PROPOSED REMEDIAL ACTION PLAN

Peters Dry Cleaning
State Superfund Project
Lockport, Niagara County
Site No. 932128
February 2015

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:

Lockport Public Library
23 East Avenue
Lockport, NY 14094

A public comment period has been set from:

2/27/2015 to 3/29/2015

A public meeting is scheduled for the following date:

3/12/2015 at 6:30 PM

Public meeting location:

Lockport City Hall Council Chambers

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 3/18/2015 to:

Michael Hinton
NYS Department of Environmental Conservation
Division of Environmental Remediation
270 Michigan Ave
Buffalo, NY 14203-2915
michael.hinton@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: Peters Dry Cleaning located at 316 Willow Street, Lockport, Niagara County. It is located in a residential neighborhood of the City and near a City Park.

Site features: The site is approximately 0.41 acres in size and was used for commercial purposes as a Dry Cleaning establishment. A two story brick structure, which housed the dry cleaning operation, has been razed.

Current Zoning and Land Use: The site is located in a residential area and is zoned R1. The facility had a special use zoning variance for commercial use, however, with the demolition of the building the zoning reverted back to the R1 designation. The site is currently vacant.

Past Use of the Site: Peters Dry Cleaning had been operated as a dry cleaning facility since the late 1930s/early 1940s. Prior to its use as a dry cleaner, the facility was used as a clothing tailor shop. A Phase II Environmental Site Assessment (ESA) identified petroleum and chlorinated solvent contamination in the soil and groundwater at the Site. Two storage tanks were also identified during the ESA include a 1,000-gallon aboveground storage tank (AST) and an abandoned 6,000-gallon underground storage tank (UST). Both tanks were used to store heating oil prior to the facility being connected with natural gas. In April 2005, the AST and UST were removed in accordance with a Department approved February Work Plan.

During the abandoned UST removal, approximately 2 cubic yards of petroleum contaminated material (sand) was removed from the site that had previously been placed into the UST unit as part of its interim or temporary closure. Some minimal petroleum contamination was also identified around the area of the UST. There were also approximately 30 tons of chlorinated solvent contaminated soil removed as part the excavation activity. The 30-tons of soil contaminated with chlorinated solvent were disposed of as hazardous waste. These activities are documented in a June 2005 Closure Report under DEC spill site #0475193.

The applicant submitted a Brownfield Cleanup Program (BCP) Application, dated November 22, 2006 to the New York State Department of Environmental Conservation (NYSDEC) which was approved on February 21, 2007. During the performance of the RI/AAR an Interim Remedial Measure (IRM) was performed that evaluated the potential for soil vapor intrusion into nearby structures. By December 2009, a Sub-Slab Depressurization System was installed in an on-site building and a nearby home.

On July 5, 2011, the applicant informed the Department that due to financial limitations, they were withdrawing from the program. The applicant has the right to withdraw from the Brownfield Cleanup Program at any time. Subsequently, the site was referred to the State Superfund Program.

Site Geology and Hydrology: Soil conditions at the Site typically consist of 3 to 5 feet of fill material (fine grained silts and clays) overlaying native soils (granular sands and silts with lesser and varying amounts of gravel). Bedrock was encountered at depths ranging from approximately 10 to 15 feet below ground surface (bgs) at the site. Water levels in the overburden wells range from about 3.5 to 5.5 bgs with an average depth of 4.6 feet bgs. Groundwater flow direction is to the northwest.

A site location map is attached as Figure 1 and site figure as Figure 1.1.

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 that restrict the use of the site to residential use (which allows for restricted-residential use, commercial use and 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:

Peter’s Dry Cleaning

The PRPs for the site declined to implement a remedial program when requested by the Department. After the remedy is selected, the PRPs will again be contacted to assume responsibility for the remedial program. If an agreement cannot be reached with the PRPs, the Department will evaluate the site for further action under the State Superfund. The PRPs are subject to legal actions by the state for recovery of all response costs the state has incurred.

SECTION 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,
- Ecological and Human Health Exposure Assessments.

The analytical data collected on this site includes data for:

- 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:

Tetrachloroethylene (PCE)
trichlororethene (TCE)
cis-1,2-Dichloroethene
vinyl chloride
trans-1,2-Dichloroethene

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.

The following IRM(s) has/have been completed at this site based on conditions observed during the RI.

- Building Demolition was conducted under the Superfund program in October 2013. The building was demolished and removed from the site prior to the RI fieldwork, with the exception of the concrete foundation, in order to investigate the soil beneath the structure. Department of Labor requirements were followed during the demolition including all asbestos monitoring requirements during asbestos abatement, including asbestos air monitoring and community dust monitoring, and

- Upon completion of the soil sampling phase of the RI, an IRM was conducted in the spring/summer 2014 to remove the contaminated soil from the site. RI and previous soil sampling results were used to delineate the extent of the soil contamination above the soil cleanup objectives (SCOs) for unrestricted use, as well as delineating the areas where contaminated soil was classified as a hazardous waste. The on-site excavations were backfilled with crushed stone from an approved source while the adjacent properties were backfilled with soil material that meets the unrestricted soil cleanup objective. The tasks completed are documented IRM Completion Report which is included in the RIFS Report dated February 2015.

