

PROPOSED REMEDIAL ACTION PLAN

Irvington Rugs and Cleaners
State Superfund Project
Irvington, Westchester County
Site No. 360175
August 2026



**Department of
Environmental
Conservation**

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 (DEC), 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.

DEC 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

DEC 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:

A public comment period has been set from: August 15 to September 15, 2026

A public meeting is scheduled for the following date: Thursday, September 10, 2026

Public meeting location: Irvington Public Library, 12 South Astor Street, Irvington, NY 10533

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:

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Division of Environmental Remediation
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DEC 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 DEC's final selection of the remedy for this site.

Receive Site Citizen Participation Information By Email

Please note that DEC'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, 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 Irvington Rugs and Cleaners site is a 0.06-acre site located in an urban area in the Village of Irvington. The site is four blocks to the east of the Hudson River and four blocks to the west of Route 9.

Site Features: Most of the site is occupied by the building. Adjacent buildings along this block of Main Street adjoin each other. A paved access driveway exists at the back border (north side) of the site. A sidewalk and a row of diagonal parking slots are in front of the building.

Current Zoning and Land Use: The site is an active dry cleaner and is zoned for commercial use. Other properties in the area are zoned a mixture of commercial and restricted- residential use. The nearest residential properties are located immediately adjacent to the site to the east, west, and north. The site and the surrounding area are serviced by public water and sewer.

Past use of the site: Various buildings were present on the site in the early 1900s, and the southern

portion of the current site building may have been constructed as early as 1905. It is not known when the site was first used for dry cleaning services. However, the previous owner of the site, and founder of the Irvington Rugs and Cleaners business purchased the site in 1965, and it is assumed dry cleaning services began around this time. The current owner, who purchased the site in 2006, continues to operate the site as a dry cleaner. Active dry cleaning reportedly ceased from 1990 until 2006, with the site used as a dry cleaning drop off location during that time. When the new owners purchased the site in 2006, active dry cleaning resumed but with a hydrocarbon-based dry-cleaning machine that uses “Easy Clean” as a solvent rather than continuing to utilize the older tetrachloroethene (PCE)-based solvent. In addition, and as discussed in Exhibit A (Nature and Extent of Contamination) the site was subject to a soil removal action to address PCE contamination in soils at the rear of the site building as part of the property transaction in 2006.

Site Geology: The geology of the site consists of a shallow fill layer containing large cobbles, gravel, and bricks. Underlying this unit is an unconsolidated glacial till which primarily consists of brown sands and silts. Bedrock was encountered at depths between nine feet (ft) below ground surface (bgs) and 20 ft bgs across the study area. The bedrock below the site is mapped as the Inwood Marble, which is characteristically a dolomite marble, calc-schist, granulite and quartzite overlain by calcite marble. However, bedrock coring and visible outcrops in a nearby basement suggest the bedrock may be the Fordham Gneiss which is a coarse-textured, banded black and white biotite gneiss.

Groundwater beneath the site and immediate surrounding area is encountered from approximately four to nine ft bgs. Although groundwater was encountered within the overburden at most locations, the top of the water table was below the bedrock surface in some downgradient areas where depth to bedrock was shallow. Groundwater measurements indicate that shallow groundwater flows west towards the Hudson River

A site location map is attached as Figure 1. A site layout and sampling location map is attached as Figure 2.

SECTION 4: LAND USE AND PHYSICAL SETTING

DEC 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 that restrict the use of the site to commercial use (which allows for industrial use) as described in Part 375-1.8(g) are 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:

Irvington Rugs and Cleaners

The DEC was not successful in its attempts to obtain voluntary agreement from PRPs to implement a remedial program for the site. After the remedy is selected, the PRPs will again be contacted to assume responsibility for the remedial program. If an agreement cannot be reached with the PRPs, DEC will evaluate the site for further action under the State Superfund. The PRPs are subject to legal actions by the state for recovery of all response costs the state has incurred.

SECTION 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
- soil vapor
- 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. DEC 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:

tetrachloroethene (PCE)	perfluorooctane sulfonate
trichloroethene (TCE)	perfluorooctane sulfonic acid
cis-1,2-dichloroethene	

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

- groundwater
- soil
- soil vapor

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.

The following IRMs have been completed at this site based on conditions observed during the RI.

IRM - Off-site Vapor Intrusion Mitigation

IRM Soil Vapor Intrusion Mitigation

Soil vapor intrusion sampling at two off-site buildings detected site contaminants of concern at "mitigate" levels in accordance with the Soil Vapor / Indoor Air Decision Matrices. Mitigate means that actions are needed to address vapor intrusion. Both buildings requiring mitigation are located hydraulically downgradient from the Irvington Rugs and Cleaners site.

At building 1, PCE and its degradation compounds were identified in soil and groundwater underlying the basement slab, in a former sump pit, and within an 8 x 12 x 1.5 ft depression in the basement slab. Based on the soil vapor and indoor air results, it was determined that a sub-slab

depressurization system (SSDS) would be the best option for mitigating vapor intrusion from the sub-slab. To address contaminated soil and groundwater within the basement, the floor depression was power washed, filled with gravel, and a concrete slab placed over the depression to match the existing basement floor grade. The sump was similarly cleaned and a specialized radon mitigation floor drain installed to prevent potential vapor migration into the basement while simultaneously allowing its continued use as sump. To depressurize the slab, one Festa AMG Eagle mitigation fan was connected to four sub-slab suction points located in four quadrants of the basement using four-inch schedule 40 PVC. Following completion of the installation, six vacuum test points were drilled and assessed for system effectiveness under normal operating conditions, and post-installation indoor air confirmation samples were collected. Based on the sub-slab vacuum measurements post SSDS installation and the results of the indoor air sampling, the SSDS is operating as designed and mitigating the potential for vapor intrusion. This IRM was completed in March 2023 and is documented in a Construction Completion Report, dated July 2023.

At building 2, soil vapor intrusion testing detected PCE and its degradation products in sub-slab vapor. Although only PCE was observed at trace levels and TCE was not detected in the indoor air, the levels of TCE in the sub-slab vapor alone necessitated the installation of an SSDS to mitigate the potential for soil vapor intrusion. To depressurize the slab, one Pressure Tech PT8 mitigation fan was connected via three-inch and four-inch schedule 40 PVC to five sub-slab suction points located in the basement. One sub-slab point had an additional area of perforated pipe installed within a sewer line trench before being sealed with a new concrete floor. Following completion of the installation, seven vacuum test points were drilled and assessed for system effectiveness under normal operating conditions. Post-installation indoor air confirmation samples were not required since the indoor air was previously unimpacted and the installation of the SSDS was meant to address the potential for indoor air impacts only. Based on the sub-slab vacuum measurements post SSDS installation, the SSDS is operating as designed and mitigating the potential for vapor intrusion. This IRM was completed in November 2023 and is documented in a Construction Completion Report, dated May 2024.

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 OU 01.

Soil and groundwater were analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), metals, polychlorinated biphenyls (PCBs), per- and polyfluoroalkyl substances (PFAS), and pesticides. Based upon investigations conducted to date, tetrachloroethene (PCE), and its degradation compounds trichloroethene (TCE) and cis 1,2-dichloroethene (Cis 1,2-DCE), along with perfluorooctane sulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) are contaminants of concern for this site. PCE is a common dry-cleaning solvent while PFAS, in general, have been commonly used to make products resistant to heat, soil, stains, grease, and

water including use as coatings for clothing and carpets. Soil data are shown on Figures 3 and 5, and groundwater data are shown in Figures 4, 6, and 7.

Soil - Sample results were compared against the commercial soil cleanup objectives (CUSCO), unrestricted use soil cleanup objectives (UUSCO), and the protection of groundwater soil cleanup objectives (PGSCOs) for those contaminants found in groundwater above applicable standards. The maximum PCE concentration observed on-site was 0.170 part-per-million (ppm) at 3 ft bgs. This value does not exceed the CUSCO of 81 ppm, nor does it exceed the UUSCO/PGSCO of 1.3 ppm. Maximum concentrations of several polycyclic aromatic hydrocarbons (PAHs) including benzo(a)anthracene at 1.82 ppm, benzo(a)pyrene at 1.73 ppm, benzo(b)fluoranthene at 1.95 ppm, benzo(k)fluoranthene at 0.98 ppm, chrysene at 1.95 ppm, and ideno(1,2,3-cd)pyrene at 1.18 ppm; pesticides including 4,4'-DDD at 0.0269 ppm, 4,4'-DDE at 0.0139 ppm, 4,4'-DDT at 0.336 ppm, and dieldrin at 0.0073 ppm; along with the metals lead at 302 ppm, mercury 1.6 ppm, and zinc at 536 ppm were observed in on-site soils exceeding the UUSCO but none exceed their respective CUSCOs. The UUSCO criteria for PAH compounds are 1 ppm for benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and chrysene, 0.8 ppm for benzo(k)fluoranthene, and 0.5 ppm for ideno(1,2,3-cd)pyrene; for metals is 63 ppm for lead, 0.18 ppm for mercury, and 109 ppm for zinc; and for pesticides is 0.005 ppm for dieldrin, and 0.0033 ppm for 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT. In addition, no PCBS were identified.

Based on the extent of groundwater contamination extending off-site, as discussed below, additional soil samples were collected off-site beneath the neighboring building immediately downgradient of the site. Since this building is a mixed-use residential building, the restricted-residential soil cleanup objectives (RRSCO) were applied. The maximum concentration of PCE observed in soils beneath this building was 8.46 ppm which does not exceed the RRSCO of 18 ppm. However, this value does exceed the UUSCO/PGSCO of 1.3 ppm. Cis-1,2 DCE was detected at a concentration of 0.98 ppm which is above its UUSCO of 0.25 ppm and PGSCO of 0.19 ppm, and TCE was detected at 1.54 ppm which exceeds its UUSCO of 0.47 ppm and PGSCO of 0.47 ppm. However, both the cis-1,2 DCE and TCE values were below their RRSCO of 41 ppm and 6.4 ppm, respectively. Additional soil samples collected at 4 ft, 7 ft, and 9 ft below the basement slab in the vicinity of the maximum PCE concentration sample did not contain any PCE exceedances. This suggests contamination is limited to the shallow subsurface directly underlying the building foundation, and is only directly accessible by drilling or excavating through the foundation itself. In addition to sub-slab soil samples, additional soil samples collected from the former sump and a floor depression contained PCE concentrations of 0.424 ppm and 0.622 ppm, respectively. While detectable, these concentrations do not exceed the UUSCO/PGSCO.

