PROPOSED REMEDIAL ACTION PLAN

Former Elka Chemical Company
State Superfund Project
Lindenhurst, Suffolk County
Site No. 152239
May 2023

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

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SECTION 1: SUMMARY AND PURPOSE OF THE PROPOSED PLAN

The New York State Department of Environmental Conservation (the Department), in consultation with the New York State Department of Health (NYSDOH), is proposing a remedy for the above referenced site. The disposal of hazardous wastes at the site has resulted in threats to public health and the environment that would be addressed by the remedy proposed by this Proposed Remedial Action Plan (PRAP). The disposal of hazardous wastes at this site, as more fully described in Section 6 of this document, has contaminated various environmental media. The proposed remedy is intended to attain the remedial action objectives identified for this site for the protection of public health and the environment. This PRAP identifies the preferred remedy, summarizes the other alternatives considered, and discusses the reasons for the preferred remedy.

The New York State Inactive Hazardous Waste Disposal Site Remedial Program (also known as the State Superfund Program) is an enforcement program, the mission of which is to identify and characterize suspected inactive hazardous waste disposal sites and to investigate and remediate those sites found to pose a significant threat to public health and environment.

The Department has issued this document in accordance with the requirements of New York State Environmental Conservation Law and Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York; (6 NYCRR) Part 375. This document is a summary of the information that can be found in the site-related reports and documents in the document repository identified below.

SECTION 2: CITIZEN PARTICIPATION

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

NYSDEC
Attn: Jared Donaldson
NYSDEC
12th Floor, 625 Broadway
Albany, NY, NY 12233-7015
Phone: 518-402-9176

A public comment period has been set from:

5/17/23 to 6/17/23

A public meeting is scheduled for the following date:

6/5/2023 at 7:00 p.m.

Public meeting location:

Lindenhurst Memorial Library, 1 Lee Avenue, Lindenhurst, NY 11757

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

Written comments may also be sent through to:

Jared Donaldson
NYS Department of Environmental Conservation
Division of Environmental Remediation
625 Broadway
Albany, NY 12233
jared.donaldson@dec.ny.gov

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

Receive Site Citizen Participation Information By Email

Please note that the Department's Division of Environmental Remediation (DER) is "going paperless" relative to citizen participation information. The ultimate goal is to distribute citizen participation information about contaminated sites electronically by way of county email listservs. Information will be distributed for all sites that are being investigated and cleaned up in a particular county under the State Superfund Program, Environmental Restoration Program, Brownfield Cleanup Program, Voluntary Cleanup Program, and Resource Conservation and Recovery Act Program. We encourage the public to sign up for one or more county listservs at http://www.dec.ny.gov/chemical/61092.html.

SECTION 3: SITE DESCRIPTION AND HISTORY

Location: The Former Elka Chemical Company site is located at 340 West Hoffman Avenue in an urban/commercial/industrial area of Lindenhurst, Suffolk County. The site is bounded to the north and west by commercial properties, to the south by Hoffman Avenue and the Long Island Railroad South Shore Branch, and to the east by New York Avenue.

Site Features: The 0.53-acre site is flat and is occupied by a single-story masonry building in the center of the site. The eastern portion of the site is a paved parking lot, and the western portion of the site is an unpaved dirt lot. The area to the west of the building is being used for vehicle storage, to the north and west by an auto wrecker, and to the northeast by a realty office.

Current Zoning and Land Use: The current zoning is commercial/industrial. The site is currently being used as a place of worship.

Past Use of the Site: The site was used as a chemical repackaging facility from the 1920s until 1985. From 1985 to 2013, the site was used as an auto dealership, and from 2013 to 2014 as a gymnasium. Prior uses of the site that have resulted in groundwater contamination include the repackaging of xylene. Groundwater sampling conducted immediately downgradient of the site by the Suffolk County Department of Health Services (August 2011), and by the New York State Department of Environmental Conservation Spill Unit (March 2011), detected petroleum related compounds in groundwater, which led to the assignment of Spi11 No. 06-50126. The property was later listed on the New York State Registry of Inactive Hazardous Waste Disposal Sites in August 2012.

Site Geology and Hydrogeology: Site geology generally consists of tan, medium to coarse grained sand with some gravel and pebbles to a depth of at least 70 feet below ground surface. No clay or other potentially confining layers are present. The depth to groundwater is five to ten feet below ground surface, depending on seasonal fluctuation. The regional groundwater flow direction is to the south. There are public water supply wells within one mile, both upgradient and side gradient of the site, which are not being impacted by site-related contamination.

A site location map is attached as Figure 1. A site map is presented as Figure 2.

SECTION 4: LAND USE AND PHYSICAL SETTING

The Department may consider the current, intended, and reasonably anticipated future land use of the site and its surroundings when evaluating a remedy for soil remediation. For this site, alternatives (or an alternative) that restrict(s) the use of the site to commercial use (which allows for industrial use) as described in Part 375-1.8(g) are/is being evaluated in addition to an alternative which would allow for unrestricted use of the site.

A comparison of the results of the investigation to the appropriate standards, criteria and guidance values (SCGs) for the identified land use and the unrestricted use SCGs for the site contaminants is included in the Tables for the media being evaluated in Exhibit A.

SECTION 5: ENFORCEMENT STATUS

Potentially Responsible Parties (PRPs) are those who may be legally liable for contamination at a site. This may include past or present owners and operators, waste generators, and haulers.

The PRPs for the site, documented to date, include:

340 West Hoffman Corporation

The Department and 340 West Hoffman Corporation entered into a Consent Order on August 5, 2017. The Order obligates the responsible party to implement a full remedial program.

SECTION 6: SITE CONTAMINATION

6.1: Summary of the Remedial Investigation

A Remedial Investigation (RI) has been conducted. The purpose of the RI was to define the nature and extent of any contamination resulting from previous activities at the site. The field activities and findings of the investigation are described in the RI Report.

The following general activities are conducted during an RI:

- Research of historical information,
- Geophysical survey to determine the lateral extent of wastes,
- Test pits, soil borings, and monitoring well installations,
- Sampling of waste, surface and subsurface soils, groundwater, and soil vapor,
- Sampling of surface water and sediment,
- Ecological and Human Health Exposure Assessments.

The analytical data collected on this site includes data for:

- air
- groundwater
- soil
- indoor air
- sub-slab vapor

6.1.1: Standards, Criteria, and Guidance (SCGs)

The remedy must conform to promulgated standards and criteria that are directly applicable or that are relevant and appropriate. The selection of a remedy must also take into consideration guidance, as appropriate. Standards, Criteria and Guidance are hereafter called SCGs.

To determine whether the contaminants identified in various media are present at levels of concern, the data from the RI were compared to media-specific SCGs. The Department has developed SCGs for groundwater, surface water, sediments, and soil. The NYSDOH has developed SCGs for drinking water and soil vapor intrusion. The tables found in Exhibit A list the applicable SCGs in the footnotes. For a full listing of all SCGs see: http://www.dec.ny.gov/regulations/61794.html.

6.1.2: RI Results

The data have identified contaminants of concern. A "contaminant of concern" is a hazardous waste that is sufficiently present in frequency and concentration in the environment to require evaluation for remedial action. Not all contaminants identified on the property are contaminants of concern. The nature and extent of contamination and environmental media requiring action are summarized in Exhibit A. Additionally, the RI Report contains a full discussion of the data. The contaminant(s) of concern identified at this site is/are:

- isopropylbenzene
- xylene (mixed)
- ethylbenzene
- 1,2,4-trimethylbenzene
- 1,3,5-trimethylbenzene
- tetrachloroethene (PCE)
- trichloroethene (TCE)
- benzo(a)anthracene
- benzo(a)pyrene
- benzo(b)fluoranthene
- dibenz[a,h]anthracene
- indeno(1,2,3-cd)pyrene
- n-propylbenzene
- vinyl chloride

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

- groundwater
- soil
- soil vapor intrusion

6.2: Interim Remedial Measures

An interim remedial measure (IRM) is conducted at a site when a source of contamination or exposure pathway can be effectively addressed before issuance of the Record of Decision.

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

6.3: Summary of Environmental Assessment

This section summarizes the assessment of existing and potential future environmental impacts presented by the site. Environmental impacts may include existing and potential future exposure pathways to fish and wildlife receptors, wetlands, groundwater resources, and surface water.

Based upon the resources and pathways identified and the toxicity of the contaminants of ecological concern at this site, a Fish and Wildlife Resources Impact Analysis (FWRIA) was deemed not necessary for the site.

Nature and Extent of Contamination: Soil and groundwater samples were analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), metals, polychlorinated biphenyls (PCBs), pesticides, herbicides, 1,4-dioxane and per- and polyfluoroalkyl substances (PFAS). Additionally, soil vapor and indoor air samples were analyzed for VOCs. Based upon investigations conducted to date, the primary contaminants of concern are SVOCs and VOCs in soil and petroleum-related VOCs in groundwater.

Soil: Exceedances of commercial use soil cleanup objectives (CUSCOs) are found in surface soils [0 to 2 inches below ground surface (bgs)] at three on-site locations. Exceedances of protection of groundwater soil cleanup objectives (PGWSCOs) for VOCs are found at depths ranging from 4-14 feet bgs at three on-site locations.

Maximum SVOC exceedances of CUSCOs in surface soil are as follows: benzo(a)anthracene at 19.3 parts per million (ppm) as compared to its CUSCO of 5.6 ppm, benzo(a)pyrene at 19.1 ppm (CUSCO of 1 ppm), benzo(b)fluoranthene at 25.4 ppm (CUSCO of 5.6 ppm), dibenzo(a,h)anthracene at 5.28 (CUSCO of 0.56 ppm), and indeno(1,2,3-cd)pyrene at 17.4 ppm (CUSCO of 5.6 ppm). Maximum VOC exceedances of PGWSCOs in subsurface soil are as follows: 1,2,4-trimethylbenzene at 84 ppm (PGWSCO of 3.6 ppm), 1,3,5-trimethylbenzene at 190 ppm (PGWSCO of 8.4 ppm), ethylbenzene at 8.8 ppm (PGWSCO of 1 ppm), n-propylbenzene at 100 ppm (PGWSCO of 3.9 ppm), and xylene at 55 ppm (PGWSCO of 1.6 ppm).