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 this site.

Soil - Based upon investigations conducted, the primary contaminants of concern for site soil prior to the Soil Removal IRM were tetrachloroethene (PCE) and its associated degradation products. Minor detections of petroleum products including semi-volatile organic compounds were also found. No other significant contaminants were identified by the site studies including metals, pesticides and herbicides. PCE was found in the on-site soil at concentrations up to 1900 ppm as compared to the residential Use Soil Cleanup Objective (SCO) of 5.5 ppm and the protection of groundwater of 1.3 ppm SCO. Documentation soil samples were taken at the limits of the soil excavation and indicated that the remaining soil substantially meets protection of groundwater and unrestricted soil cleanup criteria as outlined in 6NYCRR Part 375. Contaminated soils were excavated and disposed off-site in the spring 2014.

Groundwater - PCE and its associated degradation products are also found in both overburden and bedrock groundwater exceeding groundwater standards (5 ppb). As presented in RIFS Report. groundwater samples were collected in October 2013, prior to the IRM, with the highest total VOC concentration detected at 84,353 ppb in the source area prior to excavation. In August 2014, post-IRM groundwater sampling detected the highest total VOC concentration at 11,549 ppb in MW-101 immediately down gradient of the source area.

Soil Vapor and Indoor Air - Vapor intrusion pathways were investigated during the investigation conducted under the Brownfield Cleanup Program and the on-site building and one adjacent property were found to have a potential for soil vapor intrusion into the building. Air samples from the Peter's building detected PCE as high as 15,000 ug/m^3 below the floor slab and 14 ug/m3 in the indoor air. The private home to the west of the site was found to have PCE as high as 2800 ug/m^3 below the basement floor slab and up to 16 ug/m^3 in the indoor air. Sub-Slab Depressurization Systems (SSDS) were installed in December 2009 to mitigate the potential intrusion into the buildings. The system at the on-site building was removed by the building demolition in 2013. The nearby property SSDS is still active and will be monitored and maintained under the State Superfund program. No other properties were found to be impacted by soil vapor intrusion.

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.*

Contaminated groundwater at the site is not used for drinking or other purposes and the site is served by a public water supply that obtains water from a different source not affected by this contamination. Volatile organic compounds in the groundwater may move into the soil vapor (air spaces within the soil), which in turn 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. Because there are no buildings on-site, inhalation of site-related contaminants due to soil vapor intrusion does not represent a current concern. A sub-slab depressurization system (system that ventilates/removes the air beneath a building) has been installed in an adjacent off-site building to prevent the indoor air quality from being affected by the contamination in soil vapor beneath the building. Sampling indicates soil vapor intrusion is not a concern for other off-site buildings.

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 ground or surface water 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 or surface water contamination.
- Prevent impacts to biota from ingestion/direct contact with soil causing toxicity or impacts from bioaccumulation through the terrestrial food chain.

Soil Vapor

RAOs for Public Health Protection
- Mitigate impacts to public health resulting from existing, or the potential for, soil vapor intrusion into buildings on and adjacent to the site from contaminated groundwater.

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. 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 In-Situ Enhanced Biodegradation remedy.

The estimated present worth cost to implement the remedy is $734,000. The cost to construct the remedy is estimated to be $200,000 and the estimated average annual cost is $36,000. The cost of the Soil Excavation IRM was approximately $660,000. The IRM cost are the same for each remedy evaluated and will not be included in the remedy discussions.

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; and
   - Integrating the remedy with the end use where possible and encouraging green and sustainable re-development.

2. Enhanced Bioremediation

   In-situ enhanced biodegradation will be employed to treat contaminants in groundwater in the source area and areas down gradient of the source area. The biological breakdown of contaminants through anaerobic reductive de-chlorination or aerobic respiration will be enhanced by injecting a biological amendment into the subsurface to promote microbe growth via an infiltration gallery, injection wells screened or an alternative method and depth of injection will be determined during the remedial design. Pre-design investigation and pilot studies would be conducted to refine the extent of groundwater contamination to be addressed under this alternative. Laboratory studies would be conducted to determine the appropriate biological amendments and associated dosages, and implementation methodology for the full-scale program.

3. Monitored Natural Attenuation

   Groundwater contamination (remaining after the enhanced bioremediation) will be addressed 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 contamination will decrease by an order of magnitude in a reasonable period of time. Additional active remediation may be proposed if it appears that natural processes alone will not address the contamination. The contingency remedial action will depend on the information collected, but it is currently anticipated that further injections of a biological amendment and a microbial consortium treatment would be the expected contingency remedial action.

