being 5ppb, essentially, there are not enough VOCs in the groundwater below the site to justify installing and operating an air sparge system. Short-term, Alternative 4 (with AS) would not be more effective than Alternative 3.

Long-term Effectiveness and Permanence

Achieving long-term effectiveness is best accomplished by removing the source (contaminated soil). Alternative 2 would remove up to 50,000 cubic yards of soil and the same volume of clean backfill would also be required. If TCE-contaminated soil was excavated below the LIRR foundation and footings, all of the LIRR structure above the excavated area would need to be removed which would take a significant amount of time. The groundwater extraction and treatment system in Alternative 2 is a lengthy, energy intensive remediation process. Pollution associated with the power plant providing electricity to run the system may be greater than the groundwater contaminants it cleans up and, therefore, would not be the best sustainable design. Alternative 2 would be effective long-term but not significantly more effective than Alternatives 3 and 4 to justify the additional time, cost and disruption to the community.

Alternative 3 and 4 are similar and focus on the removal of the most contaminated soil (1,000 cubic yards) below Bays 8-15 in the upper 0-2 feet. Each would be nearly as effective, long-term, as Alternative 2. However, because the VOC concentrations in the groundwater beneath the site are low and decreasing, the Alternative 4 air sparging would not provide significant additional long term effectiveness.

Implementability

The major demolition and extensive soil excavation involved in Alternative 2 would be very disruptive to the community and difficult to implement. The demolition of the elevated LIRR structure and buildings below the LIRR would be required and tenants moved out for two years or more. Air pollution and noise pollution from the demolition would require continuous monitoring and control in the community. Structural issues for nearby buildings and remaining LIRR sections at each end of the block may be encountered as well, possibly displacing some local residents. To remove up to 50,000 cubic yards of soil, trucks would have to make over 6,000 trips through the city. To remove the debris from the demolition of the elevated LIRR would be thousands of additional truck trips through the city. The short-term risk of the extensive construction work would not be justified by the minimal additional reduction in VOC concentrations. Alternative 3 and 4 are more favorable in that they would both be readily implementable, involving less than 200 truck trips through the city, with no demolition except for the interior floors of Bays 8-15.

Reduction of Toxicity, Mobility or Volume

Alternatives 2, 3 and 4 would all remove an estimated 1,000 cubic yards of contaminated soil below Bays 8-15 to a depth of 0-2 feet where the majority of contamination is located. Alternative 2 would, in addition, remove soil to depth and do so under all 28 Bays between 101st Avenue and 103rd Avenue for a maximum volume of up to 50,000 cubic yards. Although this would be 50 times more cubic yards of soil removed, the reduction in toxicity and actual volume of contaminants (TCE, cis-1,2-DCE) would not be comparatively significant because of the VOC concentrations in the soil below the 0-2 foot depth are relatively low. Using the SVE system in Alternatives 3 and 4 (with AS) would remove the VOC mass in the deeper soils, achieving almost the same results as Alternative 2, but without the removal of up to 50,000 cubic yards of soil.

Cost-Effectivness

The breakdown of costs for all four alternatives is presented in Table 1, which details the capital cost, annual Operation Maintenance & Monitoring (OM&M) cost and total present worth of OM&M cost (based on a 5% discount rate). Alternative 3 and Alternative 4 would have similar estimated costs, however, the air sparging element of Alternative 4 would not be worth the added expense and energy consumption to gain little or no additional removal of VOCs.

Alternative 2 would be significantly more expensive by roughly 10 times ($23,500,000) with just the active groundwater treatment system estimated to be $4,000,000. Given the already low VOC concentrations in the groundwater and downward trend from natural attenuation, the cost of active groundwater treatment would have minimal, if any, beneficial effect. Millions of dollars would be spent to remove the LIRR structure in order to excavate soil to depth which, except for the top 0-2 feet, is marginally contaminated.

The estimated present worth cost to implement the remedy is $2,200,000. The cost to construct the remedy is estimated to be $1,500,000 and the estimated average annual cost for Years 1-2 is $210,000, Years 3-5 is $100,000 and Years 6-10 is $10,000.

The elements of the proposed remedy are as follows:

1. A remedial design program would be implemented to provide the details necessary for the construction, operation, maintenance, and monitoring of the remedial program.

2. The floors in Bays 8-15 would be removed and as much as practical of the contaminated shallow soils would be excavated beneath these 8 bays.

3. Post-excavation soil sampling would be conducted in each of the 8 bays to document the condition of the soil left in place.

4. All excavated contaminated soil would be disposed at a permitted disposal facility,

5. Clean backfill would replace the excavated shallow soils. Clean fill would constitute soil that meets the Division of Environmental Remediation's criteria for backfill.

6. An SVE system of vertical wells and a piping system would be constructed to collect vapors from the deeper soils.

7. An active SSD system would be constructed beneath the floors in Bays 8 through 15.

8. The SVE and SSD mechanical equipment would be installed and each system operated with off-gas treatment, as needed.

9. A vapor intrusion mitigation program would be implemented to investigate and remediate, if necessary, off-site adjacent structures (residential, commercial) and off-site adjacent bays to the Site for vapor intrusion, if access is granted. Sub-slab vapor concentrations would be compared to NYSDOH Guidance values.