Data does not indicate any off-site impacts in soil related to this site.

Groundwater:
On-site: Exceedances of Class GA groundwater standards on-site are found in the shallow groundwater from 5-20 feet bgs.

VOCs were detected in groundwater samples at levels above Class GA standards. Maximum exceedances are as follows: xylene at up to 8,400 parts per billion (ppb); ethylbenzene at up to 1,500 ppb; isopropylbenzene at up to 570 ppb; 1,2,4-trimethylbenzene at 990 ppb; 1,3,5-trimethylbenzene at 590 ppb, n-propylbenzene at up to 260 ppb, trichloroethylene (TCE) at up to 12 ppb, tetrachloroethylene (PCE) at 38 ppb, and acetone at up to 850 ppb. The above VOCs have a Class GA groundwater standard of 5 ppb, with the exception of acetone which has a standard of 50 ppb.

A 2011 Suffolk County Department of Health Services letter report to the Department documented PCE at 140 ppb and TCE at 100 ppb in a well upgradient of the site and at levels below standards immediately downgradient. The on-site PCE and TCE levels detected during the remedial investigation were an order of magnitude lower than those previously detected upgradient, demonstrating a decrease in chlorinated VOC levels. In addition, PCE and TCE levels detected during the remedial investigation in wells upgradient of the site are now non-detect or below Class GA groundwater standards. This indicates that chlorinated VOC groundwater contamination originated from upgradient, is a detached plume, and is passing through the site. Therefore, chlorinated VOCs are not site-related contaminants of concern for groundwater.

SVOCs were detected in groundwater samples above Class GA standards. Maximum exceedances are as follows: naphthalene at 92.6 ppb as compared to its standard of 10 ppb and di-n-butylphthalate at 73 ppb as compared to its standard of 50 ppb.

Metals were detected in groundwater samples above their applicable Class GA standards. Maximum exceedances are as follows: iron at 61,000 ppb as compared to its standard of 300 ppb, manganese at 1,900 ppb as compared to its standard of 300 ppb, and sodium at 55,900 ppb above its standard of 20,000 ppb. These metals are naturally occurring in Long Island soil and groundwater and are not considered to be site-related contaminants.

The PFAS compounds perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS) were reported at concentrations of up to 53 and 58 parts per trillion (ppt), respectively, exceeding their respective Ambient Water Quality Guidance values of 6.7 ppt and 2.7 ppt. PFAS compounds were detected at similar concentrations in upgradient and downgradient samples indicating that the site is not a source of these substances to the environment.

1,4-Dioxane was detected in one of twenty-three groundwater samples that were analyzed for it. This detection of 310 ppb was reported as part of a standard Method 8260 analysis, which is not the approved method for 1,4-dioxane. The groundwater samples analyzed for 1,4-dioxane *via* Method 8270 SIM reported no detections of 1,4-dioxane. The detection of 310 ppb is considered to be anomalous due to the improper testing method and lack of other detections of 1,4-dioxane at the site. Therefore, 1,4-dioxane is not a site-related contaminant of concern.

Off-site: A VOC plume extends from the site to approximately 1,600 feet off-site to the south. The highest off-site VOC detections are present along the first well transect immediately downgradient of the site. The plume dives in depth from approximately five feet bgs on-site to a depth of 25 feet downgradient and decreases in concentration as the distance downgradient from the site increases.

Maximum VOC exceedances in off-site groundwater samples are as follows: ethylbenzene at up to 1,030 ppb; 1,2,4-trimethylbenzene at up to 962 ppb; 1,3,5- trimethylbenzene at up to 570 ppb; isopropylbenzene at up to 489 ppb; n-propylbenzene at up to 635 ppb; xylene at up to 158 ppb and vinyl chloride at up to 4.29 ppb. The above VOCs have a Class GA groundwater standard of 5 ppb, with the exception of vinyl chloride which has a standard of 2 ppb.

Soil Vapor:
On-site: Soil vapor and co-located indoor air samples were collected from the building located on the Former Elka Chemical Property. Results indicated actions are recommended to address potential exposures from soil vapor intrusion. Maximum detections of VOCs in sub-slab and indoor air samples are as follows: TCE at 490 micrograms per cubic meter (mcg/m^3) in the sub slab vapor and 0.57 mcg/m^3 in the indoor air, PCE at 860 mcg/m^3 in the sub slab vapor and 5.2 mcg/m^3 in the indoor air. In addition, *cis*-1,2-dichloroethylene was detected at 12 mcg/m^3 in the sub slab vapor and 1,1,1-trichloroethane was detected at 320 mcg/m^3 in the sub slab vapor. Neither *cis* 1,2-dichloroethylene nor 1,1,1-trichloroethane were not detected in the indoor air.

Off-site: Soil vapor and co-located indoor air samples were collected from a building downgradient from the Former Elka Chemical site. Results indicated elevated levels of chlorinated VOCs in the sub slab vapor and elevated levels of methyl methacrylate in the indoor air. Based on the soil vapor and indoor air data, actions to address potential exposures *via* soil vapor intrusion have been recommended to the building owner. However, it was determined that the potential for off-site vapor intrusion to affect the indoor air of the off-site building is not related to the Elka Chemical site. Non-site related chlorinated VOCs in groundwater are likely causing SVI impacts at the off-site building, therefore, the off-site building will not be addressed under this proposed plan.

6.4: Summary of Human Exposure Pathways

This human exposure assessment identifies ways in which people may be exposed to site-related contaminants. Chemicals can enter the body through three major pathways (breathing, touching or swallowing). This is referred to as *exposure.*

The majority of the site is covered by pavement and a building, and it is unlikely that people will come into contact with subsurface contaminated soils. People who use the unpaved parking area may come into contact with surface soil contamination. Contaminated groundwater at the site is not used for drinking or other purposes and the area is served by a public water supply is not affected by this contamination. Volatile organic compounds in soil vapor may move into overlying buildings and affect the indoor air quality. This process, which is similar to the movement of radon gas from the subsurface into the indoor air of buildings, is referred to as soil vapor intrusion. Environmental sampling indicates that there is a potential for soil vapor intrusion to impact the indoor air quality of the on-site building. There is the potential for non-site related contaminants of concern to affect indoor air quality at an off-site commercial building.

6.5: Summary of the Remediation Objectives

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

The remedial action objectives for this site are:

Groundwater

RAOs for Public Health Protection

- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.
- Prevent contact with, or inhalation of volatiles, from contaminated groundwater.

RAOs for Environmental Protection

- Restore ground water aquifer to pre-disposal/pre-release conditions, to the extent practicable.
- Remove the source of groundwater contamination.

Soil

RAOs for Public Health Protection

- Prevent ingestion/direct contact with contaminated soil.
- Prevent inhalation of or exposure from contaminants volatilizing from contaminants in soil.

RAOs for Environmental Protection

- Prevent migration of contaminants that would result in groundwater contamination.

Soil Vapor

RAOs for Public Health Protection

- Mitigate impacts to public health resulting from existing, or the potential for, soil vapor intrusion into buildings at a site.

SECTION 7: SUMMARY OF THE PROPOSED REMEDY

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

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

The basis for the Department's proposed remedy is set forth at Exhibit D.

The proposed remedy is referred to as the Chemical Bioremediation, Soil Excavation, and Vapor Mitigation remedy.

The estimated present worth cost to implement the remedy is $781,000. The cost to construct the remedy is estimated to be $463,000 and the estimated average annual cost is $142,000.

The elements of the proposed remedy are as follows:

1. Remedial Design

A remedial design program will be implemented to provide the details necessary for the construction, operation, optimization, maintenance, and monitoring of the remedial program. Green remediation principles and techniques will be implemented to the extent feasible in the design, implementation, and site management of the remedy as per DER-31. The major green remediation components are as follows:

- Considering the environmental impacts of treatment technologies and remedy stewardship over the long term;
- Reducing direct and indirect greenhouse gases and other emissions;
- Increasing energy efficiency and minimizing use of non-renewable energy;
- Conserving and efficiently managing resources and materials;
- Reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste;
- Maximizing habitat value and creating habitat when possible;
- Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals;
- Integrating the remedy with the end use where possible and encouraging green and sustainable re-development; and
- Additionally, to incorporate green remediation principles and techniques to the extent feasible in the future development at this site, any future on-site buildings shall be constructed, at a minimum, to meet the 2020 Energy Conservation Construction Code of New York (or most recent edition) to improve energy efficiency as an element of construction.

As part of the remedial design program, to evaluate the remedy with respect to green and sustainable remediation principles, an environmental footprint analysis will be completed. The environmental footprint analysis will be completed using an accepted environmental footprint analysis calculator such as SEFA (Spreadsheets for Environmental Footprint Analysis, USEPA), SiteWiseTM (available in the Sustainable Remediation Forum [SURF] library) or similar Department accepted tool. Water consumption, greenhouse gas emissions, renewable and non-renewable energy use, waste reduction and material use will be estimated, and goals for the project related to these green and sustainable remediation metrics, as well as for minimizing community impacts, protecting habitats and natural and cultural resources, and promoting environmental justice, will be incorporated into the remedial design program, as appropriate. The project design specifications will include detailed requirements to achieve the green and sustainable remediation goals. Further, progress with respect to green and sustainable remediation metrics will be tracked during implementation of the remedial action and reported in the Final Engineering Report (FER), including a comparison to the goals established during the remedial design program.

Additionally, the remedial design program will include a climate change vulnerability assessment, to evaluate the impact of climate change on the project site and the proposed remedy. Potential vulnerabilities associated with extreme weather events (e.g., hurricanes, lightning, heat stress and drought), flooding, and sea level rise will be identified, and the remedial design program will incorporate measures to minimize the impact of climate change on potential identified vulnerabilities.

2. Excavation

Excavation and off-site disposal of all on-site soils which exceed commercial SCOs and all on-site soils in which contaminants of concern exceed protection of groundwater use SCOs above the water table, as defined by 6 NYCRR Part 375-6.8. Approximately 280 cubic yards of contaminated soil will be removed from the site.