The maximum PFOS concentration observed on site occurred within the rear driveway at a concentration of 22 part-per-billion (ppb) at 2 ft bgs. This PFOS value exceeds the protection of groundwater guidance value of 1.0 ppb. Further delineation of this contamination extended off-site along the access driveway toward N. Dutcher St and rear courtyard of 49 Main St. The maximum off-site concentration of PFOS is 18.4 ppb observed at 2 ft bgs, with several additional samples exceeding the protection of groundwater guidance value. However, no PFOS samples exceed either the restricted residential or commercial use guidance values of 8.8 ppb and 440 ppb, respectively.

Groundwater – VOCs were detected in groundwater at the rear of the site and extending downgradient to the west of the site at concentrations which exceed the NYS Ambient Water Quality Standards and Guidance Values (AWQSGVs). Maximum concentrations of PCE, TCE, and cis 1,2-DCE detected at the rear of the site building were 21.9 ppb, 6.2 ppb, and 6.4 ppb, respectively. PCE was also detected in an on-site sump at a concentration of 154 ppb. The groundwater standards for each respective containment are 5 ppb.

Additional off-site groundwater samples were collected underneath the neighboring building and further downgradient to complete full delineation of groundwater contamination. The maximum concentration of PCE, TCE, and cis-1,2-DCE observed off-site was 2,880 ppb, 59.6 ppb, and 22.9 ppb, respectively. These concentrations were detected immediately under the neighboring building basement slab (See Figure 4). In addition, a sump located at the neighboring building contained a maximum PCE concentration of 425 ppb. As shown on Figure 4, PCE contamination originates on-site and extends off-site in two discrete groundwater plumes that are both limited in extent. The northern plume originates from the previously excavated area located to the rear of the site building extending approximately 50 feet west to N. Dutcher Street. The southern plume originates from under the center of the site building and extends approximately 180 feet to the southwest at concentrations above AWQSGVs.

Perfluorooctanesulfonic acid (PFOS) and Perfluorooctanoic acid (PFOA) are also present in groundwater at maximum concentrations of 480 part-per-trillion (ppt) and 95 ppt, respectively. For comparison, the ambient water quality guidance values for PFOS and PFOA are 2.7 ppt and 6.7 ppt, respectively. Off-site sampling of PFOS and PFOA revealed the presence of a larger plume emanating from the rear parking lot and extending more than 300 feet downgradient.

In addition, dieldrin was identified on-site at a concentration of 0.014 ppb, which exceeds its standard of 0.004 ppb. However, this exceedance is limited to a single monitoring well with a duplicate sample from the same well indicating no exceedances are present. Iron, manganese, and sodium were also observed on-site at concentrations exceeding their AQQSGVs. These compounds are consistent with background levels of metals in the environment and are not considered contaminants of concern.

The data suggests that off-site impacts exist given the extent of the southern VOC groundwater plume and the larger PFOS and PFOA plume.

Soil Vapor & Indoor Air- Sub-slab soil vapor samples with co-located indoor air samples were collected within the on-site building. PCE and TCE were detected in sub-slab soil vapor samples with a maximum concentration of 0.85 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) and 0.47 $\mu\text{g}/\text{m}^3$, respectively. PCE and TCE were detected at maximum concentrations of 0.34 $\mu\text{g}/\text{m}^3$ and 1.3 $\mu\text{g}/\text{m}^3$ in the indoor air samples. Currently, concentrations in the indoor air samples are attributed to indoor air sources (spot cleaners), and mitigation is not warranted. In addition, exterior soil vapor samples were collected from sixteen locations on- and off- site at depths of approximately five feet bgs. Maximum concentrations of PCE and TCE were 1,100 $\mu\text{g}/\text{m}^3$ and 110 $\mu\text{g}/\text{m}^3$, respectively. These concentrations were observed along the rear driveway to the site. PCE was detected in the remaining eight soil vapor samples, but at a maximum concentration of 11 $\mu\text{g}/\text{m}^3$.

TCE was not detected in three of the remaining samples, but at a maximum concentration of 1.6 µg/m³.

Five off-site buildings allowed access for a soil vapor intrusion investigation. Evaluation of these data in accordance with NYSDOH's Soil Vapor Intrusion Guidance indicated mitigation was necessary at two buildings to address vapor intrusion (as discussed in Section 6.2: Interim Remedial Measures, while sampling at the remaining three buildings did not require further action).

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*.

Direct contact with contaminants in soil is unlikely because the entirety of the site is covered with the building and asphalt pavement. Contaminated groundwater at the site is not used for drinking or other purposes, and the area is served by a public water supply that obtains water from a different source not affected by site-related contamination. Volatile organic compounds in soil vapor (air spaces within the soil) can move into neighboring structures and affect 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 actions are not needed to address exposures related to soil vapor intrusion in the on-site building. Actions have been taken off-site, where necessary, to address the potential for exposure associated with soil vapor intrusion.

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 DEC's proposed remedy is set forth at Exhibit D. The remedial elements are depicted on Figure 8.

The proposed remedy is referred to as the In-Situ Chemical Oxidation and Enhanced Bioremediation remedy.

The estimated present worth cost to implement the remedy is \$1,490,000. The cost to construct the remedy is estimated to be \$478,000 and the estimated average annual cost is \$34,000.

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), SiteWise(TM) (available in the Sustainable Remediation Forum [SURF] library) or similar NYSDEC 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. In-Situ Chemical Oxidation

In-situ chemical oxidation (ISCO) will be implemented to treat chlorinated volatile organic compounds in soil and groundwater. A chemical oxidant will be injected into the subsurface to destroy contaminants within an approximately 940 square foot area located primarily under the buildings at 49 and 53 Main Street where elevated dry-cleaning solvents were detected. The method and depth of injection will be determined during the remedial design.

Prior to the full implementation of this technology, laboratory and on-site pilot scale studies will be conducted to define design parameters. Between the pilot and the full-scale implementations, it is estimated that twelve injection points will be installed. It is estimated that the chemical oxidant will be injected during approximately two separate events over several months.

Groundwater monitoring will be completed on-site and in down-gradient off-site areas for contaminants of concern. The results of the monitoring program will be evaluated and, if needed, additional groundwater treatment will be implemented, which could potentially include areas downgradient and off-site, as a contingency to ensure that off-site groundwater concentrations meet remedial cleanup goals.

3. Enhanced Bioremediation

In-situ enhanced biodegradation will be employed to treat chlorinated volatile organic compounds in groundwater in an approximately 180 square foot area where tetrachloroethene concentrations exceed 10 ppb in the yard and driveway at the rear of the buildings at 49 and 53 Main Street. The biological breakdown of contaminants through anaerobic reductive dechlorination will be enhanced by injecting a molasses and water solution, or similar substance, into the subsurface to promote microbe growth. The method and depth of injection will be determined during the remedial design.

Groundwater monitoring will be completed on-site and in down-gradient off-site areas for contaminants of concern. The treatment zone will also be monitored for dissolved oxygen and oxidation/reduction potential. The results of the monitoring program will be evaluated and, if needed, additional groundwater treatment will be implemented, which could potentially include areas downgradient and off-site, as a contingency to ensure that off-site groundwater concentrations meet remedial cleanup goals.

4. 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 DEC 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 DEC approved Site Management Plan.

5. Site Management Plan

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

1. 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 Remedy Element 4 above.

Engineering Controls: The injection and monitoring wells discussed in Remedy Element 2 and 3.

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;
- a provision for further investigation and remediation should large scale redevelopment occur, if any of the existing structures are demolished, if the subsurface is otherwise made accessible, or new technologies are developed that allow for remediation of previously inaccessible contamination. The nature and extent of contamination in areas where access was previously limited or unavailable will be immediately and thoroughly investigated pursuant to a plan approved by the DEC. Based on the investigation results and the DEC determination of the need for a remedy, a Remedial Action Work Plan (RAWP) will be developed for the final remedy for the site, including removal and/or treatment of any source areas to the extent feasible. Citizen Participation Plan (CPP) activities will continue through this process. Any necessary remediation will be completed prior to, or in association with, redevelopment. This includes both the on-site, the neighboring apartment building, and both the apartment building rear garden space and rear driveway.
- descriptions of the provisions of the environmental easement including any land use, and groundwater use restrictions;
- a provision for evaluation of the potential for soil vapor intrusion for any occupied buildings on the site, including provision for implementing actions recommended to address exposures related to soil vapor intrusion;
- provisions for the management and inspection of the identified engineering controls;
- maintaining site access controls and DEC notification; and
- the steps necessary for the periodic reviews and certification of the institutional and/or engineering controls.

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

- monitoring of groundwater to assess the performance and effectiveness of the remedy;

- a schedule of monitoring and frequency of submittals to the DEC;
- monitoring for vapor intrusion for any buildings on the site, as may be required by the Institutional and Engineering Control Plan discussed above.
- provision to evaluate the potential for vapor intrusion for off-site buildings, including provision for implementing actions recommended to address exposures.

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 are arranged into volatile organic compounds (VOCs) and per- and polyfluoroalkyl substances (PFAS). For comparison purposes, the SCGs are provided for each medium that allows for unrestricted use. For soil, if applicable, the Restricted Use SCGs identified in Section 4 and Section 6.1.1 are also presented.