10. Monitoring of groundwater would be conducted of impacted groundwater on-site and off-site.

11. Imposition of an institutional control in the form of an environmental easement that would require (a) limiting the use and development of the property to residential use, which would also permit commercial or industrial uses. More restrictive land use and development controls may be considered, if necessary, based upon post-excavation soil sampling results; (b) compliance with the approved site management plan; (c) restricting the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by NYSDOH; and (d) the property owner to complete and submit to the Department a periodic certification of institutional and engineering controls.

12. Development of a Site Management Plan which would include the following institutional and engineering controls: (a) provide provisions for the continued proper operation and maintenance of the SVE and SSD systems; (b) provide a monitoring plan for TCE and cis-1,2-DCE in the groundwater; c) pursue a plan for vapor intrusion investigations in off-site areas with soil vapor mitigation systems installed, if required; (d) identification of any use restrictions on the site; and (e) a soil management plan if post-excavation soil sampling results exceed unrestricted soil cleanup objectives.

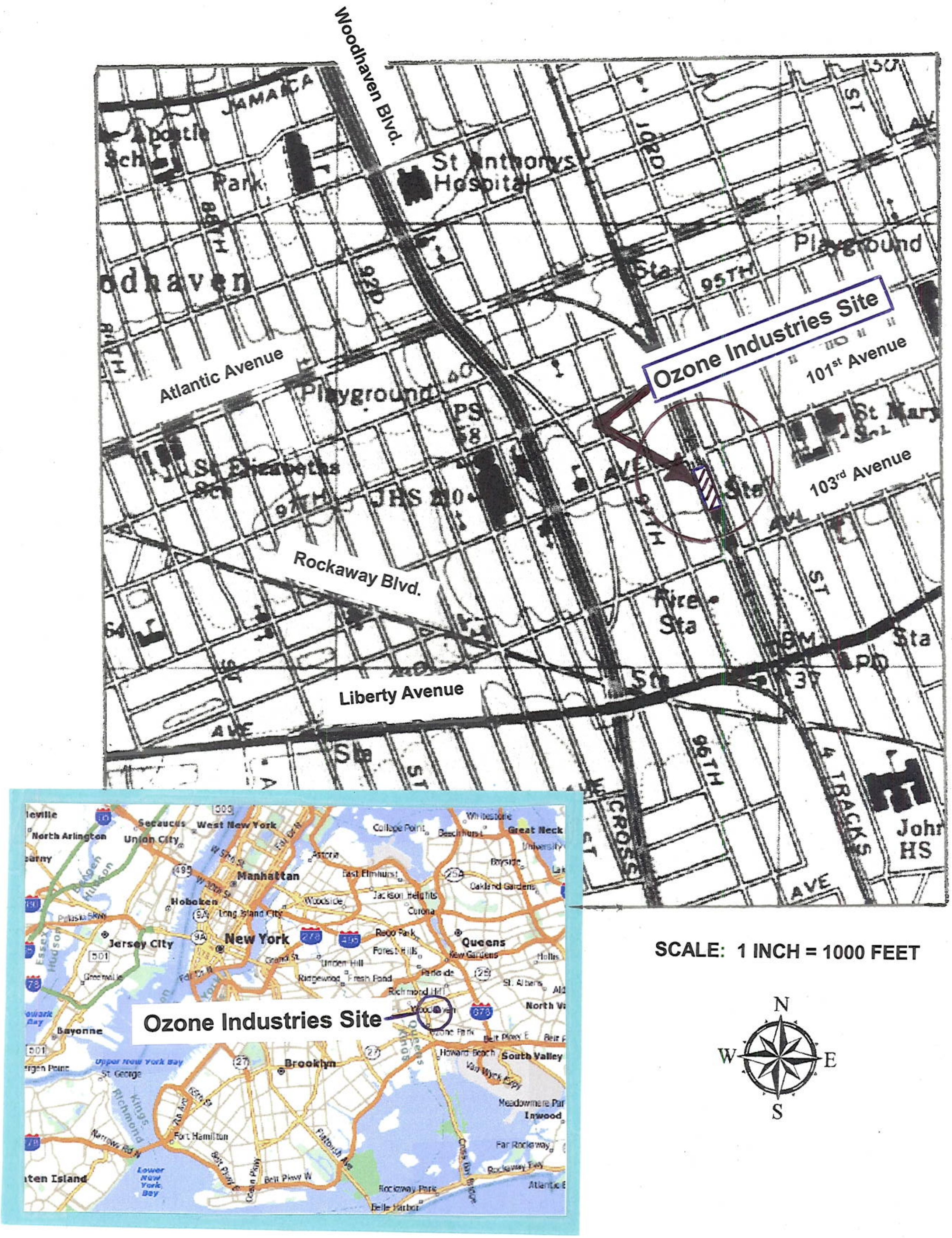
13. The property owner would provide a periodic certification of institutional and engineering controls, prepared and submitted by a professional engineer or such other expert acceptable to the Department, until the Department notifies the property owner in writing that this certification is no longer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

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

Since the remedy results in untreated hazardous waste remaining at the site, a long-term monitoring program would be instituted. This program would allow the effectiveness of the SVE, SSD and groundwater monitoring remedy elements to be monitored and would be a component of the long-term management for the site.