3. Backfill

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

4. Cover System

A site cover will be required in areas where the upper one foot of exposed surface soil will exceed the applicable soil cleanup objectives (SCOs), to allow for commercial use of the site on the western, unpaved portion of the site. Where a soil cover is to be used it will be a minimum of one foot of soil placed over a demarcation layer, with the upper six inches of soil of sufficient quality to maintain a vegetative layer. Soil cover material, including any fill material brought to the site, will meet the SCOs for cover material for the use of the site as set forth in 6 NYCRR Part 375-6.7(d). Substitution of other materials and components may be allowed where such components already exist. Such components may include, but are not necessarily limited to: pavement, concrete, paved surface parking areas, sidewalks, building foundations and building slabs. Additional sampling will be conducted during a pre-design investigation to determine if a cover system is required on the western, unpaved portion of the site.

5. Enhanced Bioremediation

In-situ enhanced biodegradation will be employed to treat contaminants in groundwater in the general areas depicted on Figure 11. The biological breakdown of contaminants through aerobic respiration will be enhanced by a means determined to be most effective during a pilot study. The method and depth of injection, and number and placement of the injection and monitoring wells, will be determined during the remedial design.

Performance monitoring will be required within and downgradient of the treatment zone. Performance monitoring will be conducted for contaminants of concern upgradient and downgradient of the treatment zone to verify remedy effectiveness. The treatment zone will be monitored for dissolved oxygen and other attenuation parameters as appropriate. Performance monitoring data will be used to demonstrate decreasing trends that are statistically significant in the areas of treatment and/or downgradient locations, and to evaluate whether subsurface conditions remain optimal for continued bioremediation. Performance monitoring demonstration will include statistically decreasing trends in average contaminant of concern concentrations. Performance monitoring will be conducted quarterly for two years to determine the effectiveness of the remedy. Following performance monitoring, additional treatments and/or alternate substrates may be utilized to enhance degradation. Long term groundwater monitoring will be required at a frequency to be determined following performance monitoring.

6. Vapor Mitigation

Any on-site buildings will be required to have a sub-slab depressurization system, or other acceptable measures, to mitigate the migration of soil vapor into the building from soil and groundwater.

7. Engineering and Institutional Controls

Engineering Control: The cover system and sub-slab depressurization system discussed in Paragraphs 4 and 6 above.

Institutional Control: Imposition of an institutional control in the form of an environmental easement for the controlled property which will:

- require the remedial party or site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8 (h)(3);
- allow the use and development of the controlled property for commercial use as defined by Part 375-1.8(g), although land use is subject to local zoning laws;
- restrict the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYSDOH or County DOH; and
- require compliance with the Department approved Site Management Plan.

8. Site Management Plan

A Site Management Plan is required, which includes the following:

A. an Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the site and details the steps and media-specific requirements necessary to ensure the following institutional and/or engineering controls remain in place and effective:

Institutional Controls: The Environmental Easement discussed in Paragraph 6 above.
Engineering Controls: The cover system and sub-slab depressurization system discussed in Paragraphs 4 and 6 above.

This plan includes, but may not be limited to:

- an Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination;
- provisions for the management and inspection of the identified engineering controls;
- maintaining site access controls and Department notification; and
- the steps necessary for the periodic reviews and certification of the institutional and/or engineering controls.

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

- monitoring of groundwater and soil vapor to assess the performance and effectiveness of the remedy;
- a schedule of monitoring and frequency of submittals to the Department; and
- monitoring for vapor intrusion for any buildings on the site, as may be required by the Institutional and Engineering Control Plan discussed above.

C. an Operation and Maintenance (O&M) Plan to ensure continued operation, maintenance, optimization, monitoring, inspection, and reporting of any mechanical or physical components of the remedy. The plan includes, but is not limited to:

- procedures for operating and maintaining the remedy;
- compliance monitoring of treatment systems to ensure proper O&M as well as providing the data for any necessary permit or permit equivalent reporting;
- maintaining site access controls and Department notification; and
- providing the Department access to the site and O&M records.

Exhibit A

Nature and Extent of Contamination

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

For each medium for which contamination was identified, a table summarizes the findings of the investigation. The tables present the range of contamination found at the site in the media and compares the data with the applicable SCGs for the site. The contaminants include volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs). Forcomparison purposes, the SCGs are provided for each medium that allows for unrestricted use. For soil, if applicable, the Commercial Use SCGs identified in Section 4 and Section 6.1.1 are also presented.

Groundwater

Groundwater samples were collected from multi-level monitoring wells, located on-site and offsite, extending to 60 feet below ground surface (bgs). On-site and off-site monitoring wells were sampled for volatile organic compounds (VOC), semi-volatile organic compounds (SVOCs), pesticides, PCBs, metals, 1,4-dioxane, and per and polyfluorinated alkyl substances (PFAS). VOCs were fully delineated in groundwater with contamination present to 25 feet bgs. Metals were detected in on-site and off-site samples consistent with regional groundwater conditions. No other compounds were detected above NYS SCGs.

Table 1 - Groundwater		**Screening Criteria in use: NEW YORK STATE CLASS GA**	
Detected Constituents	**Concentration Range Detected (ppb)**	**SCG (ppb)**	**Frequency Exceeding SCG**
Metals NYS CLASS GA			
Antimony	0-6.00	3	1/34
Iron (DISSOLVED)	0-4,890	300	6/7
Manganese (DISSOLVED)	8.63-413	300	1/7
Selenium	0-12.0	10	1/34
Sodium (DISSOLVED)	8,310-62,800	20000	5/7
Thallium	0-8.00	0.5	4/34
SVOC NYS CLASS GA			
2,4-Dimethylphenol	0-3.01	1	1/34
Bis(2-Ethylhexyl) Phthalate	0-10.7	5	1/34
Di-N-Butyl Phthalate	0-73.0	50	1/34
VOC NYS CLASS GA			
1,2,4-Trimethylbenzene	0-990	5	12/68
1,2-Dichlorobenzene	0-4.00	3	1/102

1,3,5-Trimethylbenzene (Mesitylene)	0-590	5	11/69
Acetone	0-850	50	1/68
Bromodichloromethane	0-90.0	50	1/68
Chloroform	0-12.3	7	2/68
Cis-1,2-Dichloroethylene	0-25.0	5	1/68
Ethylbenzene	0-1,500	5	12/69
Isopropylbenzene (Cumene)	0-489	5	16/69
Methylene Chloride	0-23.0	5	1/68
M-P-Xylene	0-4,000	5	11/69
Naphthalene	0-114	10	9/74
N-Butylbenzene	0-54.0	5	11/69
N-Propylbenzene	0-635	5	14/69
O-Xylene (1,2-Dimethylbenzene)	0-1,800	5	7/69
Sec-Butylbenzene	0-35.2	5	14/69
T-Butylbenzene	0-7.70	5	2/69
Tetrachloroethylene (PCE)	0-38.0	5	1/68
Toluene	0-100	5	1/69
Trichloroethylene (TCE)	0-12.0	5	2/68
Vinyl Chloride	0-4.29	2	1/68
Xylenes, Total	0-5,800	5	12/69
		Screening Criteria in use: NYS Maximum Contaminant Levels	
PFAS		**SCG (ppt)**	**Frequency Exceeding SCG**
PFOA	0-53	6.7	17/20
PFOS	0-58	2.7	20/20
		Screening Criteria in use: NYS Maximum Contaminant Levels	
1,4-dioxane		**SCG (ppb)**	**Frequency Exceeding SCG**
1,4-dioxane	0-310	1	1/23

a - ppb: parts per billion, which is equivalent to micrograms per liter, ug/L, in water.
b- SCG: Standard Criteria or Guidance - Ambient Water Quality Standards and Guidance Values (TOGs 1.1.1), 6 NYCRR Part 703, Surface water and Groundwater Quality Standards, and Part 5 of the New York State Sanitary Code (10 NYCRR Part 5).
c- ppt: parts per trillion

The primary groundwater contaminants are petroleum related VOCs xylene, ethylbenzene, isopropylbenzene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, n-propylbenzene, sec-butylbenzene, and naphthalene associated with operation of the former chemical company. The VOC contamination in groundwater is present on-site and to approximately 1,600 feet downgradient of the site to the south. The chlorinated VOCs TCE and PCE were detected above standards in two on-site groundwater samples; however, they were not detected in on-site soil samples. A 2011 Suffolk County Department of Health Services letter report to the Department documented PCE at 140 ppb and TCE at 100 ppb in a well upgradient of the site and at levels below standards immediately downgradient. The on-site PCE and TCE levels detected during the remedial investigation were an order of magnitude lower than those previously detected upgradient, demonstrating a decrease in chlorinated VOC levels. In addition, PCE and TCE levels detected during the remedial investigation in wells upgradient of the site are now non-detect or below Class GA groundwater standards. This indicates that chlorinated VOC groundwater contamination originated from upgradient, is a detached plume, and is passing through the site. Therefore, chlorinated VOCs are not site-related contaminants of concern for groundwater. Groundwater contamination is presented in Figures 3-6.

PFAS compounds were detected at similar concentrations in upgradient and downgradient samples indicating that the site is not a source of these substances to the environment.

Based on the findings of the RI, the use of petroleum related VOCs at the Former Elka Chemical Company has resulted in the contamination of groundwater from petroleum-related VOCs. The site contaminants that are considered to be the primary contaminants of concern which will drive the remediation of groundwater to be addressed by the remedy selection process are the petroleum-related VOCs: xylene, ethylbenzene, isopropylbenzene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, n-propylbenzene, sec-butylbenzene, and naphthalene.

Soil

Surface and subsurface soil samples were collected at the site during the RI. Surface soil samples were collected from a depth of 0-2 inches to assess direct human exposure. Subsurface soil samples were collected from a depth of 2 - 14 feet to assess soil contamination impacts to groundwater. The results indicate that soils at the site exceed the commercial SCG for VOCs, SVOCs, and PCBs. Soil contamination is presented on Figures 8 and 9.