Waste/Source Areas

Wastes are defined in 6 NYCRR Part 375-1.2 (aw) and include solid, industrial and/or hazardous wastes. Source Areas are defined in 6 NYCRR Part 375 (au). Source areas are areas of concern at a site where substantial quantities of contaminants are found which can migrate and release significant levels of contaminants to another environmental medium.

Due diligence activities to understand possible environmental liabilities at the site were performed by a previous consultant in preparation for a property transaction in 2005-2006. The consultant's assessment identified concentrations of VOCs in soil, groundwater and soil vapor collected beneath the on-site building foundation and parking area. The assessment concluded that the soils beneath the site parking area were impacted by VOCs at concentrations greater than protection of groundwater and unrestricted use standards but below restricted residential standards. In addition, tetrachloroethene (PCE), trichloroethene (TCE), and cis-1,2-dichloroethene (cis-1,2-DCE) were detected in groundwater at maximum concentrations of 600 ppb, 440 ppb, and 1,200 ppb, respectively. These concentrations were in exceedance of the 5 ppb SCG for each compound. Lastly, PCE was detected in soil vapor collected beneath the site parking lot and below the slab on grade portion of the site building at maximum concentrations of 53,800 µg/m³, and 1,450 µg/m³, respectively.

Based on these investigations, soil was excavated from the site parking lot in an area approximately 21 feet long, 12 feet wide, and 5 feet deep and disposed of off-site at a permitted disposal facility in April 2006 as part of a property transaction. Results of five post-excavation confirmation soil samples collected were below the current regulatory standards for PCE for the protection of groundwater standard. One groundwater sample was also collected in the vicinity of the excavation in May 2006 and analyzed for VOCs. PCE was the only compound detected, at a concentration of 28 ppb.

Although this work was not completed under DEC oversight, based on the reported pre-and post-excavation samples, this work appears to have successfully mitigated an on-site source area. However, based on concentrations observed during the RI, residual contamination from this former source area persists and will be addressed in the remedy selection process.

Soil

Soil samples were collected at 26 locations, both on-site and off-site depending on the specific laboratory analysis, to determine the nature and extent of soil contamination. Figures 3 and 5 detail soil sampling locations. These soil samples were collected at depths ranging from near surface to 16 feet deep. In some cases, shallow samples were collected below the pavement cover system or below the foundation slab of on and off-site buildings. Forty-two soil samples were collected from fourteen locations, up to six feet deep, in the rear driveway to further delineate concentrations of PFAS. Soil samples were logged in five-foot intervals and screened using a photoionization detector (PID). Samples were collected from areas that exhibited the highest PID readings, where odors or staining were observed, or at the water table. Soil samples were compared to Unrestricted Use SCOs, Commercial Use SCOs, and Protection of Groundwater SCOs.

Table 1 below includes the results of soil sampling.

Table 1 – Soil

Detected Constituents	Concentration Range Detected (ppm) ^a	Unrestricted SCG ^b (ppm)	Frequency Exceeding Unrestricted SCG	Restricted Use Commercial SCG ^c (ppm)	Frequency Exceeding Restricted SCG	Restricted Use PGW SCG ^d (ppm)	Frequency Exceeding PGW SCG
VOCs							
Tetrachloroethene (PCE)	0.0437-8.46	1.3	5/21	81	0/21	1.3	5/21
Trichloroethene (TCE)	0.00110-1.54	0.47	1/21	54	0/21	0.47	1/21
cis-1,2-Dichloroethene (CIS-1,2 DCE)	0.000400-0.980	0.19	3/21	500	0/21	0.19	3/21
SVOCs							
Benzo(a)anthracene	0.0416-1.82	1	1/6	37	0/6	1	1/6
Benzo(a)pyrene	0.0554-1.73	1	1/6	3.7	0/6	22	0/6
Benzo(b)fluoranthene	0.0773-1.95	1	1/6	37	0/6	2.1	0/6
Benzo(k)fluoranthene	0.0556-0.980	0.8	1/6	47	0/6	2	0/6
chrysene	0.0587-1.95	1	1/6	47	0/6	1	1/6
Ideno(1,2,3-cd)pyrene	0.0558-1.18	0.5	1/6	37	0/6	6.6	0/6
Inorganics							
Lead	7.30-302	63	5/6	1000	0/6	450	0/6
Mercury	0.150-1.60	0.18	4/6	1.1	0/6	0.73	1/6
Zinc	35.1-536	109	3/6	10000	0/6	2480	0/6
Pesticides							
4,4'-DDD	0.0043 – 0.0269	0.0033	2/6	33	0/6	0.0033	2/6
4,4'-DDE	0.0053 – 0.0139	0.0033	4/6	22	0/6	0.0033	4/6
4,4'-DDT	0.0014 - 0.336	0.0033	4/6	27	0/6	0.0033	4/6
Dieldrin	0.0037 – 0.0073	0.005	1/6	0.48	0/6	0.006	1/6
PFAS							
Perfluorooctanesulfonic acid (PFOS)	0.00011-0.022	0.00088	33/45	0.440	0/45	0.001	32/45
Perfluorooctanoic acid (PFOA)	0.0000644-0.00118	0.00066	1/45	0.500	0/45	0.8	0/45

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. Ecological Resources}

The concentrations of chlorinated solvent contamination only exceeded SCGs at two locations. These locations are off-site and exist beneath the neighboring apartment building in line with the on-site sump basin. These concentrations of observed soil impacts decrease with depth. In addition, soil sampling in the rear driveway identified an area of PFOS contamination that extends from the rear parking area of the site and extends westward towards N. Dutcher Street and partially contains the rear patio for the neighboring property. PFOS concentrations in this area detected at a maximum concentration of 22 ppb. Although these concentrations are elevated above the protection of groundwater standard and would therefore be a contributing source to the observed groundwater impacts, they do not exceed the current use SCG for both the on-site and neighboring apartment buildings that share the driveway.

In addition to the chlorinated solvent and PFAS contamination observed, soil exceedances for various metals, pesticides, and SVOCs were detected. The metals lead, mercury, and zinc were prevalent in shallow on-site soils above unrestricted levels, with one observation of mercury above the restricted-residential standard. These are generally attributed to historic fill and, although they were observed, they do not exceed the commercial use SCG. Several SVOCs were observed in a single on-site soil sample, located below the asphalt driveway. These observations are generally attributed to the asphalt as many of those compounds occur in pavement systems. The pesticides are similarly considered as remaining concentrations from historical pesticide use but are not present at concentrations above their applicable SCOs. Therefore, these contaminants are not considered site specific contaminants of concern.

Based on the findings of the Remedial Investigation, the past disposal of hazardous waste has resulted in the contamination of soil. The site contaminants identified in soil which are considered to be the primary contaminants of concern, to be addressed by the remedy selection process are tetrachloroethene (PCE) and its breakdown products trichloroethene (TCE), and cis-1,2 dichloroethane (cis-1, 2 DCE).

The secondary contaminant of concern is perfluorooctane sulfonate (PFOS). Although this contaminant was observed above SCGs, remediation of its soil source is presently unfeasible given the status of current remedial technology and site constraints. Specifically, current remedial technologies for addressing PFOS soil contamination primarily involve excavation. Given the close proximity of neighboring buildings, limited room for construction activities, the potential for leaving inaccessible contamination behind above protection of groundwater SGVs (e.g., contamination at or below building footers), and a lack of exposure pathway for residents, the proposed remedy does not rely upon active remediation for PFOS. Instead, this contamination will be handled through the Site Management Plan with provisions to address remaining contamination if the layout of the investigation area changes and contamination becomes more accessible, or if remedial technologies improve that allow for mitigation of currently inaccessible contamination.

Groundwater

Groundwater samples were collected at 33 locations, both on-site and off-site, to determine the nature and extent of contamination in the groundwater. These samples addressed the data gaps remaining from the earlier Site Characterization (SC). The monitoring wells on-site are screened in the shallow overburden at depths ranging from two to 15 feet deep. An on-site bedrock well is screened from 21 to 26 feet deep. Temporary monitoring wells, utilized off-site, are screened in the shallow overburden at depths ranging from seven to 15 feet deep. In addition, four sump basins were sampled from the basements of four properties. Several groundwater grab

samples were also collected from exploratory borings in the basement slabs of the on-site and neighboring off-site apartment building.

As seen in Table 2, several samples exceeded the SCGs for the contaminants of concern, but impacts were confined to the shallow overburden groundwater.

Table 2 - Groundwater

Detected Constituents	Concentration Range Detected (ppb) ^a	SCG ^b (ppb)	Frequency Exceeding SCG
VOCs			
Tetrachloroethylene (PCE)	0.500-2,880	5	14/42
Trichloroethylene (TCE)	0.210-59.6	5	9/42
Cis-1,2-Dichloroethylene	0.200-22.9	5	7/42
Pesticides			
Dieldrin	0.014	0.004	1/5
Metals			
Iron	20 – 6,400	300	3/9
Manganese	19 – 1,500	300	3/9
Sodium	22,000 – 110,000	20,000	9/9
PFAS			
Perfluorooctanesulfonic acid (PFOS)	0.00200-0.480	0.0027	14/16
Perfluorooctanoic acid (PFOA)	0.0110-0.0950	0.0067	16/16

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).

Data indicates that two chlorinated solvent plumes exist on-site and off-site, as shown on Figure 4. The location of the first plume is within the rear driveway of the site and extends off-site to the west for approximately 50 feet. This first plume appears to result from residual contamination remaining following the 2006 remedial excavation in the rear of the site building. The location of the second plume is underneath the site building and extends westward for approximately 180 feet. This second plume begins in the approximate location of the site sump basin, extends beneath the slab of the neighboring apartment building, and intersects with an historical sump basin along the western edge of the apartment building. The highest concentrations of chlorinated solvents were detected along the axis of the plume from the on-site sump basin to the former sump basin of the apartment building.

Samples were also collected from eleven monitoring wells to assess the presence of PFAS compounds in groundwater. As seen on Figures 6 and 7, PFAS compounds were detected above SCGs across the site and in downgradient areas.