Table 1
Remedial Alternative Costs

Remedial Alternative	Capital Cost ($)	Annual Costs ($)	Total Present Worth ($)
Alternative 1 No Action	0	0	0
Alternative 2	22,000,000	200,000	23,500,000
Alternative 3	1,500,000	210,000	2,200,000
Alternative 4	1,800,000	270,000	2,600,000



OZONE INDUSTRIES SITE LOCATION MAP

FIGURE 1

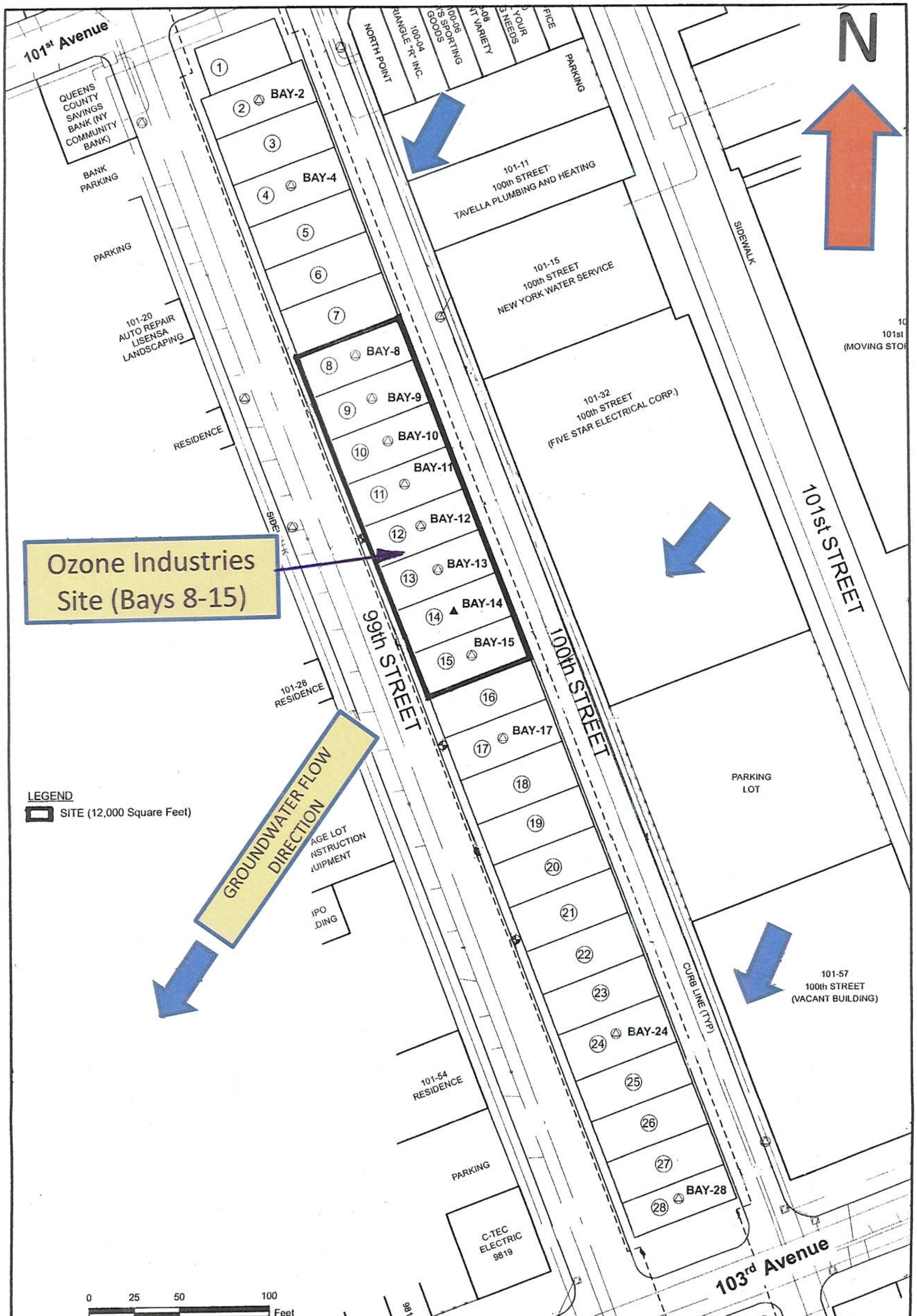
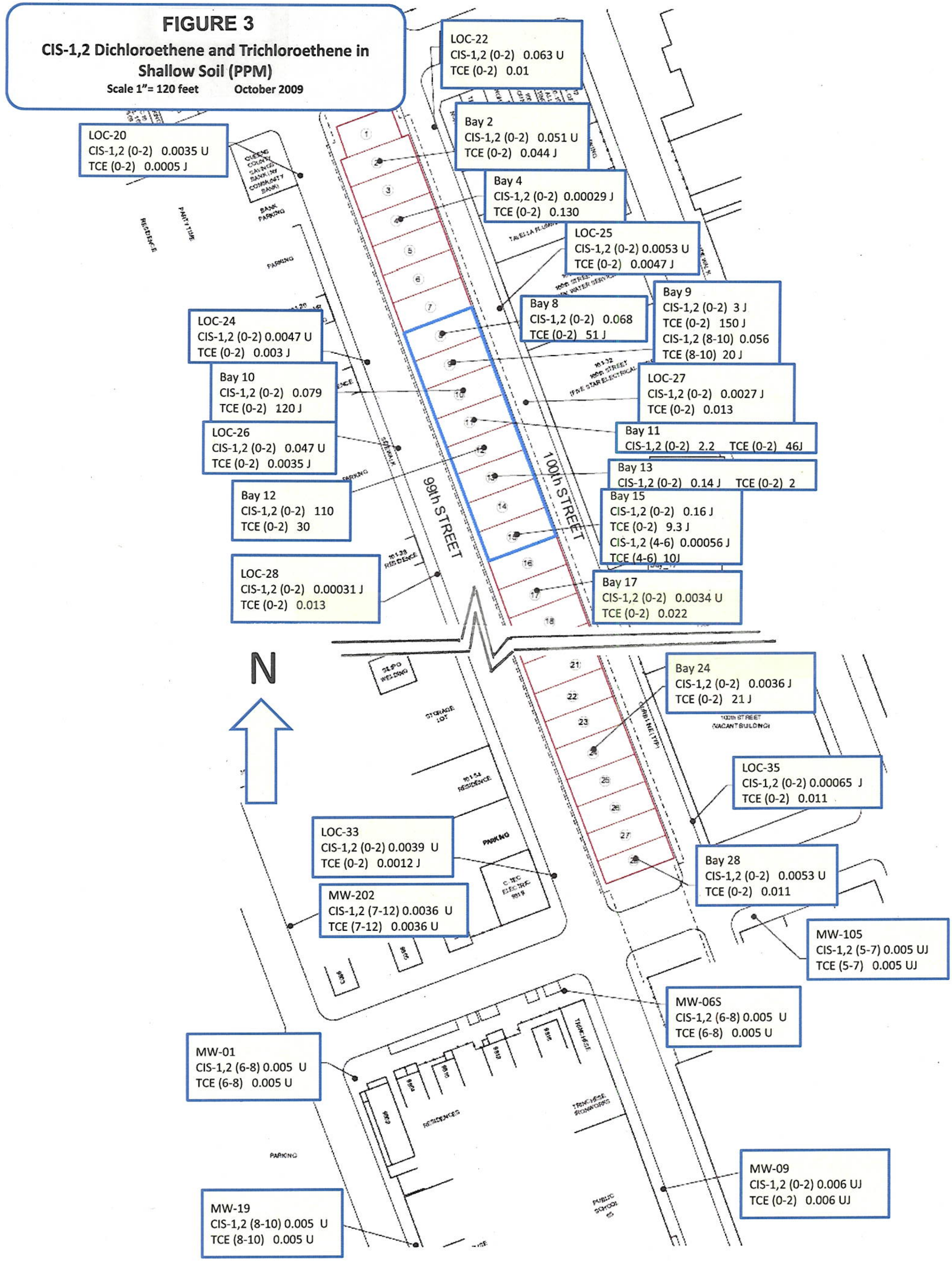