Table 2 - Soil		Screening Criteria in use: 375 SOIL - COMMERCIAL USE, 375 SOIL - PROTECTION OF GROUNDWATER, 375 SOIL - UNRESTRICTED USE					
Detected Constituents	**Concentration Range Detected (ppm)**	**375 SOIL – UNRESTRICTED USE (ppm)**	**Frequency Exceeding Unrestricted Use SCG**	**375 SOIL – COMMERCIAL USE (ppm)**	**Frequency Exceeding Restricted Use SCG**	**375 SOIL - PROTECTION OF GROUNDWATER (ppm)**	**Frequency Exceeding Restricted Use SCG**
Metals PART 375							
Lead	0-74.6	63	1/22	1000	0/22	450	0/22
Mercury	0-0.188	0.18	1/21	2.8	0/21	0.73	0/21
Selenium	0-5.84	3.9	1/22	1500	0/22	4	1/22
Zinc	3.52-199	109	4/22	10000	0/22	2480	0/22
Pesticides/PCBs PART 375							
Aldrin	0-0.0102	0.005	1/6	0.68	0/6	0.19	0/6

Dieldrin	0-0.0318	0.005	2/6	1.4	0/6	0.1	0/6
P,P'-DDD	0-0.00728	0.0033	1/6	92	0/6	14	0/6
P,P'-DDE	0-0.0151	0.0033	2/6	62	0/6	17	0/6
P,P'-DDT	0-0.0329	0.0033	1/6	47	0/6	136	0/6
PCB-1260 (Aroclor1260)	0-3.00	0.1	2/6	1	1/6	3.2	0/6
SVOC PART 375							
Benzo(A)Anthracene	0-19.3	1	2/22	5.6	2/22	1	2/22
Benzo(A)Pyrene	0-19.1	1	2/22	1	2/22	22	0/22
Benzo(B)Fluoranthene	0-25.4	1	2/22	5.6	2/22	1.7	2/22
Benzo(K)Fluoranthene	0-19.6	0.8	2/22	56	0/22	1.7	2/22
Chrysene	0-18.8	1	2/22	56	0/22	1	2/22
Dibenz(A,H)Anthracene	0-5.28	0.33	2/22	0.56	2/22	1000	0/22
Indeno(1,2,3-C,D)Pyrene	0-17.4	0.5	2/22	5.6	2/22	8.2	2/22
VOC PART 375							
1,2,4-Trimethylbenzene	0-450	3.6	3/22	190	1/22	3.6	3/22
1,3,5-Trimethylbenzene (Mesitylene)	0-190	8.4	3/22	190	1/22	8.4	3/22
Ethylbenzene	0-11.0	1	2/22	390	0/22	1	2/22
N-Butylbenzene	0-13.0	12	1/22	500	0/22	12	1/22
N-Propylbenzene	0-100	3.9	3/22	500	0/22	3.9	3/22
O-Xylene (1,2-Dimethylbenzene)	0-11.0	0.26	2/22	500	0/22	1.6	2/22
Xylenes, Total	0-65.0	0.26	2/22	500	0/22	1.6	2/22

a - ppm: parts per million, which is equivalent to milligrams per kilogram, mg/kg, in soil;
b - SCG: Part 375-6.8(a), Unrestricted Soil Cleanup Objectives.
c - SCG: Part 375-6.8(b), Restricted Use Soil Cleanup Objectives for the Protection of Public Health for Commercial Use,unless otherwise noted.
d - SCG: Part 375-6.8(b), Restricted Use Soil Cleanup Objectives for the Protection of Groundwater.

The primary soil contaminants are VOCs and SVOCs associated with the on-site storage of petroleum related compounds. No chlorinated VOCs were detected above unrestricted use SCOs in on-site soil. As noted on Figures 8 and 9, SVOC exceedances of CUSCOs are located in surface soil within a vehicle storage lot and VOC exceedances of PGWSCOs are located in subsurface soils beneath the former tank storage area.

Based on the findings of the Remedial Investigation, the use of petroleum related compounds at the Former Elka Chemical Company has resulted in the contamination of soil. The site contaminants identified in soilwhich are considered to be the primary contaminants of concern, to be addressed by the remedy selection process are, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, indeno(1,2,3-CD)pyrene, 1,2,4-

trimethylbenzene, and 1,3,5-trimethylbenzene.

Soil Vapor

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

Sub-slab vapor, indoor air, and outdoor air samples were collected from the structure located on the former Elka Chemical property and from one downgradient commercial property. The samples were collected to assess the potential for soil vapor intrusion. The results indicate chlorinated solvents including trichloroethylene (TCE) and tetrachloroethylene (PCE) were detected in on-site and off-site sub-slab vapor and indoor air samples.

Sub-slab vapor and co-located indoor air samples collected from the building located on the Former Elka Chemical Property indicated elevated levels of chlorinated VOCs; actions to address potential exposures are necessary. Maximum detections of VOCs are as follows: TCE at 490 micrograms per cubic meter (mcg/m^3) in the sub slab vapor and 0.57 mcg/m^3 in the indoor air and PCE at 860 mcg/m^3 in the sub slab vapor and 5.2 mcg/m^3 in the indoor air. In addition, *cis*-1,2-dichloroethylene was detected at 12 mcg/m^3 in the sub slab vapor and 1,1,1-trichloroethane was detected at 320 mcg/m^3 in the sub slab vapor. Neither *cis* 1,2-dichloroethylene nor 1,1,1-trichloroethane were detected in the indoor air.

The primary soil vapor contaminants on-site are TCE and PCE which are potentially associated with the chlorinated VOC groundwater impacts emanating from an upgradient, off-site source. As noted on Figure 10, the primary soil vapor contamination is found under the on-site building. Soil vapor intrusion testing in the downgradient commercial property found elevated levels of chlorinated solvents, but they were determined to be unrelated to the site contamination. Therefore, mitigation is necessary for the on-site building and mitigation is recommended for the off-site commercial property outside of the Former Elka Chemical Remedial program.

Based on the findings of the Remedial Investigation, while from a non-site related upgradient detached source, the primary contaminants of concern which will drive the remediation of soil vapor to be addressed by the remedy selection process are, trichloroethylene (TCE) and tetrachloroethylene (PCE).

Exhibit B

Description of Remedial Alternatives

The following alternatives were considered based on the remedial action objectives (RAOs) (see Section 6.5) to address the contaminated media identified at the site as described in Exhibit A.

Alternative 1: No Action

The No Action Alternative is evaluated as a procedural requirement and as a basis for comparison. This alternative leaves the site in its present condition and does not provide any additional protection to public healthand the environment.

Alternative 2: Monitored Natural Attenuation, Soil Excavation, and Vapor Mitigation

This Alternative would address groundwater contamination with monitored natural attenuation (MNA). Groundwater will be monitored for site related contamination and also for MNA indicators which will provide an understanding of the biological activity breaking down the contamination. It is anticipated that MNA process will achieve groundwater RAOs within 15 to 20 years.

Soil contamination would be addressed *via* excavation and off-site disposal of all on-site soils which exceed commercial SCOs and all on-site soils in which contaminants of concern exceed protection of groundwater use SCOs above the water table, as defined by 6 NYCRR Part 375-6.8. Approximately 280 cubic yards of contaminated soil will be removed from the site.

A site cover would be required in areas where the upper one foot of exposed surface soil will exceed the applicable soil cleanup objectives (SCOs), to allow for commercial use of the site on the western, unpaved portion of the site.

Any on-site buildings would be required to have a sub-slab depressurization system, or other acceptable measures, to mitigate the migration of vapor into the building from soil and groundwater**.**

This alternative also employs site management, including institutional and engineering controls (IC/ECs), to ensure the remedy continues to be protective and to allow the appropriate reuse of the property until remedial objectives are achieved. Institutional controls are anticipated to prohibit potable use of groundwater. The environmental easement and Site Management Plan (SMP) will limit the use of the site to commercial use. The SMP will also include an excavation work plan to ensure proper management of soil that may be excavated from the site in the future.

Present Value: ………………………………………………………………………………$627,000
Capital Costs: ………………………………………………………………………………$250,000

Annual Costs: ……………………………………………………………………….……..$52,000

Alternative 3: Enhanced Bioremediation, Soil Excavation, and Vapor Mitigation

In-situ enhanced biodegradation will be employed to treat contaminants in on and off-site groundwater. The biological breakdown of contaminants through aerobic respiration will be enhanced by a means determined to be most effective during a pilot study. The areal extent of treatment, method, and depth of injections will be determined during the remedial design.

Soil contamination would be addressed *via* excavation and off-site disposal of all on-site soils which exceed commercial SCOs and all on-site soils in which contaminants of concern exceed protection of groundwater use SCOs above the water table, as defined by 6 NYCRR Part 375-6.8. Approximately 280 cubic yards of contaminated soil will be removed from the site.

A site cover would be required in areas where the upper one foot of exposed surface soil will exceed the applicable soil cleanup objectives (SCOs), to allow for commercial use of the site on the western, unpaved portion of the site.

Any on-site buildings would be required to have a sub-slab depressurization system, or other acceptable measures, to mitigate the migration of vapor into the building from soil and groundwater**.**

This alternative also employs site management, including institutional and engineering controls (IC/ECs), to ensure the remedy continues to be protective and to allow the appropriate reuse of the property until remedial objectives are achieved. Institutional controls are anticipated to prohibit potable use of groundwater. The environmental easement and Site Management Plan (SMP) will limit the use of the site to commercial use. The SMP will also include an excavation work plan to ensure proper management of soil that may be excavated from the site in the future.

Present Value: …………………………………………………………………………$781,000
Capital Costs: …………………………………………………………………………$463,000
Annual Costs: …………………………………………………………………………$142,000

Alternative 4: Air Sparge/Soil Vapor Extraction, Enhanced Bioremediation, Soil Excavation, and Vapor Mitigation

This alternative utilizes air sparging (injection) and soil vapor extraction to address the groundwater plume contaminated by volatile organic compounds (VOCs). VOCs are removed from the groundwater and soil below the water table (saturated soil) by injecting air into the contaminated zone. Injected air, rising through the groundwater, volatilizes and transfers the VOCs from the groundwater and/or soil into the injected air. The VOCs are carried with the injected air upward into the vadose zone (the area below the ground surface but above the water table) where a soil vapor extraction system designed to remove the injected air is installed. The SVE system applies a vacuum to wells that have been installed into the vadose zone to remove the VOCs along with the air introduced by the sparging process. The number and depth of air injection and SVE wells will be determined during the remedial design. The air containing VOCs extracted from the SVE wells will be treated by passing the air stream through a treatment system, such as activated carbon, which will remove the VOCs from the air prior to it being discharged to the atmosphere.

In-situ enhanced biodegradation will also be employed to treat contaminants in groundwater off-site and in a limited area on-site to be determined during the remedial design. The biological breakdown of contaminants through aerobic respiration will be enhanced by a means determined to be most effective during a pilot study. The method and depth of injection will be determined during the remedial design.