The observation of dieldrin is limited to a single monitoring well and is only marginally above standard. Notably, a duplicate sample taken concurrently did not contain a dieldrin exceedance. This suggests the elevated concentration was due to high levels of turbidity rather than actual groundwater contamination. Nearby monitoring wells also did not contain dieldrin exceedances. Based on this, dieldrin is not considered a contaminant of concern in groundwater. Lastly, the observations of iron, manganese, and sodium are consistent with background levels of metals in the environment and are not considered contaminants of concern.

Based on the findings of the RI, the past disposal of hazardous waste has resulted in contamination of groundwater. 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: PCE and its breakdown products TCE, and cis-1, 2 DCE.

Secondary contaminants of concern are perfluorooctane sulfonate (PFOS) and perfluorooctane sulfonic acid (PFOA). Similar to the soil section above, PFOS and PFOA in groundwater will be managed through the Site Management Plan with provisions to address remaining contamination if the layout of the investigation area changes and contamination becomes more accessible, or if remedial technologies improve that allow for mitigation of currently inaccessible contamination. Future remedial efforts to mitigate PFOS and, by extension, PFOA, in soils will also address and improve conditions in the groundwater.

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 soil vapor, 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 was collected to evaluate whether soil vapor intrusion was occurring. There are no SCGs for soil vapor; however, the October 2006 “Guidance for Evaluation of Soil Vapor Intrusion of the State of New York” contains matrices that are one aspect of the evaluation criteria used to determine whether actions are needed to address exposures associated with soil vapor intrusion.

Soil vapor samples were collected from the sub-slab and indoor air of the 53 Main Street property and several off-site buildings. In general, co-located sub-slab vapor samples and indoor air samples were collected from each structure. An ambient air sample was also collected during each event. The site building itself was evaluated for soil vapor intrusion during the site characterization and again during the remedial investigation. During the site characterization, higher concentrations of tetrachloroethene were observed in the indoor air compared to the sub-slab which suggested an indoor air source though none could be identified. Sampling conducted at the conclusion of the remedial investigation revealed that concentrations had decreased in both indoor air and sub-slab vapor to the point where no remedial action was required.

The neighboring apartment building contained both PCE and its breakdown product TCE in sub-slab and indoor air. Furthermore, to determine the precise vapor intrusion pathway, a soil vapor pathway survey was completed using a portable gas chromatograph. The results identified the former sump basin, a large depression near the furnace, and several cracks as the primary pathway in which vapor entered the building. In addition, the next downgradient building, at the intersection of N. Dutcher Street and Main Street contained both PCE and its breakdown product TCE in the sub-slab vapor only. Based on the results of the soil vapor intrusion sampling, the remaining three properties did not require remedial action. Two additional properties were unresponsive in the initial request to conduct soil vapor sampling. DEC and NYSDOH visited both properties and provided occupants of both buildings follow-up sampling requests, but no response from the owners were received.

In addition to soil vapor intrusion sampling, sixteen soil gas sampling points were also located on-site and off-site to evaluate the extent of a potential soil vapor plume, but elevated concentrations were only observed along the rear driveway to the site.

Soil vapor contamination in buildings identified during the RI was addressed during the IRMs described in Section 6.2.

Based on the findings of the Remedial Investigation, the presence of PCE and TCE has resulted in the contamination of soil vapor. The site contaminants that are considered to be the primary contaminants of concern which will drive the remediation of soil vapor to be addressed by the remedy selection process are PCE and TCE.

Table 3 - On-site and off-site Soil Vapor

Detected Constituents	Concentration Range Detected (ug/m ³)
Tetrachloroethene	ND – 1,100
Trichloroethylene	ND – 100

Table 4 - On-site and Off-site Sub-slab Soil Vapor and Indoor Air

Detected Constituents	Sub-slab Concentration Range Detected (ug/m ³)	Indoor Air Concentration Range Detected (ug/m ³)
Tetrachloroethene	ND – 460	ND – 330
Trichloroethene	ND – 97	ND – 0.7

Exhibit B

Description of Remedial Alternatives

The following alternatives were considered based on the remedial action objectives (see Section 6.5) to address the contaminated media identified at the site as described in Exhibit A. The SVI mitigation systems installed as part of the IRM are common to each of the alternatives.

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 health and the environment.

Alternative 2: Soil Excavation to Background with In-Situ Sorption, In-Situ Chemical Reduction, and Enhanced Bioremediation of Groundwater for Unrestricted Use

This alternative achieves all of the SCGs discussed in Section 6.1.1 and Exhibit A and soil meets the unrestricted soil cleanup objectives listed in Part 375-6.8 (a). This alternative would include: the excavation of surface and subsurface soil exceeding background concentrations of PFOS (3.15 ppb) to minimize the potential for direct exposure to impacted soil. The extent of this soil removal will include nearly all accessible on-site soils.

Alternative 2 also includes a permeable reactive barrier (PRB) that utilizes in-situ sorption with liquid carbon where PFOS and PFOA concentrations in groundwater exceed 50 ppt to bind PFOS and PFOA contamination and reduce contaminant mobility, followed by in-situ chemical reduction and enhanced bioremediation where PCE concentrations exceed 5 ppb in groundwater. Alternative 2 includes a pre-design investigation (PDI) to conduct baseline groundwater sampling, develop a vertical profile of contaminant mass flux via flux mapping, and perform property surveys, structural analyses, and waste characterization to support excavation design. Groundwater monitoring, including monitored natural attenuation (MNA), will be conducted for five years to evaluate the effectiveness of the remedy. After which, it is assumed that neither a Site Management Plan (SMP) nor Long-Term Monitoring (LTM) will be required.

<i>Present Worth:</i>	\$ 2,821,000
<i>Capital Cost:</i>	\$ 2,535,000
<i>Annual Costs:</i>	\$ 10,000

Alternative 3A: Low-Permeability Cover System with In-Situ Chemical Oxidation of Groundwater

This alternative would include the in-situ chemical oxidation (ISCO) of impacted groundwater and containment of PFOS-impacted soils under a low-permeability cover system that utilizes the existing pavement system and extends the pavement onto the gravel area of the rear garden space of the neighboring building. Groundwater treatment will be restricted to areas where PCE concentrations exceed 100 ppb, to reduce the size and concentration of the source area to effectively reduce potential impacts to indoor air. Alternative 3A includes a PDI to conduct baseline groundwater sampling and to perform property surveys and waste characterization to support cover system design. Following implementation, a SMP will be prepared, periodic inspections and monitoring will be conducted to evaluate site conditions, and ICs will be implemented in the form of an environmental easement to prevent installation of drinking water wells. Additional monitoring wells will be installed, and monitoring will be conducted to assess groundwater quality for up to 30 years.

<i>Present Worth:</i>	\$ 1,583,000
<i>Capital Cost:</i>	\$ 571,000
<i>Annual Costs:</i>	\$ 34,000

Alternative 3B: Low-Permeability Cover System with Enhanced Bioremediation of Groundwater

This alternative would include the enhanced bioremediation of impacted groundwater and containment of PFOS-impacted soils under a low-permeability cover system that utilizes the existing pavement system and extends the pavement onto the gravel area of the rear garden space of the neighboring building. Groundwater treatment will be restricted to areas where PCE concentrations exceed 100 ppb, to reduce the size and concentration of the source area to effectively reduce potential impacts to indoor air. Alternative 3B includes a PDI to conduct baseline groundwater sampling and to perform property surveys, and waste characterization to support cover system design. Following implementation, an SMP will be prepared, periodic inspections and monitoring will be conducted to evaluate site conditions and ICs will be implemented in the form of an environmental easement to prevent installation of drinking water wells. Additional monitoring wells will be installed, and monitoring will be conducted to evaluate natural attenuation and assess groundwater quality for up to 30 years.

<i>Present Worth:</i>	\$ 1,441,000
<i>Capital Cost:</i>	\$ 387,000

Annual Costs:..... \$ 35,000

Alternative 4: In-Situ Chemical Oxidation and Enhanced Bioremediation of Groundwater

This alternative would include groundwater treatment with ISCO where PCE concentrations exceed 100 ppb, to reduce the size and concentration of the source area to effectively reduce potential impacts to indoor air. Additionally, groundwater in the northern part of the site that exceeds 10 ppb will be treated with enhanced bioremediation. Alternative 4 includes a PDI to conduct baseline groundwater sampling and to perform property surveys. Following implementation, a SMP will be prepared, periodic inspections and monitoring will be conducted to evaluate site conditions, and ICs will be implemented in the form of an environmental easement to prevent installation of drinking water wells. The SMP will contain provisions to manage PFOS and PFOA groundwater contamination, and re-visit PFOS contaminated soil if the site is redeveloped or otherwise changed, or if remedial technologies allow for remediation of currently inaccessible contamination. Additional monitoring wells will be installed, and monitoring will be conducted to assess groundwater quality for up to 30 years.

Present Worth:..... \$ 1,490,000

Capital Cost:..... \$ 478,000

Annual Costs:..... \$ 34,000

Alternative 5: Long-Term Groundwater Monitoring and Institutional Controls

This alternative would include preparation of an SMP, and periodic inspections and monitoring will be conducted to evaluate site conditions, and ICs will be implemented in the form of an environmental easement to prevent installation of drinking water wells and future residential use of the site. Additional monitoring wells will be installed, and groundwater samples will be tested for multiple parameters to evaluate water quality for up to 30 years. Alternative 5 includes a PDI to install monitoring wells and conduct baseline groundwater sampling.