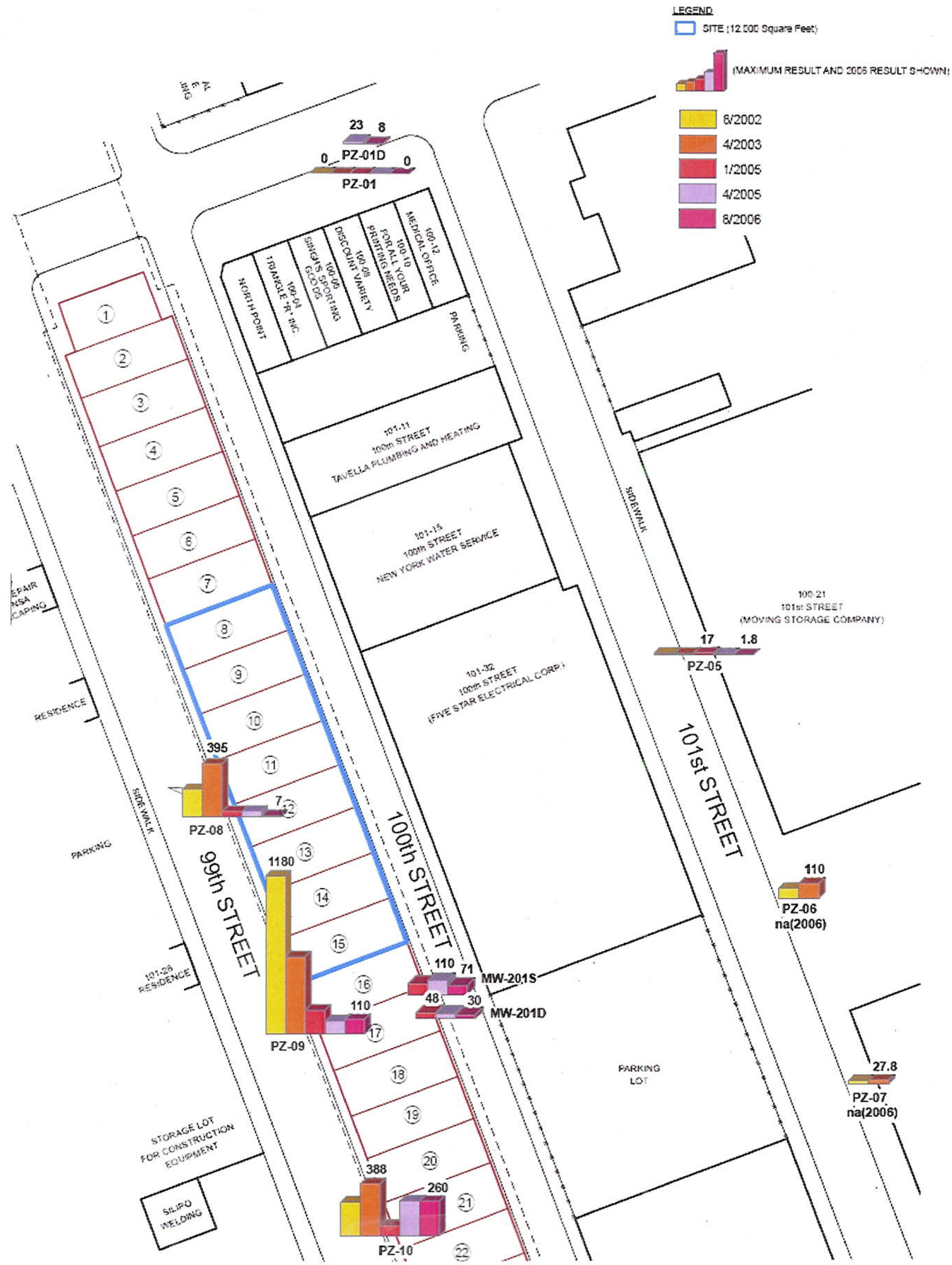
FIGURE 2
Site Plan and Groundwater Flow Direction