Soil contamination would be addressed *via* excavation and off-site disposal of all on-site soils which exceed commercial SCOs and all on-site soils in which contaminants of concern exceed protection of groundwater use SCOs above the water table, as defined by 6 NYCRR Part 375-6.8. Approximately 280 cubic yards of contaminated soil will be removed from the site.

A site cover would be required in areas where the upper one foot of exposed surface soil will exceed the applicable soil cleanup objectives (SCOs), to allow for commercial use of the site on the western, unpaved portion of the site.

Any on-site buildings would be required to have a sub-slab depressurization system, or other acceptable measures, to mitigate the migration of vapor into the building from soil and groundwater**.**

This alternative also employs site management, including institutional and engineering controls (IC/ECs), to ensure the remedy continues to be protective and to allow the appropriate reuse of the property until remedial objectives are achieved. Institutional controls are anticipated to prohibit potable use of groundwater. The environmental easement and Site Management Plan (SMP) will limit the use of the site to commercial use. The SMP will also include an excavation work plan to ensure proper management of soil that may be excavated from the site in the future.

Present Value: ……………………………………………………………………..…$1,209,000
Capital Costs: ……………………………………………………………………….$433,000
Annual Costs: ……………………………………………………………………….$144,000

Alternative 5: Restore Site to Pre-Disposal Conditions

This alternative utilizes air sparging (injection) and soil vapor extraction to address the groundwater plume contaminated by volatile organic compounds (VOCs). VOCs are removed from the groundwater and soil below the water table (saturated soil) by injecting air into the contaminated zone. Injected air, rising through the groundwater, volatilizes and transfers the VOCs from the groundwater and/or soil into the injected air. The VOCs are carried with the injected air upward into the vadose zone (the area below the ground surface but above the water table) where a soil vapor extraction system designed to remove the injected air is installed. The SVE system applies a vacuum to wells that have been installed into the vadose zone to remove the VOCs along with the air introduced by the sparging process. The number and depth of air injection and SVE wells will be determined during the remedial design. The air containing VOCs extracted from the SVE wells will be treated by passing the air stream through a treatment system, such as activated carbon, which will remove the VOCs from the air prior to it being discharged to the atmosphere.

In-situ enhanced biodegradation will also be employed to treat contaminants in groundwater off-site and in a limited area on-site to be determined during the remedial design. The biological breakdown of contaminants through aerobic respiration will be enhanced by a means determined to be most effective during a pilot study. The method and depth of injection will be determined during the remedial design.

Soil contamination would be addressed *via* excavation and off-site disposal of all on-site soils which exceed unrestricted use SCOs, as defined by 6 NYCRR Part 375-6.8. The on-site building would need to be demolished to fully remove all impacted material. Approximately 2900 cubic yards of contaminated soil would be removed from the site.

Any on-site buildings would be required to have a sub-slab depressurization system, or other acceptable measures, to mitigate the potential migration of vapor into the building from groundwater until RAOs are achieved.

This alternative also employs site management, including institutional and engineering controls (IC/ECs), to ensure the remedy continues to be protective and to allow the appropriate reuse of the property until remedial objectives are achieved. Institutional controls are anticipated to prohibit potable use of groundwater and prevent soil vapor intrusion.

Present Value: ………………………………………………………………………..$1,703,000
Capital Costs: ……………………………………………………………………………$907,000
Annual Costs: ……………………………………………………………………………$144,000

Exhibit C

Remedial Alternative Costs

Remedial Alternative	Capital Cost ($)	Annual Costs ($)	Total Present Worth ($)
No Action	0	0	0
Monitored Natural Attenuation, Soil Excavation, and Vapor Mitigation	$250,000	$52,000	$627,000
Enhanced Bioremediation, Soil Excavation, and Vapor Mitigation	$463,000	$142,000	$781,000
Air Sparge/Soil Vapor Extraction, Enhanced Bioremediation, Soil Excavation, and Vapor Mitigation	$433,000	$144,000	$1,209,000
Restore to Pre-disposal Conditions	$907,000	$144,000	$1,703,000

Exhibit D

SUMMARY OF THE PROPOSED REMEDY

The Department is proposing Alternative 3, Enhanced Bioremediation, Soil Excavation, and Vapor Mitigation as the remedy for this site. Alternative 3 would achieve the remediation goals for the site by employing enhanced bioremediation to treat on-site and off-site groundwater contamination, soil excavation to address the limited areas of on-site soil contamination, and installation of a sub-slab depressurization system to address the potential for soil vapor intrusion in on-site buildings. The elements of this remedy are described in Section 7. The proposed remedy is depicted in Figure 10.

Basis for Selection

The proposed remedy is based on the results of the RI and the evaluation of alternatives. The criteria to which potential remedial alternatives are compared are defined in 6 NYCRR Part 375. A detailed discussion of the evaluation criteria and comparative analysis is included in the Feasibility Study (FS) report.

The first two evaluation criteria are termed "threshold criteria" and must be satisfied in order for an alternativeto 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.

The proposed remedy, Alternative 3 would satisfy this criterion by removing or destroying on-site and off-site contamination in soil and groundwater to standards, criteria, and guidance values and by mitigating the potential for soil vapor intrusion in the on-site building. Alternatives 4 and 5 would also satisfy this criterion. Alternative 1 (No Action) does not provide any protection to public health and the environment and will not be evaluated further. Alternative 2, would not meet the groundwater remedial action objectives and the threshold criteria in a reasonable amount of time.

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

Alternative 3 complies with SCGs as it addresses both on-site and off-site contamination. Alternatives 4 and 5 would also comply with this criterion. Alternative 2 would also comply with this criterion but to a lesser degree or with lower certainty. Because Alternatives 2, 3, 4, and 5 all satisfy the threshold criteria, the remaining criteria are particularly important in selecting a final remedy for the site. It is expected that Alternatives 3, 4, and 5 would achieve groundwater SCGs in less than 5 years, while under Alternative 2 groundwater contamination will remain above SCGs for many years.

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

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

Long-term effectiveness is best accomplished by those alternatives involving in-situ destruction of groundwater contaminants (Alternatives 3, 4, and 5). All alternatives would remove soil contamination above CUSCOs and would mitigate the potential for soil vapor intrusion. Alternative 5 would remove all soil contamination above UUSCOs but would possibly require the demolition of the on-site building to achieve this. All alternatives will require engineering and institutional controls until groundwater standards are met, and it is determined by the Department, in consultation with NYSDOH, that vapor mitigation systems are no longer needed.

4. Reduction of Toxicity, Mobility or Volume. Preference is given to alternatives that permanently and significantly reduce the toxicity, mobility or volume of the wastes at the site.

Alternatives 3, 4, and 5 through the aerobic biodegradation have the ability to permanently reduce the toxicity, mobility or volume of contaminants. However, these alternatives require extensive pilot testing and monitoring to ensure the most effective product is selected for the site conditions and will require amendments to the subsurface conditions to promote biodegradation. Alternatives 4 and 5, would additionally implement in-situ air sparging, which would provide a greater reduction in the toxicity, mobility, and volume of contaminants. However, due to the presence of a weathered petroleum layer at the site, the effectiveness of Air Sparge/SVE may be limited due to impermeability issues. Alternative 2 would eventually reduce the toxicity, mobility, and volume of contaminants after a long period of time. All Alternatives would address soil and vapor mitigation. Alternative 5 would remove the greatest quantity of impacted soil.

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

Alternatives 2 through 4 all have short-term impacts which could easily be controlled, however, Alternative 2 would have the smallest impact. Alternative 3 would have greater short-term impacts than Alternative 2 due to the work associated with enhanced bioremediation. Alternative 4 would have greater short-term impacts than Alternative 3 due to the additional intrusive work associated with the installation of the AS/SVE system. Alternative 5 would have the greatest short-term impacts as extensive excavation work would be necessary to remove the weathered petroleum layer. This excavation would possibly require the demolition of the on-site building and would have potential odor impacts during the excavation. The time needed to achieve the remediation goals is the shortest for Alternative 5 and longer for Alternatives 2, 3, and 4. Alternative 2 would take the longest to achieve the remediation goals.

6. Implementability. The technical and administrative feasibilities 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.

Alternatives 2, and 3 are readily implementable. Alternative 4 would require more construction work and coordination to implement. Additionally, there is some uncertainty as to whether the presence of a weathered petroleum layer would reduce the effectiveness of in-situ air sparging. The implementability of Alternative 4 would be determined in extensive pilot testing. Alternative 5 would possibly require the demolition of the on-site building in addition to the assessment of the feasibility of implementing AS/SVE. For these reasons, Alternative 5 is the most difficult to implement.

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

The costs of the alternatives vary significantly. Alternative 2 has a low cost but would take the longest amount of time to meet RAOs for groundwater contamination. Alternative 4 has a slightly lower capital cost than Alternative 3 since the combination of technologies would allow for a reduction in the number of bioremediation injection points. However, the overall present value of Alternative 4 is significantly higher than Alternative 3 since due to the ongoing operational costs of the AS/SVE system. Alternative 5 has the highest cost of any Alternative due to the increased excavation volume and the potential building demolition.

8. Land Use. When cleanup to pre-disposal conditions is determined to be infeasible, the Department may consider the current, intended, and reasonable anticipated future land use of the site and its surroundings in the selection of the soil remedy.

An environmental easement is required for Alternatives 2, 3, 4, and 5 because groundwater contamination is expected to remain above the NYS Class GA groundwater criteria during the treatment period and soil contamination will remain on-site above UUSCOs. The proposed restricted commercial use is consistent with local zoning and surrounding land uses, so Alternatives 2 through 4 meet this criterion equally. Once groundwater meets standards and vapor mitigation is no longer needed, the easement may be extinguished, and the site would meet unrestricted conditions under Alternative 5.

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

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

Alternative 3 is being proposed because, as described above, it satisfies thethreshold criteria and provides the best balance of the balancing criterion.