Present Worth:..... \$ 1,117,000

Capital Cost:..... \$ 63,000

Annual Costs:..... \$ 35,000

Exhibit C

Remedial Alternative Costs

Remedial Alternative	Capital Cost (\$)	Annual Costs (\$)	Total Present Worth (\$)
Alternative 1: No Action	0	0	0
Alternative 2: Soil Excavation to Background with In-Situ Sorption, In-Situ Chemical Reduction, and Enhanced Bioremediation of Groundwater (Unrestricted Use)	\$ 2,535,000	\$ 10,000	\$ 2,821,000
Alternative 3A: Low-Permeability Cover System with In-Situ Chemical Oxidation of Groundwater	\$ 571,000	\$ 34,000	\$ 1,583,000

Alternative 3B: Low-Permeability Cover System with Enhanced Bioremediation of Groundwater	\$ 387,000	\$ 35,000	\$ 1,441,000
Alternative 4: In-Situ Chemical Oxidation and Enhanced Bioremediation of Groundwater	\$ 478,000	\$ 34,000	\$ 1,490,000
Alternative 5: Long-Term Groundwater Monitoring and Institutional Controls	\$ 63,000	\$ 35,000	\$ 1,117,000

Exhibit D

SUMMARY OF THE PROPOSED REMEDY

DEC is proposing Alternative 4: In-Situ Chemical Oxidation and Enhanced Bioremediation of Groundwater as the remedy for this site. Alternative 4 would achieve the remediation goals for the site by injecting an oxidizing chemical to treat the larger plume and augmenting the existing microbial population to help eliminate the smaller plume. Elimination of these plumes will also eliminate any remaining soil sources and reduce contaminants in soil vapor. The elements of this remedy are described in Section 7. The proposed remedy is depicted in Figure 8.

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 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.

Alternative 1 (No Action) does not provide any protection to public health and the environment and thus will not be evaluated further.

The proposed remedy (Alternative 4) will satisfy this criterion by injecting a chemical oxidant along the axis of the larger plume beneath the neighboring apartment building. In addition, this alternative will also enhance existing microbial populations with chemical reductants and bio-amendments to help in eliminating the smaller plume which is likely remaining from the 2006 remedial excavation. Alternative 4 addresses the source of groundwater and soil vapor contamination, which is the most significant threat to public health and the environment. Alternative 5 only relies upon institutional controls to provide protection. Alternatives 2 through 4 address groundwater exposure pathways through targeted groundwater treatment, with Alternative 2 targeting the most areas, followed by Alternative 4, then Alternatives 3A, 3B.

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

All of the retained alternatives are expected to comply with SCGs but will achieve the objectives over different time frames. Alternative 2 complies with SCGs to the extent practicable. It creates the conditions necessary to restore groundwater quality to the extent practicable. Alternatives 3A and 3B will leave contaminated soils on-site and off-site above Protection of Groundwater SCGs, but below Commercial SCGs, under a lower permeability cover system. Alternatives 3A and 3B include targeted groundwater treatment to reduce time required to achieve SCGs, while Alternative 4 targets an additional area of treatment to further reduce time required to achieve SCGs. Alternatives 4 and 5 leave contaminated soil on-site and off-site at concentrations greater than SCGs. However, Alternative 4 will re-visit PFOS contaminated soil removal if the site is redeveloped or otherwise changed, or if remedial technologies are developed that will allow for remediation of currently inaccessible contamination. Alternative 5 leaves contaminated groundwater on-site and off-site at concentrations greater than SCGs with the expectation that SCGs may be met at some future time due to natural attenuation processes. Therefore, Alternative 2 ranks highest for meeting site-specific and chemical-specific SCGs, followed in decreasing rating by Alternatives 3A and 3B, 4, and 5.

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.

Alternative 5 rates the lowest at Long-Term Effectiveness and Permanence since little to no active remediation will occur for this alternative. Alternative 2 rates the highest for long-term effectiveness and permanence given that soils with contamination exceeding background levels will be permanently removed, the proposed area of groundwater treatment is larger than other alternatives thereby increasing the reduction of site-related groundwater contamination, and the proposed remedy includes a permeable reactive barrier for reduction in plume mobility downgradient. Alternatives 3A and 3B rate next highest for long-term effectiveness and permanence, given that contaminated soil will remain in place on-site and off-site rather than permanently removed. Alternative 4 rates third for long-term effectiveness and permanence, given that contaminated soil will not be immediately addressed, however, an additional treatment area for groundwater will be implemented compared to Alternatives 3A through 3B, and the contaminated soil will be re-evaluated in the future if site constraints change.

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.

Alternative 5 rates the lowest at Reduction of Toxicity, Mobility, or Volume with Treatment, as no active remediation will occur for this alternative. Any reduction in toxicity or volume of contaminants will occur from natural attenuation processes. Alternative 2 rates the highest for reduction in toxicity, mobility, and volume. This is the only alternative that addresses PFOS and PFOA contamination in groundwater, through the implementation of liquid activated carbon to reduce plume mobility. Alternative 2 also addresses a larger area of PCE-impacted groundwater than Alternatives 3A and 3B, thereby having an increased reduction in contaminant toxicity and volume. Alternatives 3A through 3B address the same area of PCE-impacted groundwater, either through in-situ

chemical oxidation or enhanced bioremediation. Alternatives 3A and 3B also address the same area of PFOS-impacted soil. Although PFOS impacted soil remains on-site and off-site in Alternatives 3A and 3B, impacted soils are contained under a low permeability cover, which would reduce the infiltration of rainwater through PFOS-impacted soils, thereby reducing the mobility of contamination into groundwater. Alternative 4 does not reduce toxicity, mobility or volume of PFAS impacted soil; however, it does address a larger area of PCE-impacted groundwater than Alternatives 3A through 3B. In addition, under Alternative 4, PFOS-impacted soils will be re-evaluated in the future as site constraints change, or as remedial technologies improve.

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.

Although ECs will be used and a health and safety plan (HASP) will be prepared and followed, there is potential for short-term adverse impacts and risks upon the community, the workers, and the environment during the construction of Alternatives 2, 3A, 3B, 4 and 5.

Alternative 5 is ranked as having the least adverse short-term impacts followed by Alternative 4, as the only intrusive activities included are the installation of monitoring wells (both alternatives), and drilling activities for injection of amendments (Alternative 4). Alternatives 2, 3A, and 3B all include adverse short-term impacts for the soil remedy where best management practices will be implemented to avoid impacting surrounding buildings, properties, and day-to-day public activities. Alternatives 2, 3A, and 3B require the excavation and off-site disposal of soil, which will result in increased truck traffic in the community. Of these alternatives, due to the size of the soil excavation area, duration of operations, and impacts to building access for those occupants who utilize the rear driveway, Alternative 2 will have the highest short-term impacts followed by 3A and 3B.

Alternatives 3A through 3B both address the same-sized proposed groundwater treatment area; however, the duration of injections of chemical oxidants (Alternative 3A) is expected to be longer than that of bio-amendments (Alternative 3B), due to larger volume of injection material required for ISCO compared to enhanced bioremediation. Due to differences in duration of implementations of remedies, Alternative 5, the least adverse for short-term impacts, is followed in ranking by Alternative 4, then Alternatives 3B and 3A. Alternative 2 is ranked as having the most adverse short-term impacts due to the longest duration and largest areal extent of intrusive activities of the proposed remedy.

Rankings of Alternatives with regards to short-term effectiveness are generally inverse to rankings with regards to short-term adverse impacts. For instance, alternatives that include remedies to address soil contamination will commonly be effective immediately. Additionally, remediation of impacted groundwater via ISCO mechanisms implemented in Alternatives 3A and 4 are expected to result in contaminant breakdown more rapidly than the combined ISCR and bioremediation mechanisms implemented in Alternatives 2 and 3B, but have more significant short-term impacts. Alternative 5 is ranked lowest for short-term effectiveness as this alternative does not rely on an active remedy to address site contamination but instead relies on natural degradation and implementation of ICs.

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.

There would be little to no difficulties implementing Alternatives 4 or 5. Administrative difficulties for Alternatives 3A through 5 would include implementing an environmental easement to limit potential future use of the site.

Administrative difficulties for Alternatives 2 through 5 will also include cooperation with city officials and property owners for the installation of permanent groundwater monitoring wells. Alternative 2 is expected to have the most technical and administrative difficulties due to this alternative proposing the largest expanse of treatment area for impacted groundwater, proposed injection points in roadways and town sidewalks. Alternative 2, along with Alternatives 3A through 3B will also have technical and administrative difficulties associated with the soil remedy that will require structural analysis and/or protection of nearby structures and restrict use of a neighboring yard and driveway during construction. These technical difficulties may result in the potential for structural impacts to the surrounding buildings during heavy equipment use and soil removal next to the foundation as well as the potential for having to leave source material behind since it may be inaccessible due to proximity to foundation footers, utilities, and other site constraints. Implementation of Alternatives 3A through 4 are expected to have comparable technical difficulties associated with conducting injections through basement floors. Time frames to complete injections are expected to be longer for Alternatives 3A and 4 compared to 3B due to differences in injection volumes between ISCO and enhanced bioremediation; however, the number of locations, proposed treatment area, and number of rounds of injections are common among all alternatives, with slightly more injection locations for Alternative 4. Alternatives 3A and 3B are expected to have higher administrative difficulties than Alternatives 2 and 5 upon completion of the remedy, due to the annual EC inspections and certifications for the low permeability cover system that will be required for these alternatives.

As discussed in the PRAP, the area is served by public water with no usage of groundwater for potable purposes in the investigation area. Based on this information coupled with the technical difficulties associated with excavating soil beneath and near multi-story structures, remediation of the PFOS contaminated soil is considered presently unfeasible. Instead, this area will be re-evaluated in the future under the Site Management Plan if property re-development occurs or if in-situ remedial technologies to address PFOS soil contamination advance.

Alternative 5 is ranked highest for implementability followed by Alternatives 4, 3A and 3B, and 2 in decreasing order.

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

The costs of the alternatives vary considerably. With its large volume of soil to be handled, and the multi-faceted approach to chemical injections, Alternative 2 (excavation and off-site disposal, permeable reactive barrier with ISCR and enhanced bioremediation) would have the highest present worth cost. Alternatives 3A and 3B have similar costs since both options include installation of the low-permeability soil covers as well as similar injection approaches. Alternative 4 has a slightly lower capital cost compared to the soil removal options, but its long-term costs are comparable to 3A through 3B due to repeat injections and long-term O&M. Alternative 5 will be much less expensive than all other options but only relies upon institutional controls and monitoring to address contamination.