FIGURE 3

CIS-1,2 Dichloroethene and Trichloroethene in Shallow Soil (PPM)

Scale 1"= 120 feet October 2009





Sheet Number	Figure Number				
1	4	TRICHLOROETHENE IN GROUNDWATER (ug/l) FORMER OZONE INDUSTRIES, INC. OZONE PARK, NEW YORK, NY			
		Scale: 1" = 60'	Date: 2/09	Project Number: 10746-002-0003	

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Designed By:	Revisions			
	No.	Description	Date	By:
Drawn By: J.E.B.				
Checked By: R.M.				
Approved By: D.A.				

4A	TRICHLOROETHENE IN GROUNDWATER (ug/l) FORMER OZONE INDUSTRIES, INC. OZONE PARK, NEW YORK, NY	AECOM AECOM Environment 2 TECHNOLOGY PARK DRIVE WESTFORD, MA 01886 (978) 589-3000 www.aecom.com	Designed By: Drawn By: J.E.B. Checked By: R.M. Approved By: D.A.	Revisions: No. / Description / Date / By:

Scale:	Date:	Project Number
1" = 60'	2/09	10748-002-0003

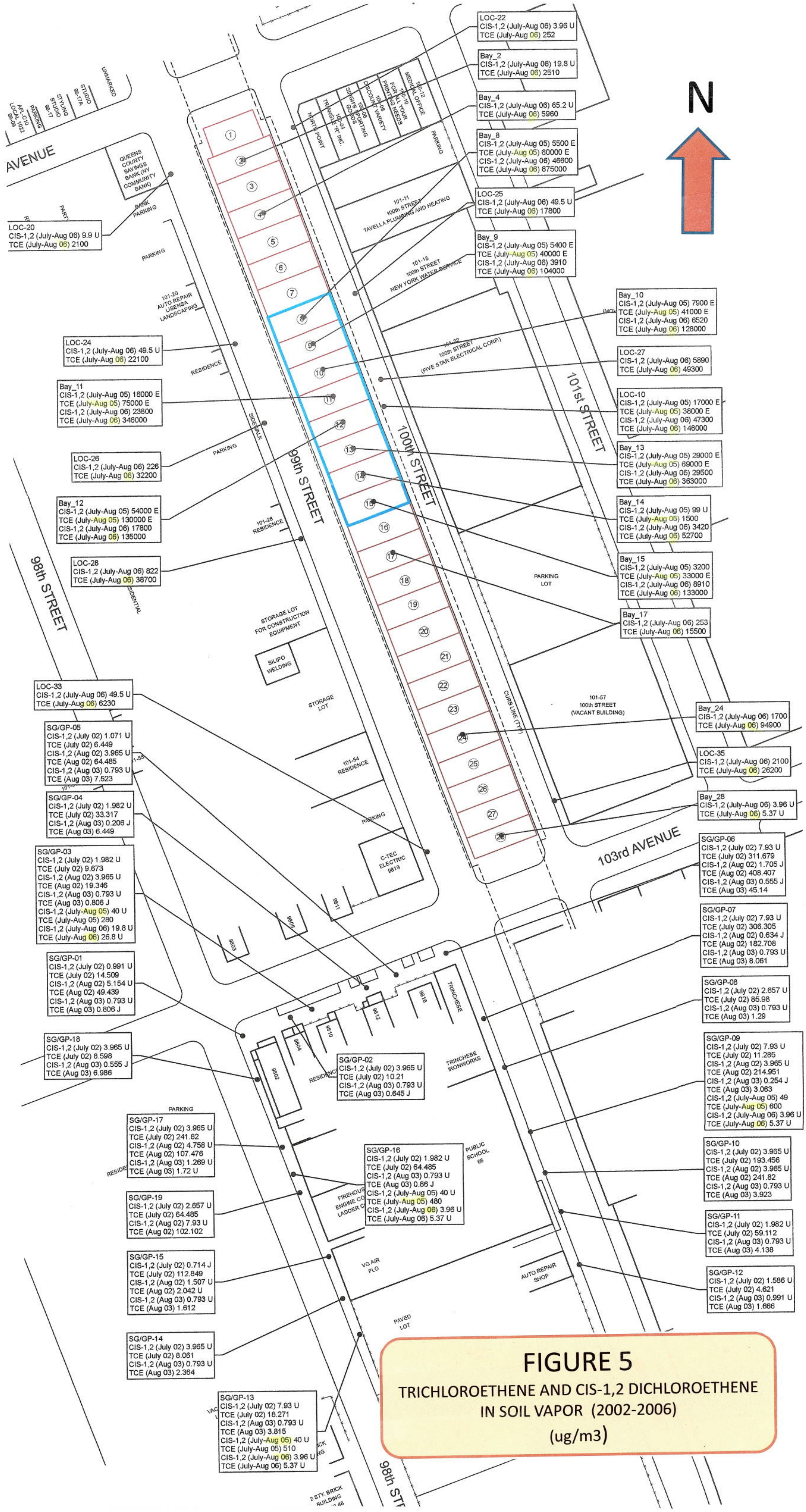
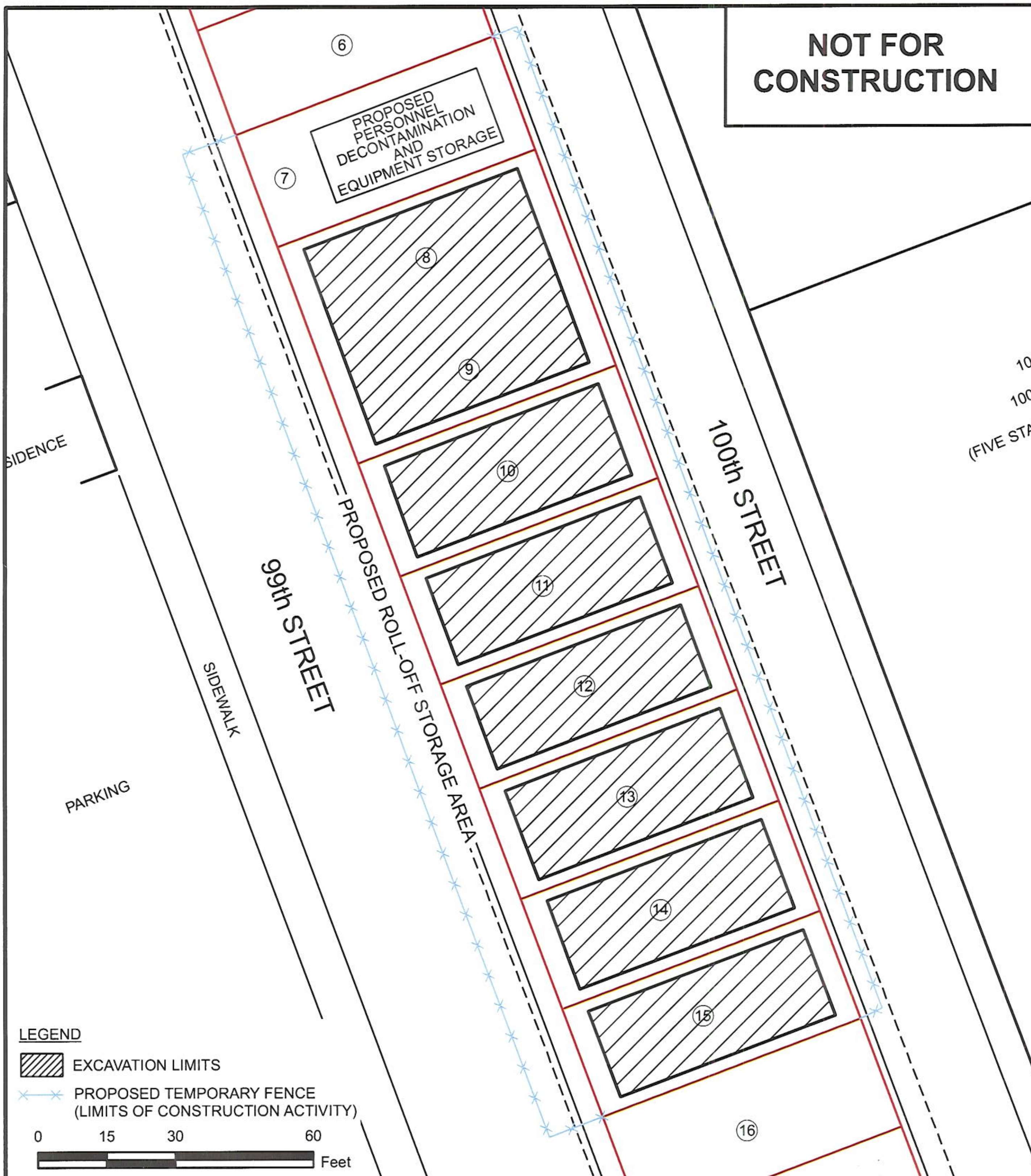