Figure 1: Site Location
152239 - Former Elka Chemical Company
Lindenhurst, Suffolk County

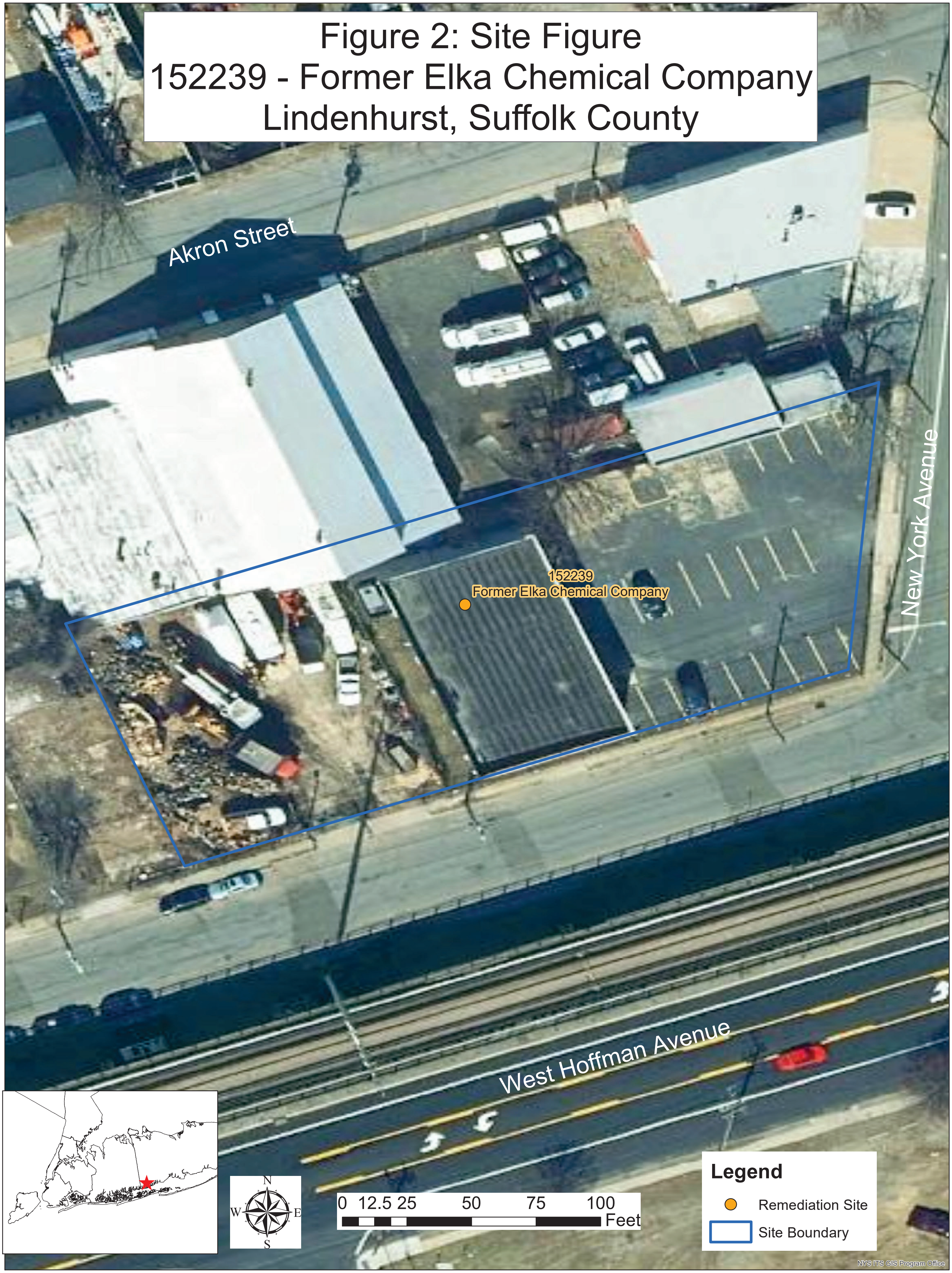

Figure 2: Site Figure
152239 - Former Elka Chemical Company
Lindenhurst, Suffolk County

SCALE: 1" = 40'

LEGEND

GP-6S NO EXC.	GROUNDWATER SAMPLING LOCATION AND VOC EXCEEDANCES OF CLASS GA STANDARDS. CLASS GA STANDARDS ARE SHOWN IN PARENTHESIS. ALL VALUES SHOWN ARE IN mcg / l. (5*) THE PRINCIPLE ORGANIC CONTAMINANT STANDARD FOR GROUNDWATER OF 5 mcg/l APPLIES TO THIS SUBSTANCE.

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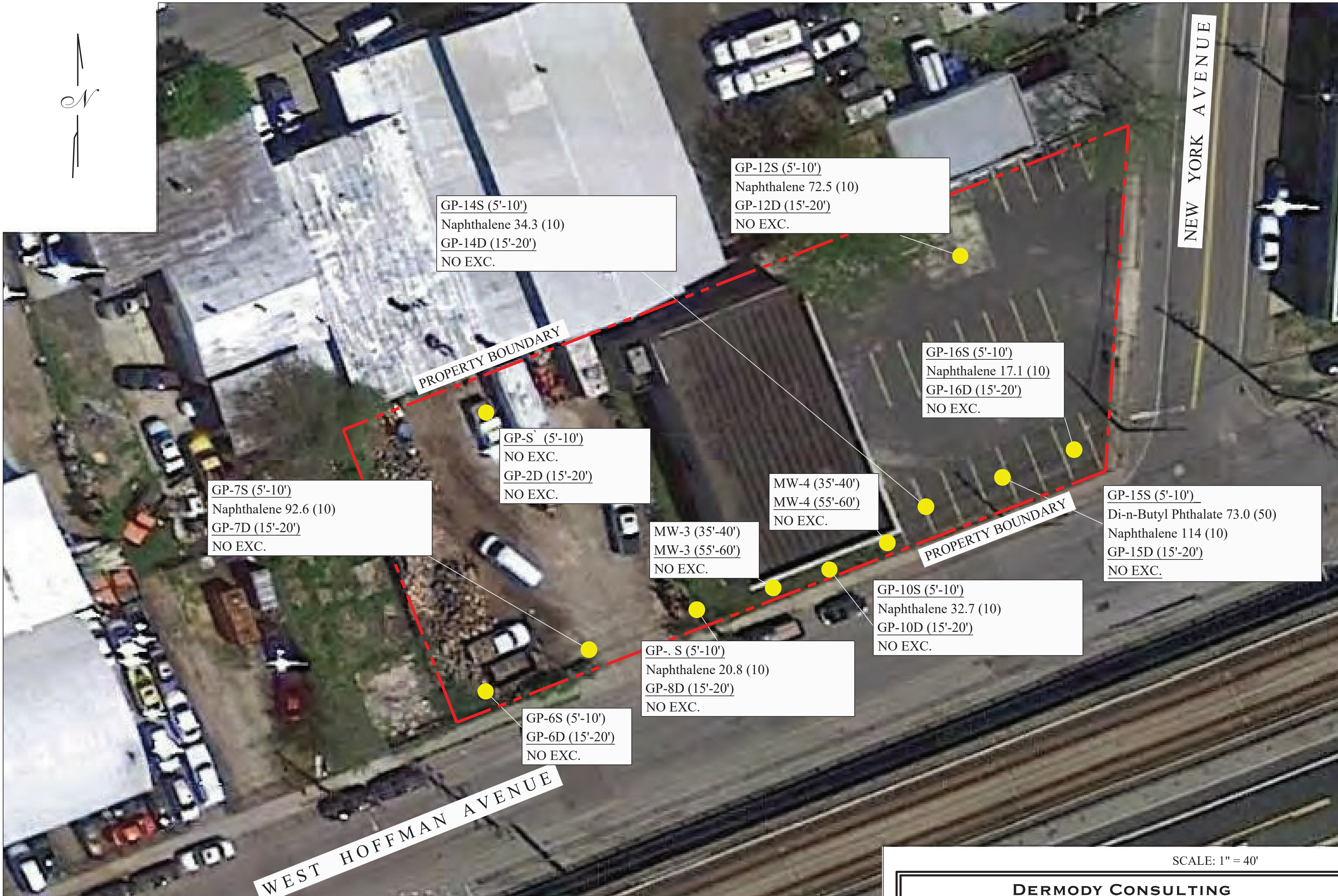
FIGURE 3
ON-SITE GROUNDWATER SAMPLING LOCATIONS AND VOC EXCEEDANCES OF CLASS GA STANDARDS
340 WEST HOFFMAN AVENUE
LINDENHURST, NEW YORK



SCALE: 1" = 40'

LEGEND

GP-6S
NO EXC.

GROUNDWATER SAMPLING LOCATION
AND SVOC EXCEEDANCES OF CLASS GA STANDARDS. CLASS GA STANDARDS ARE SHOWN IN PARENTHESIS. ALL VALUES SHOWN ARE IN mcg / l.
(5*) THE PRINCIPLE ORGANIC CONTAMINANT STANDARD FOR GROUNDWATER OF 5 mcg/l APPLIES TO THIS SUBSTANCE.

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FIGURE 4
ON-SITE GROUNDWATER SAMPLING LOCATIONS AND SVOC EXCEEDANCES OF CLASS GA STANDARDS
340 WEST HOFFMAN AVENUE
LINDENHURST, NEW YORK

LEGEND

SCALE: 1" = 280'

GW-4 NO EXC.	OFF-SITE GROUNDWATER SAMPLING LOCATION AND VOC EXCEEDANCES OF CLASS GA STANDARDS. CLASS GA STANDARDS ARE SHOWN IN PARENTHESIS. ALL VALUES SHOWN ARE IN mcg / l. (5*) THE PRINCIPLE ORGANIC CONTAMINANT STANDARD OF 5 mcg / l FOR GROUNDWATER APPLIES TO THIS SUBSTANCE.