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

soil remedy.

As established in Section 6, exposure pathways at the site include potential exposure to subsurface soil, groundwater, and soil vapor intrusion. Each Alternative currently addresses soil vapor intrusion as mitigation systems are already in place. Alternative 2 addresses potential exposure pathways to soil by removing contaminated subsurface soils to background or residential use SCOs, preventing future exposure and minimizing the source of groundwater PFOS and PFOA contamination. Alternatives 3A and 3B will limit PFOS migration through implementation of a low permeability cover system. Infiltration of rainwater through PFOS-impacted soils will be reduced, thereby also reducing the mobility of PFOS and other potential PFAS, including PFOA, contamination in groundwater, but land use will have restrictions. A secondary benefit of the low permeability cover system is that potential direct contact with subsurface soils will be limited. For Alternatives 2 through 3B, the combination of removal or containment of PFOS-impacted soil with targeted groundwater injection treatments meets current and foreseeable Land Use. Although Alternatives 1, 4 and 5, do not address potential soil exposure pathways, the foreseeable land use as commercial or mixed-use commercial/residential are expected to limit residential exposure to contaminated soil.

The final criterion, Community Acceptance, 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.

9. 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 DEC 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.

10). Green and Sustainable Remediation: Potential Indirect Environmental Impact of the Remedy. For this criterion, preference is given to alternatives that have the potential to remediate the site with the lowest potential negative environmental impact, such as CO₂ emissions. This criterion also considers the resilience of alternatives to potential climate change effects such as sustained changes in average temperatures, increased heavy precipitation events, and increased coastal flooding. A detailed analysis can be found in the March 2026 Feasibility Study.

The environmental impacts of each remedial alternative were calculated using SiteWise™. Environmental footprint analyses for each alternative include calculations of greenhouse gas emissions (GHG) emissions, total energy use, air emissions of pollutants (nitrogen oxides, sulfur oxides, and particulate matter), water consumption, resource consumption, and worker safety ratings. Inputs considered during the calculations of these metrics include the production of required treatment or construction materials, transportation of materials, equipment, and personnel, on-site equipment operation, and waste management.

Alternative 4 has the second lowest footprint analysis as there would be no hauling of contaminated materials off site and fewer laboratory samples than Alternative 5. Alternative 5 rates third according to the footprint analysis having a higher emissions footprint than Alternative 4. Minimal emissions are required for the installation of monitoring wells; however, there are higher emissions associated with long term monitoring due to repeated sampling events and a greater number of lab samples than Alternative 4. Alternatives 3B and 3A rate fourth and fifth, respectively, because of the small footprint and shallow depth of soil to be excavated and replaced with asphalt, and the shorter duration of the bioremediation compared to the ISCO for groundwater. Alternative 2 is calculated to have the highest footprint. Alternative 2 would require significant resources for additional

transportation and disposal of excavated soil and fuel for equipment and water for multiple injections of amendments into groundwater. For alternatives 3A, 3B, 4 and 5, long term management accounts for a large portion of total GHG emissions. The emissions factors are high because of the repeated collection and analysis of laboratory samples. SiteWise calculates the impacts of lab samples based on the cost of samples, rather than what kind of test is being performed. It is expected for these results to vary from the output given by SiteWise. Another portion of the long-term management component is personnel transportation. The 30-year time frame for long term management allows for the possibility to reduce overall emissions through use of electric vehicles.

Alternative 4 is being proposed because, as described above, it satisfies the threshold criteria and provides the best balance of the balancing criterion.

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PDF: \\corp.pbwan.net\gib-e8\USUSP\W100-PLD2\Project\Projects\NYSDEC_General\NYSDEC Information D009809\Database\GIS\Irvington Rugs and Cleaners\GIS\Figures\2025\Figure 1.1 - Site Location.pdf 12-22-2024 9:11 PM madison.bolduc



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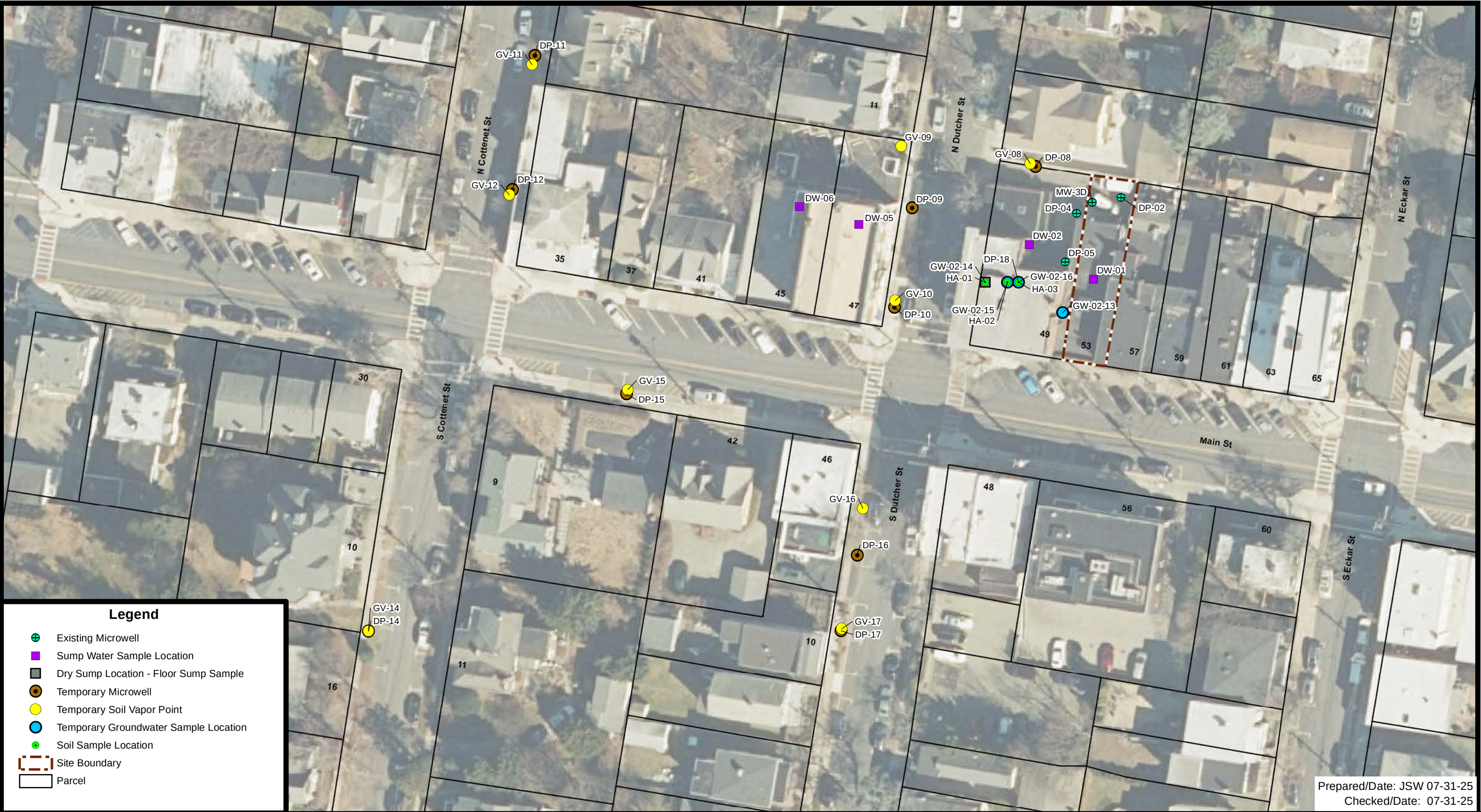
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Prepared/Date: MCB 12-22-24
Checked/Date: EKS 12-22-24

NYSDEC Site # 360175
Irvington Rugs and Cleaners
Irvington, New York

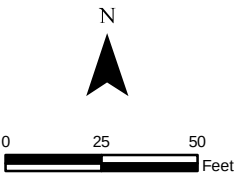
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Site Location
Project 3616216144 Figure 1