FIGURE 5

TRICHLOROETHENE AND CIS-1,2 DICHLOROETHENE IN SOIL VAPOR (2002-2006)

(ug/m3)



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CONCEPTUAL LIMITED SOIL EXCAVATION LAYOUT

FORMER OZONE INDUSTRIES, INC.
OZONE PARK, NEW YORK, NY

Scale:	Date:	Project Number:
1' = 30'	2/09	10748-001-0003

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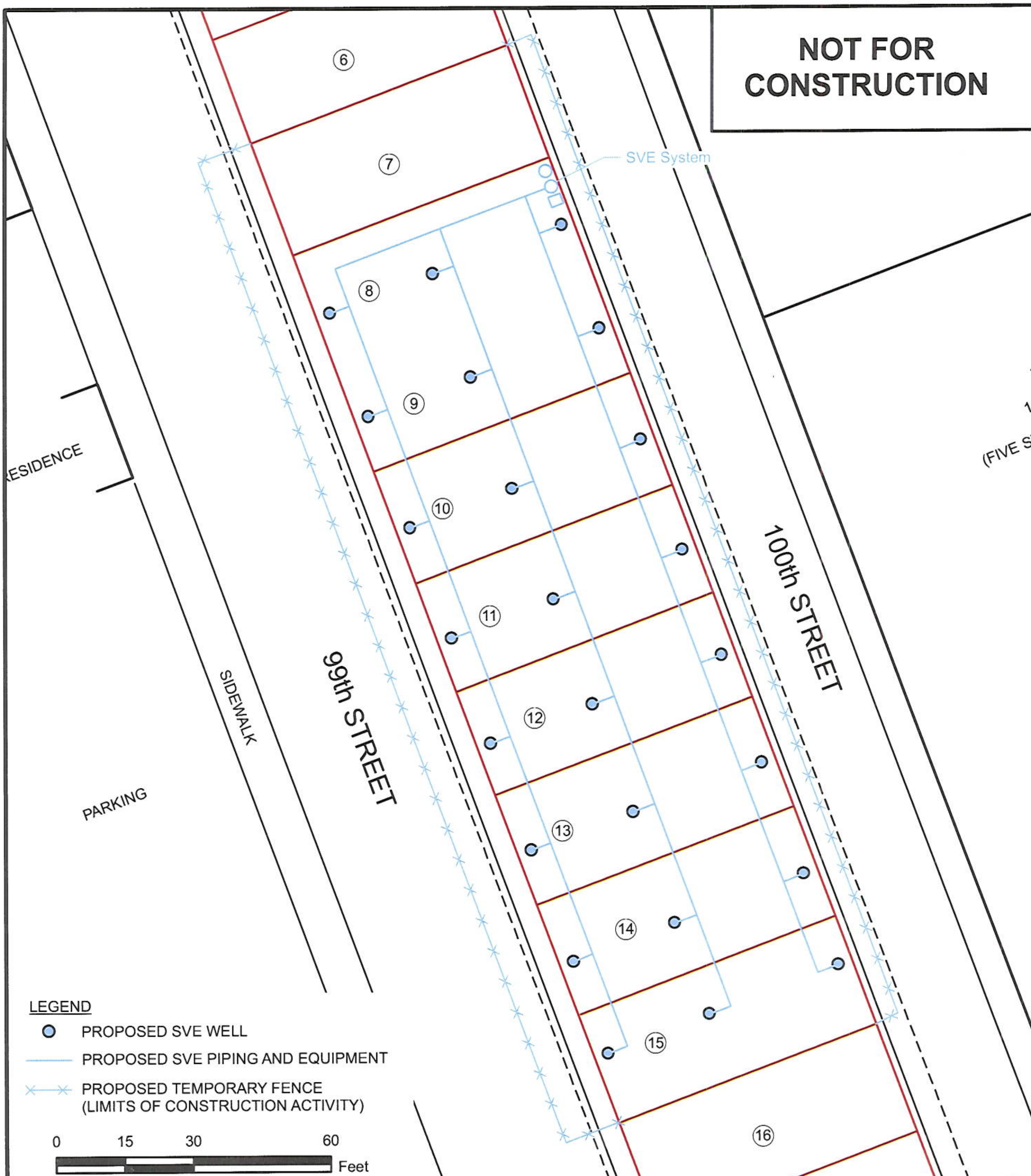