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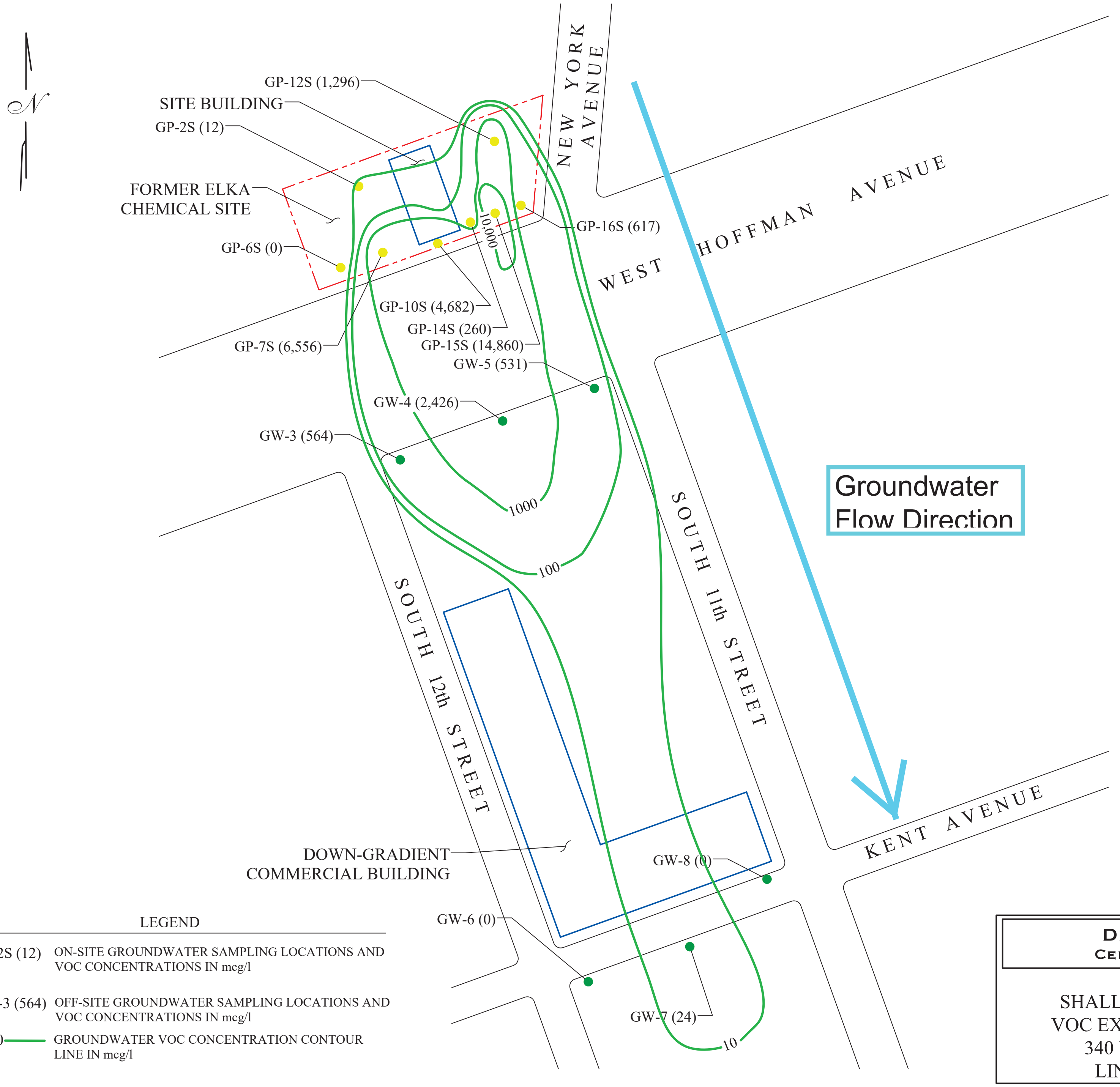
FIGURE 5
OFF-SITE GROUNDWATER SAMPLING LOCATIONS AND VOC EXCEEDANCES OF CLASS GA STANDARDS

340 WEST HOFFMAN AVENUE
LINDENHURST, NEW YORK



LEGEND

GP-2S (12)	ON-SITE GROUNDWATER SAMPLING LOCATIONS AND VOC CONCENTRATIONS IN mcg/l
GW-3 (564)	OFF-SITE GROUNDWATER SAMPLING LOCATIONS AND VOC CONCENTRATIONS IN mcg/l
10	GROUNDWATER VOC CONCENTRATION CONTOUR LINE IN mcg/l

DRAWING NOT TO SCALE

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CENTER MORICHES, NEW YORK

FIGURE 6
SHALLOW GROUNDWATER TOTAL
VOC EXCEEDANCES CONTOUR MAP
340 WEST HOFFMAN AVENUE
LINDENHURST, NEW YORK

LEGEND

SCALE: 1" = 280'

GW-3 (5'-10')
PFOS 20.1
PFOA 15.7

GROUNDWATER SAMPLING LOCATION AND EXCEEDANCES OF NYSDEC PFAS GUIDELINES. NYSDEC GUIDLINES ARE SHOWN IN PARENTHESIS. ALL VALUES ARE IN MICROGRAMS PER LITER.

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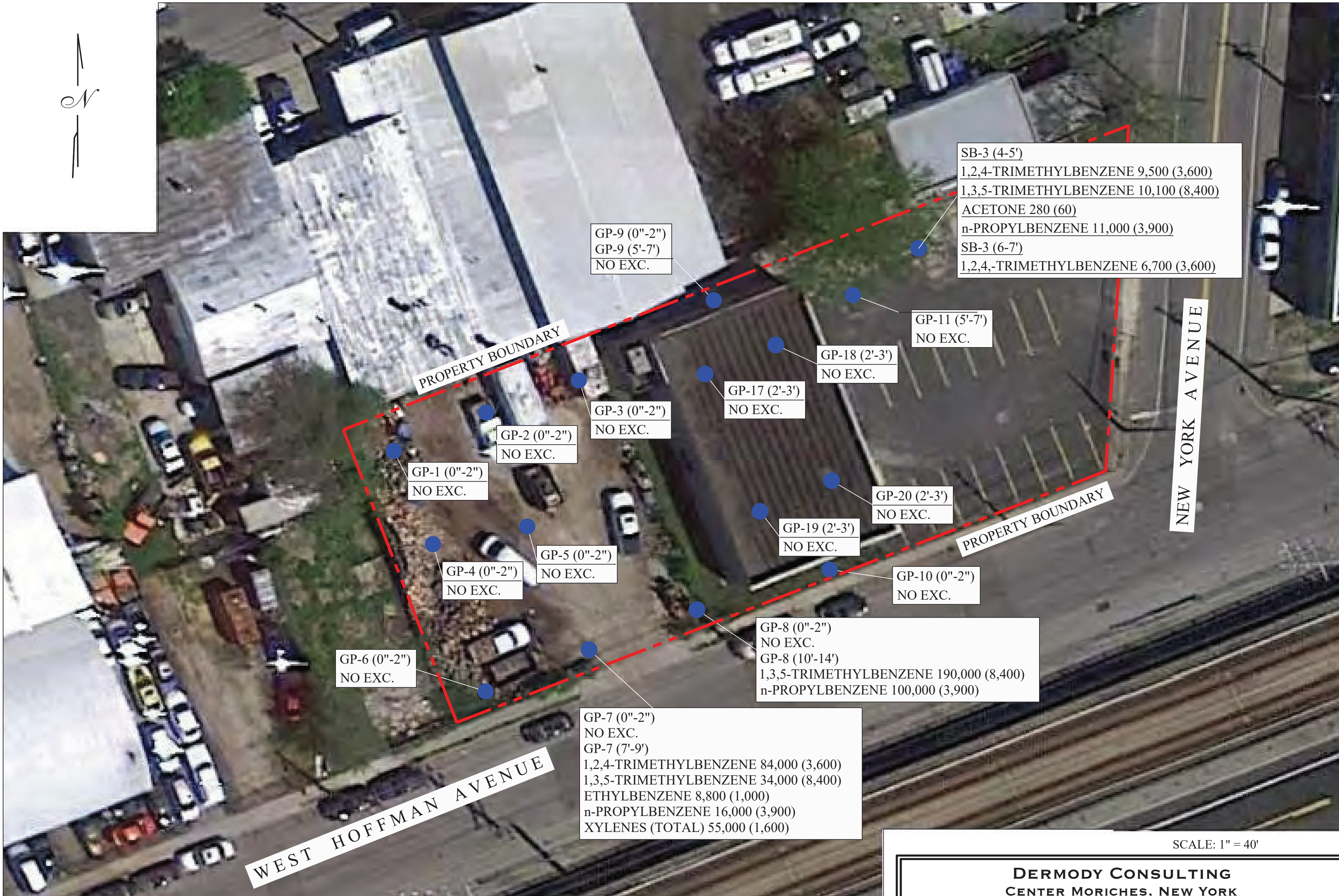
FIGURE 7
ON-SITE AND OFF-SITE GROUNDWATER SAMPLING LOCATIONS AND EXCEEDANCES OF NYSDEC PFAS GUIDELINES
340 WEST HOFFMAN AVENUE
LINDENHURST, NEW YORK



SCALE: 1" = 40'

LEGEND

GP-1 (0"-2")
NO EXC.