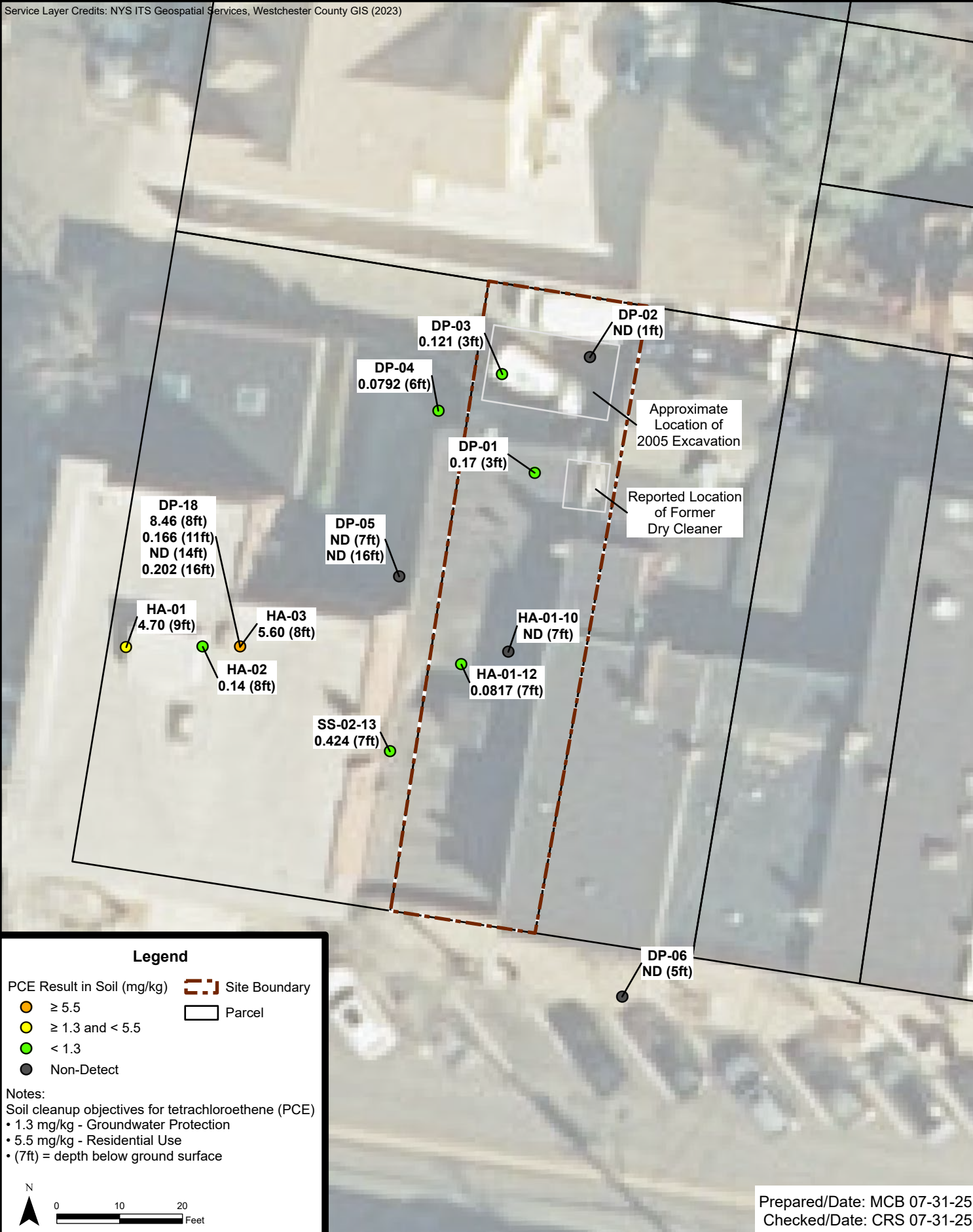
NYSDEC Site # 360175
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Irvington, New York

1. Imagery - Westchester County color digital orthoimagery (2016) obtained from New York State GIS Clearinghouse at: gis.ny.gov.



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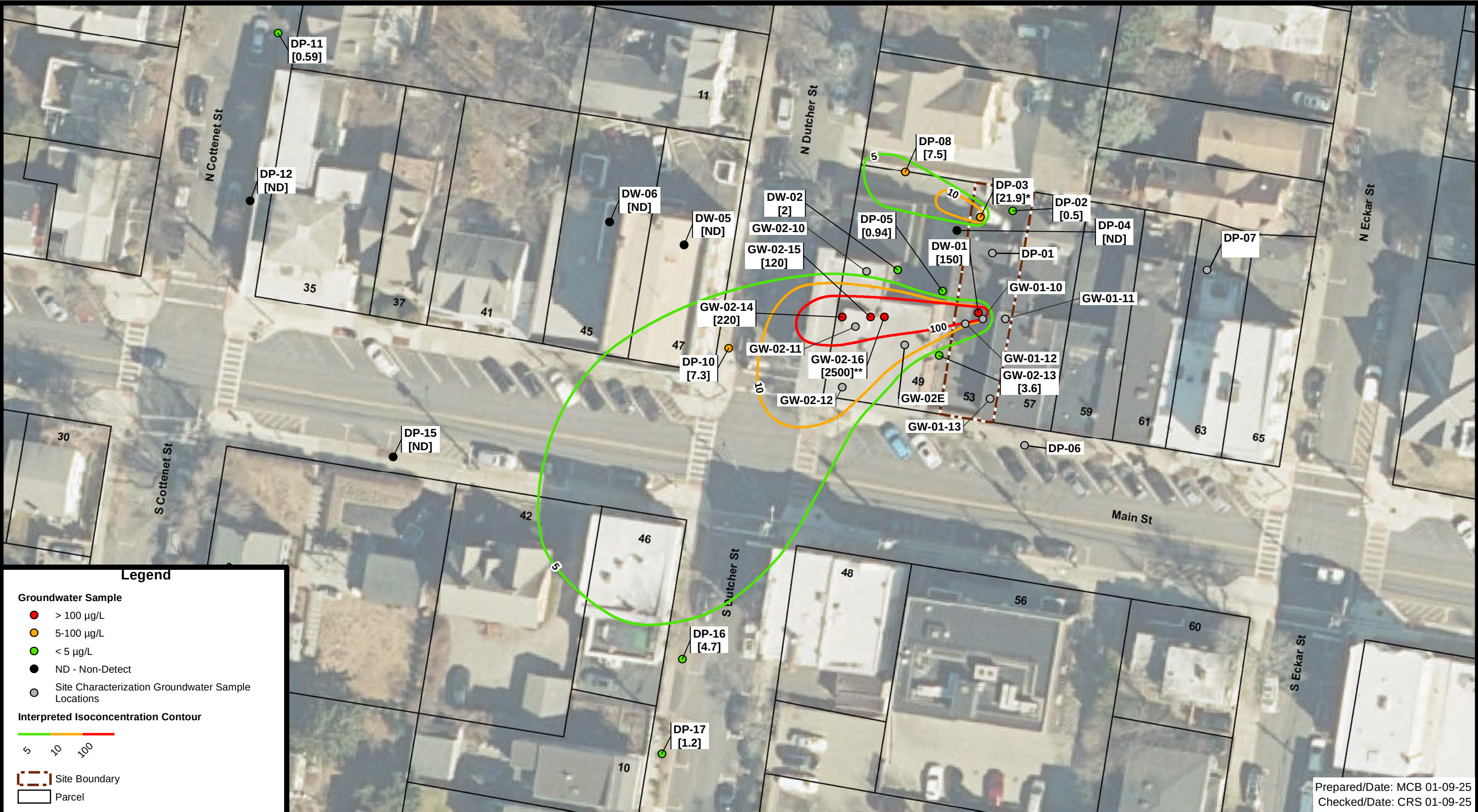
Sampling Locations
Project 3616216144
Figure 2



NYSDEC Site # 360175
 Irvington Rugs and Cleaners
 Irvington, New York

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RI and SC PCE Results in Soil
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NYSDEC Site # 360175
Irvington Rugs and Cleaners
Irvington, New York

Notes:

- Groundwater samples collected between January and May 2022.
(Except *, which was collected in December 2018).
- Groundwater results for tetrachloroethene (PCE) in micrograms per liter (µ/L). Imagery - Westchester County color digital orthoimagery (2016) obtained from New York State GIS Clearinghouse at: gis.ny.gov.
- ** 2,500 ug/L reported during Remedial Investigation in 2022. A July 2025 Pre-Design Investigation observed a maximum concentration of 2,880 ug/L at this location (DP-18).

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PCE Overburden Groundwater Results

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Figure 4



Soil Sample Depth (ft)

- 0
- 1
- 2
- 5

Legend

PFOS Concentration (ppb)

- Not Sampled
- 0 to 0.88
- > 0.88 to 3.15
- > 3.15 to 8.8
- > 8.8

Potential Area of PFOS Exceeding Background

Site Boundary

Parcel

Note:
Westchester County color digital orthoimagery (2023) obtained from New York State GIS Clearinghouse at: gis.ny.gov.

Guidance Value for Anticipated Site Use		PFOS Concentration in ppb
Unrestricted		0.88
Protection of Groundwater		1.0
Potential Background*		3.15
Residential		8.8
Restricted Residential		44
Note: Concentrations from NYSDEC April 2023 PFAS Guidance. * = Potential Background = sample result from SB-9.		