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CONCEPTUAL SVE LAYOUT
FORMER OZONE INDUSTRIES, INC.
OZONE PARK, NEW YORK, NY

Scale:	Date:	Project Number:
1' = 30'	2/09	10748-001-0003

Figure Number: 7

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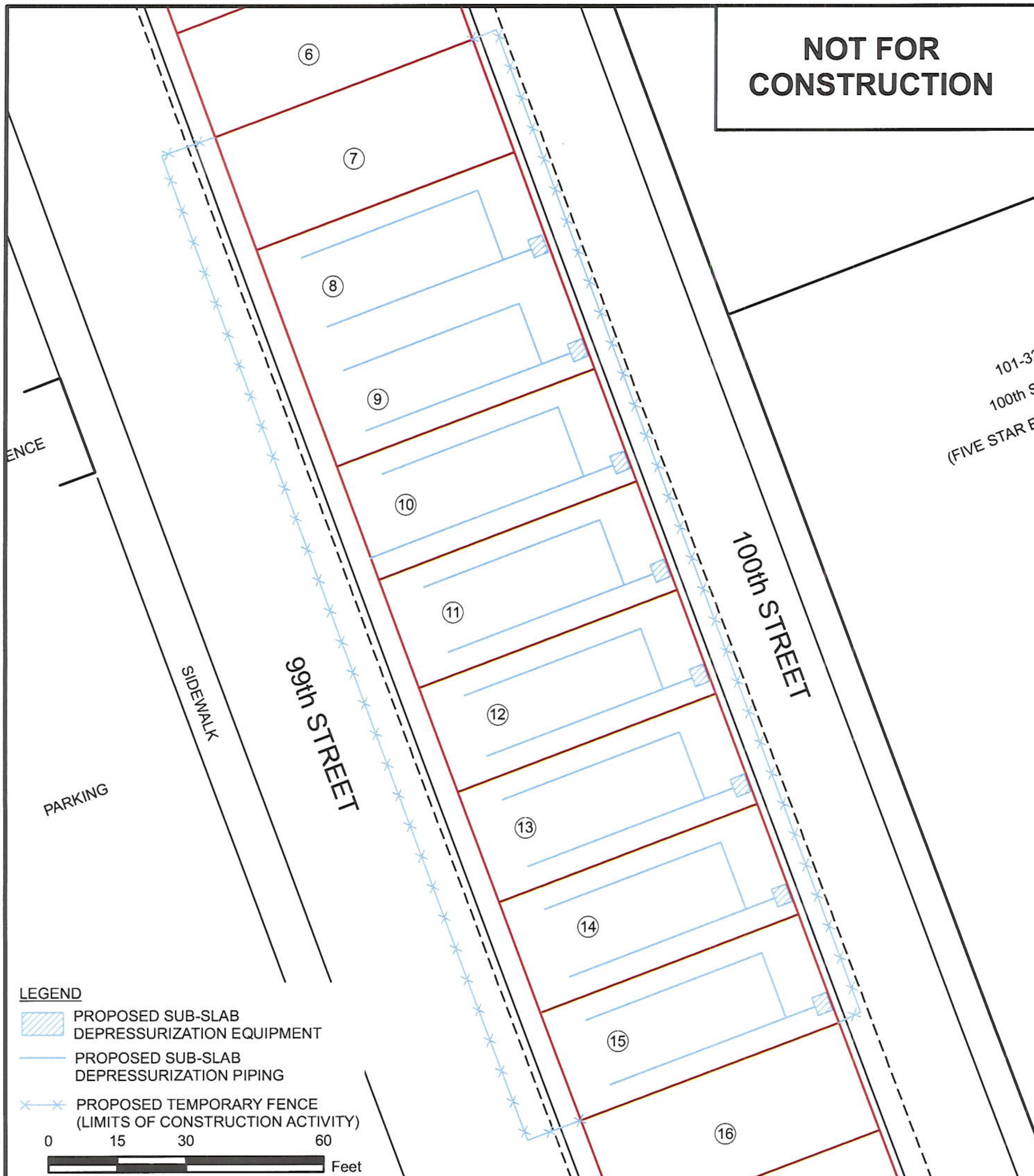

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CONCEPTUAL SUB-SLAB DEPRESSURIZATION SYSTEM LAYOUT

FORMER OZONE INDUSTRIES, INC.
OZONE PARK, NEW YORK, NY

Scale:	Date:	Project Number:
1' = 30'	2/09	10748-001-0003

Figure Number: **8**

Sheet Number: 1