SOIL SAMPLING LOCATION, AND VOC EXCEEDANCES OF PROTECTION OF GROUNDWATER SCOs

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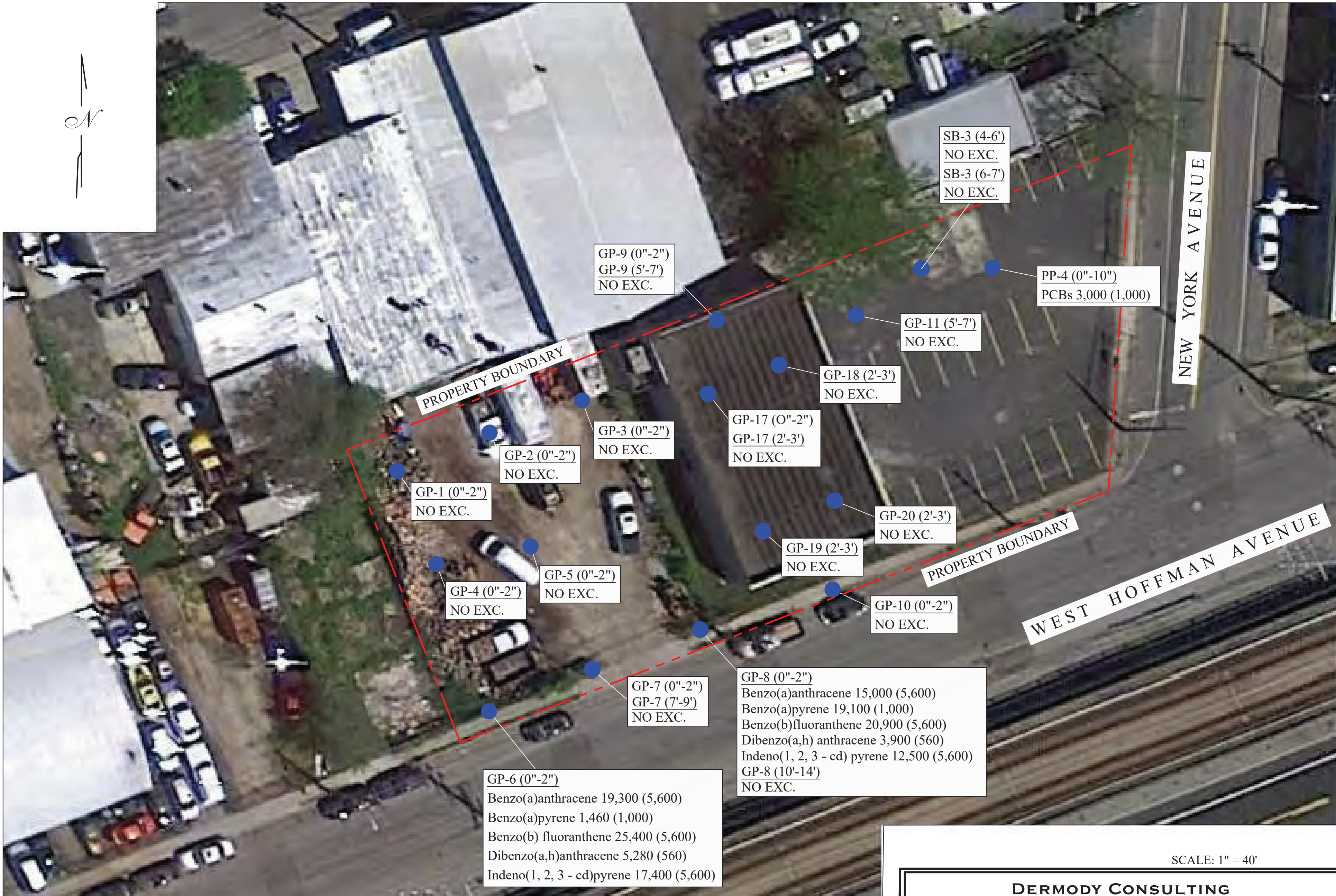
FIGURE 8
ON-SITE SOIL SAMPLING LOCATIONS AND VOC EXCEEDANCES OF PROTECTION OF GROUNDWATER SCOs
340 WEST HOFFMAN AVENUE
LINDENHURST, NEW YORK



SCALE: 1" = 40'

LEGEND

GP-1 (0"-2")
NO EXC.

SOIL SAMPLING LOCATION AND SVOC AND PCB EXCEEDANCES OF COMMERCIAL SOIL CLEANUP OBJECTIVES. SOIL CLEANUP OBJECTIVE VALUES ARE SHOWN IN PARENTHESIS.
ALL VALUES SHOWN ARE IN mcg / Kg.

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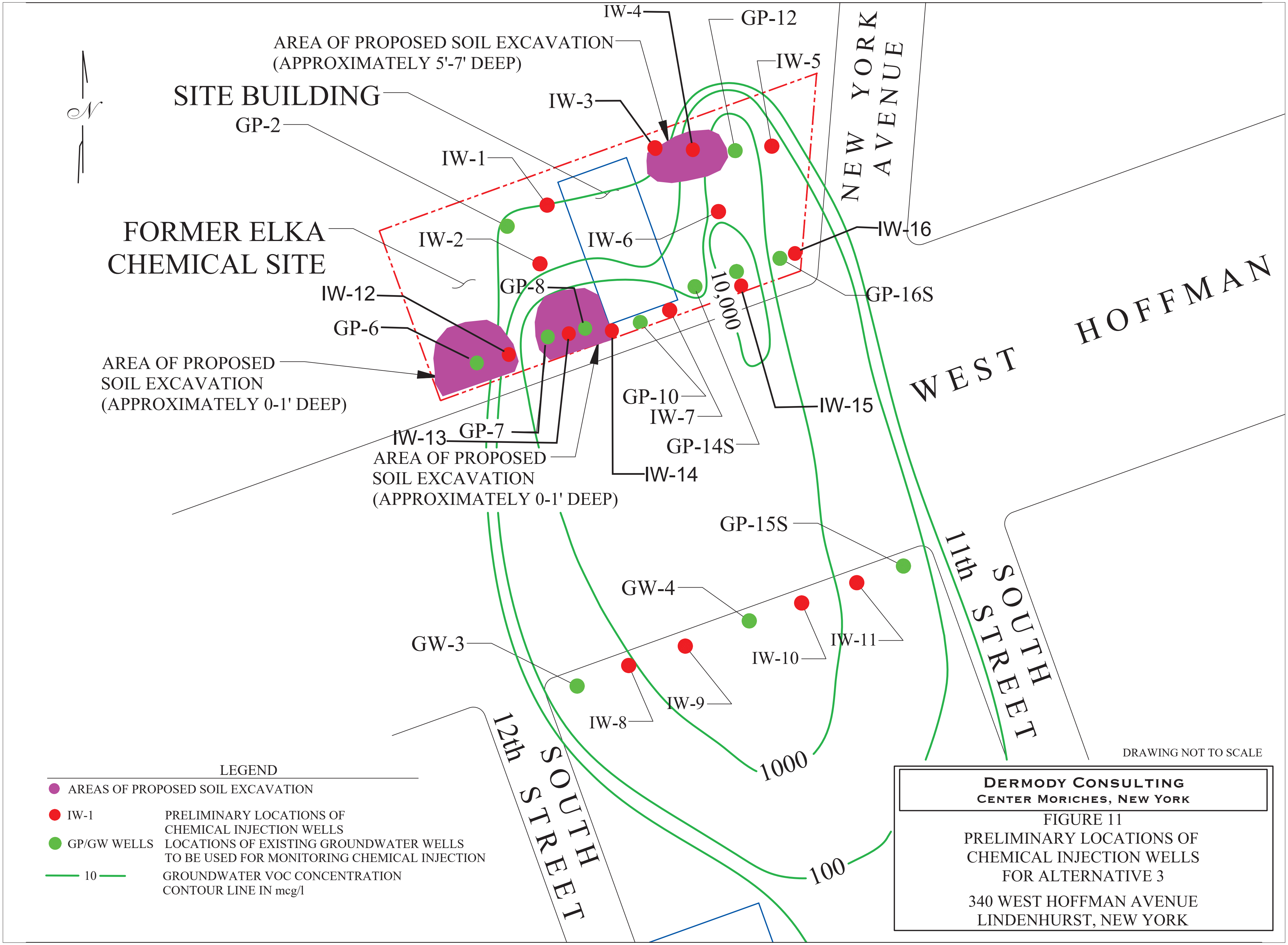
FIGURE 9
ON-SITE SOIL SAMPLING LOCATIONS AND SVOC AND PCB EXCEEDANCES OF APPLICABLE SCOs
340 WEST HOFFMAN AVENUE
LINDENHURST, NEW YORK

Figure 10: CVOC SVI Results
152239 - Former Elka Chemical Company
Lindenhurst, Suffolk County

	OA-1		
	OA-1		
	21 Mar 2020		
Chemical Name	Result	Qual	Unit
Carbon Tetrachloride	0.54	D	ug/m3
Chloromethane (Methyl Chloride)	1.2	D	ug/m3
Methylene Chloride	2.3	D	ug/m3

	IA-2			SS-2		
	21 Mar 2020			21 Mar 2020		
Chemical Name	Result	Qual	Unit	Result	Qual	Unit
Tetrachloroethylene (PCE)	5.2	D	ug/m3	860	D	ug/m3
Cis-1,2-Dichloroethylene	0.081	U	ug/m3	2.1	D	ug/m3
1,1,1-Trichloroethane (TCA)	0.45	U	ug/m3	99	D	ug/m3
Methylene Chloride	2	D	ug/m3	6	D	ug/m3
Trichloroethylene (TCE)	0.57	D	ug/m3	210	D	ug/m3

	IA-1			SS-1		
	21 Mar 2020			21 Mar 2020		
Chemical Name	Result	Qual	Unit	Result	Qual	Unit
Tetrachloroethylene (PCE)	4.3	D	ug/m3	810	D	ug/m3
Cis-1,2-Dichloroethylene	0.089	U	ug/m3	12	D	ug/m3
1,1,1-Trichloroethane (TCA)	0.49	U	ug/m3	320	D	ug/m3
Methylene Chloride	2	D	ug/m3	8.5	D	ug/m3
Trichloroethylene (TCE)	0.48	D	ug/m3	490	D	ug/m3


N
SITE BUILDING
FORMER ELKA CHEMICAL SITE
AREA OF PROPOSED SOIL EXCAVATION (APPROXIMATELY 5'-7' DEEP)
AREA OF PROPOSED SOIL EXCAVATION (APPROXIMATELY 0-1' DEEP)
AREA OF PROPOSED SOIL EXCAVATION (APPROXIMATELY 0-1' DEEP)
IW-1
IW-2
IW-3
IW-4
IW-5
IW-6
IW-7
IW-8
IW-9
IW-10
IW-11
IW-12
IW-13
IW-14
IW-15
IW-16
GP-2
GP-6
GP-7
GP-8
GP-10
GP-12
GP-14S
GP-15S
GP-16S
GW-3
GW-4
10,000
1000
100
NEW YORK AVENUE
WEST HOFFMAN
11th SOUTH STREET
12th SOUTH STREET
DRAWING NOT TO SCALE
LEGEND
AREAS OF PROPOSED SOIL EXCAVATION
IW-1 PRELIMINARY LOCATIONS OF CHEMICAL INJECTION WELLS
GP/GW WELLS LOCATIONS OF EXISTING GROUNDWATER WELLS TO BE USED FOR MONITORING CHEMICAL INJECTION
10 GROUNDWATER VOC CONCENTRATION CONTOUR LINE IN mcg/l
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CENTER MORICHES, NEW YORK
FIGURE 11
PRELIMINARY LOCATIONS OF CHEMICAL INJECTION WELLS FOR ALTERNATIVE 3
340 WEST HOFFMAN AVENUE
LINDENHURST, NEW YORK