NYSDEC Site # 360175
Irvington Rugs and Cleaners
Irvington, New York

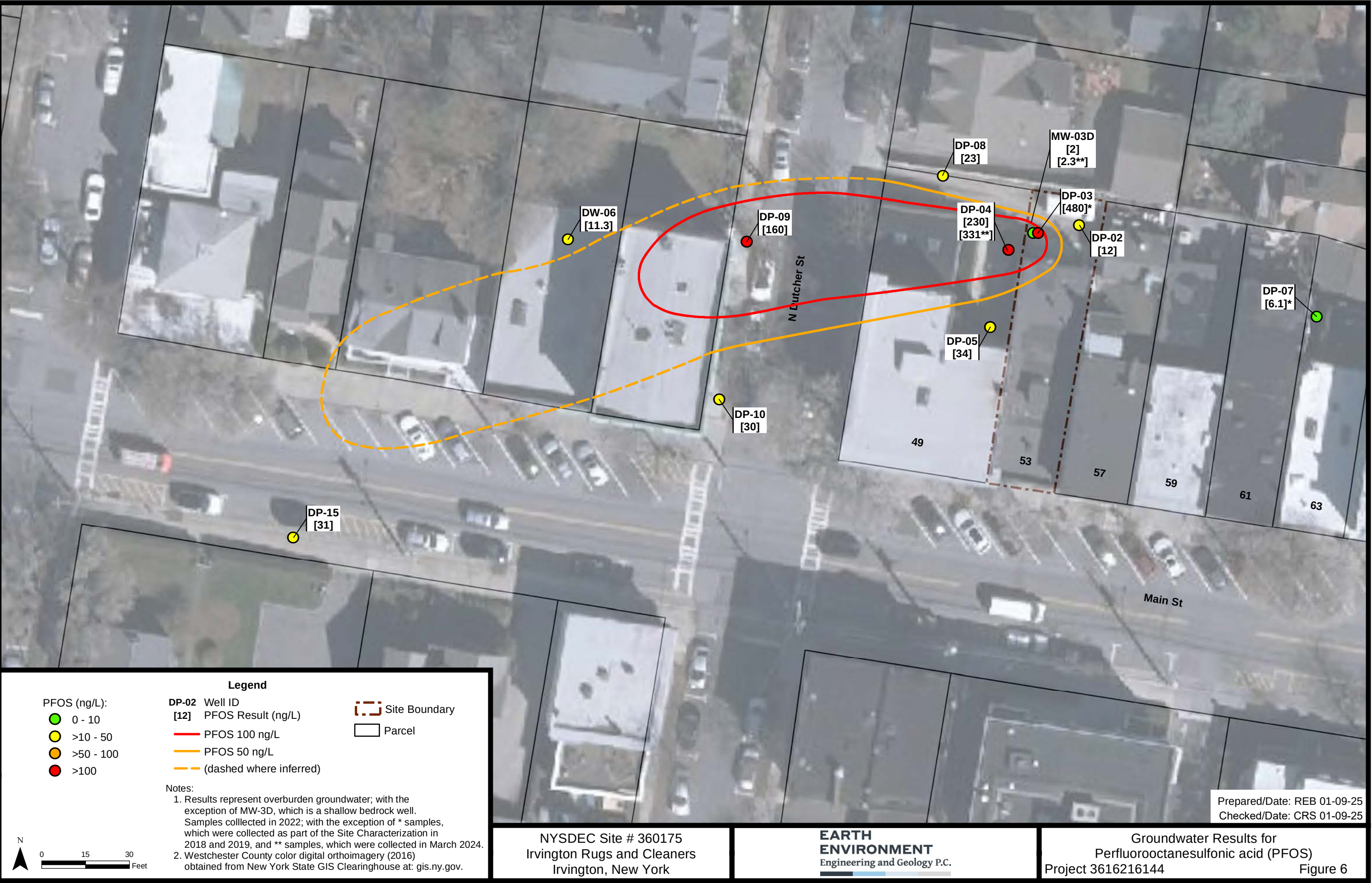
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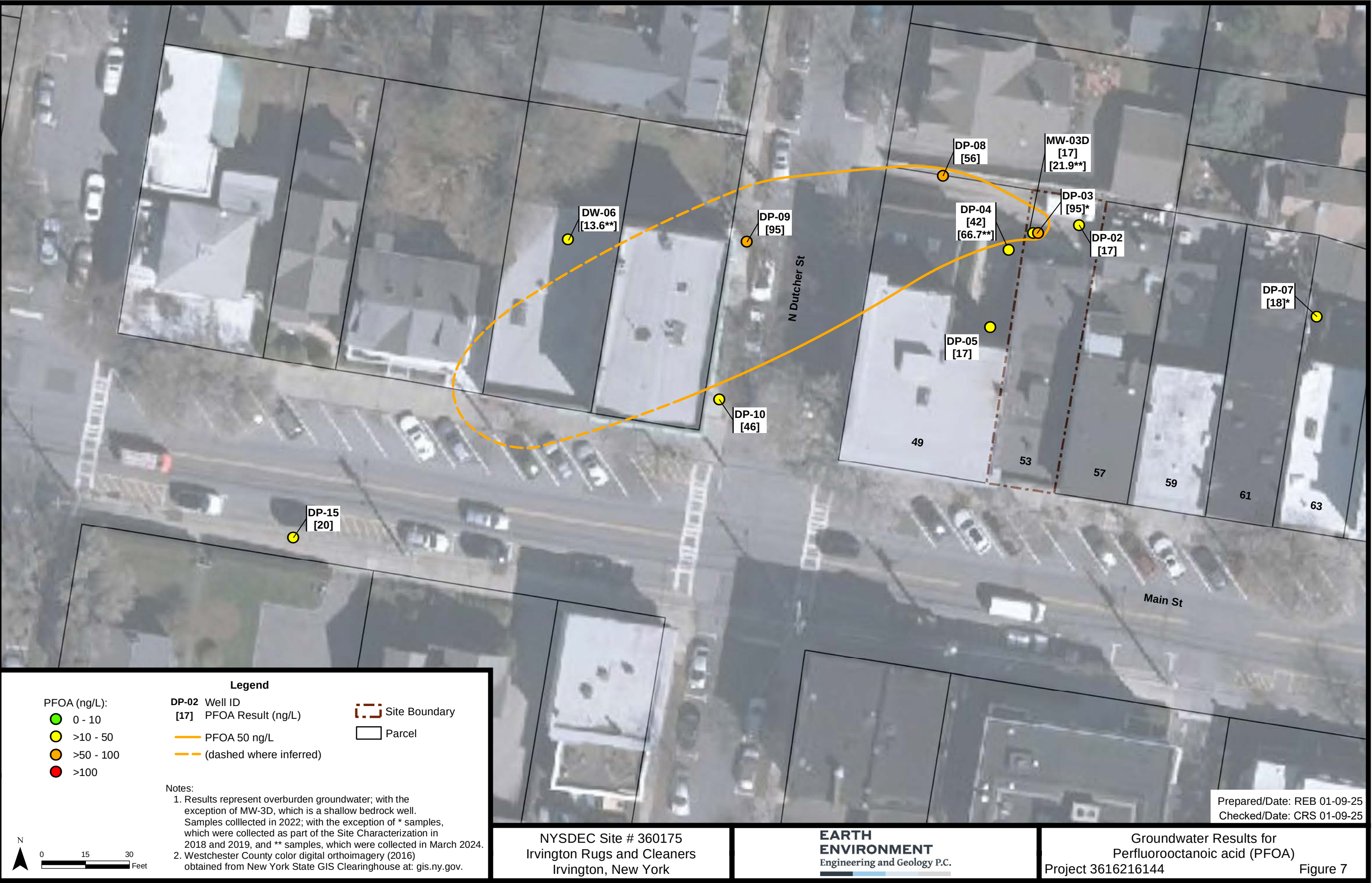
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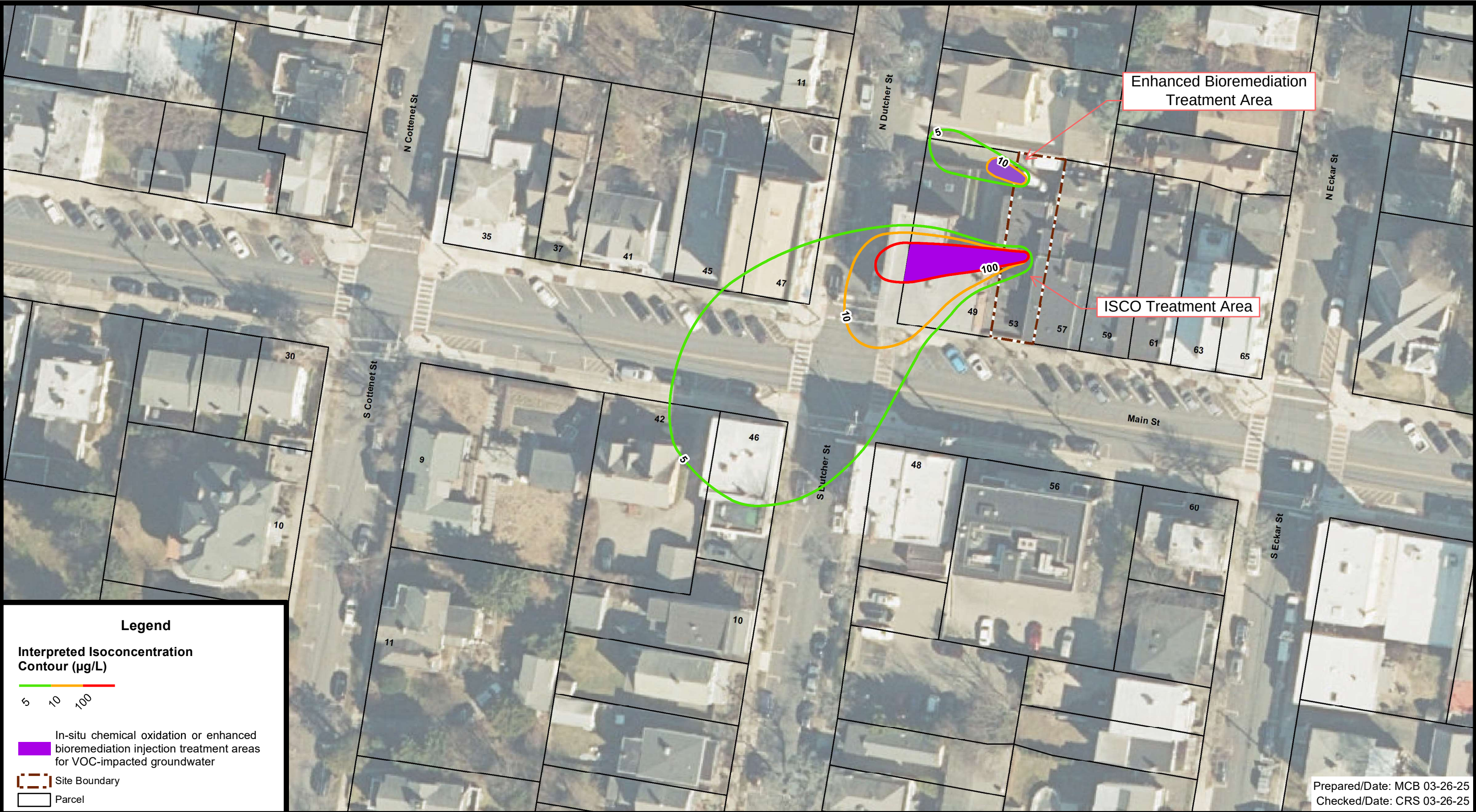
PFOS Soil Sample Results

Project 3616216144

Figure 5

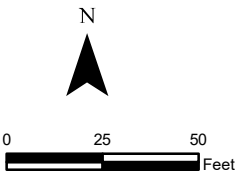






NYSDEC Site # 360175
Irvington Rugs and Cleaners
Irvington, New York

- Notes:
1. Isoconcentration contours developed from analytical results of sampling conducted during the Remedial Investigation
 2. Imagery - Westchester County color digital orthoimagery (2016) obtained from New York State GIS Clearinghouse at: gis.ny.gov.



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Alternative 4
Proposed Injections Treatment Area

Project 3616216144 Figure 8