4. Institutional Control

Imposition of an institutional control in the form of an environmental easement for the controlled property that:

- requires 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);
- allows the use and development of the controlled property for residential use as defined by Part 375-1.8(g), although land use is subject to local zoning laws;
- restricts 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;
- requires compliance with the Department approved Site Management Plan.

5. 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: As noted in Section 4 above.

Engineering Controls: SSDS installed at adjacent home.

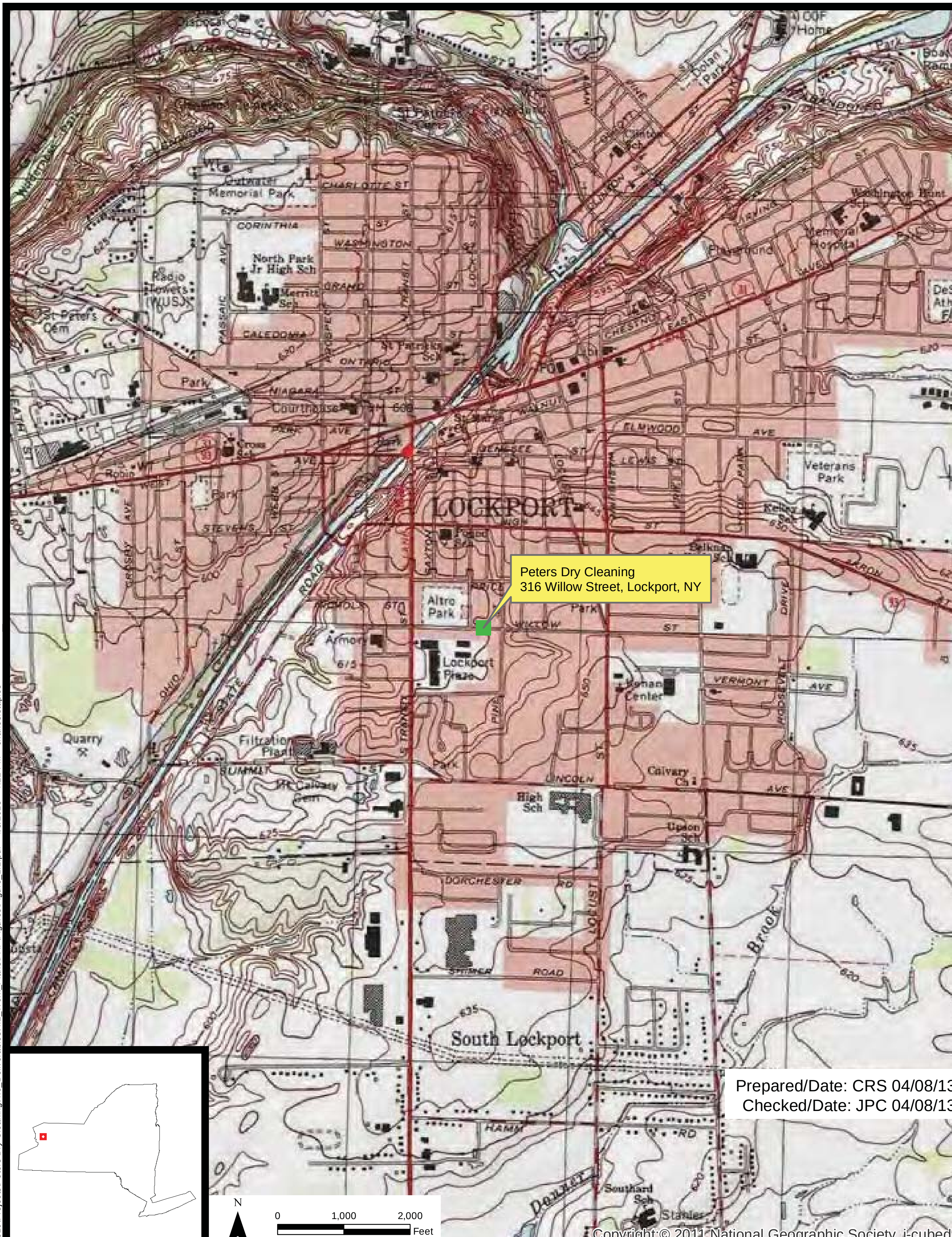
This plan includes, but may not be limited to:

- an Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination;
- descriptions of the provisions of the environmental easement including any land use, groundwater and/or surface water use restrictions;
- 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.
- a provision for evaluation of the potential for soil vapor intrusion for any buildings developed on the site, including provision for implementing actions recommended to address exposures related to soil vapor intrusion; and
- maintaining site access controls and Department notification; and providing the Department access to the site and O&M records.

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 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 developed on the site, as may be required by the Institutional and Engineering Control Plan discussed above.

FIGURES



NYSDEC Site No. 932128
Peters Dry Cleaning
Lockport, New York

MACTEC

Figure 1

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NYSDEC
Peters Dry Cleaning (Site No. 932138)
Lockport, NY

MACTEC

Figure 1.1 Site Features

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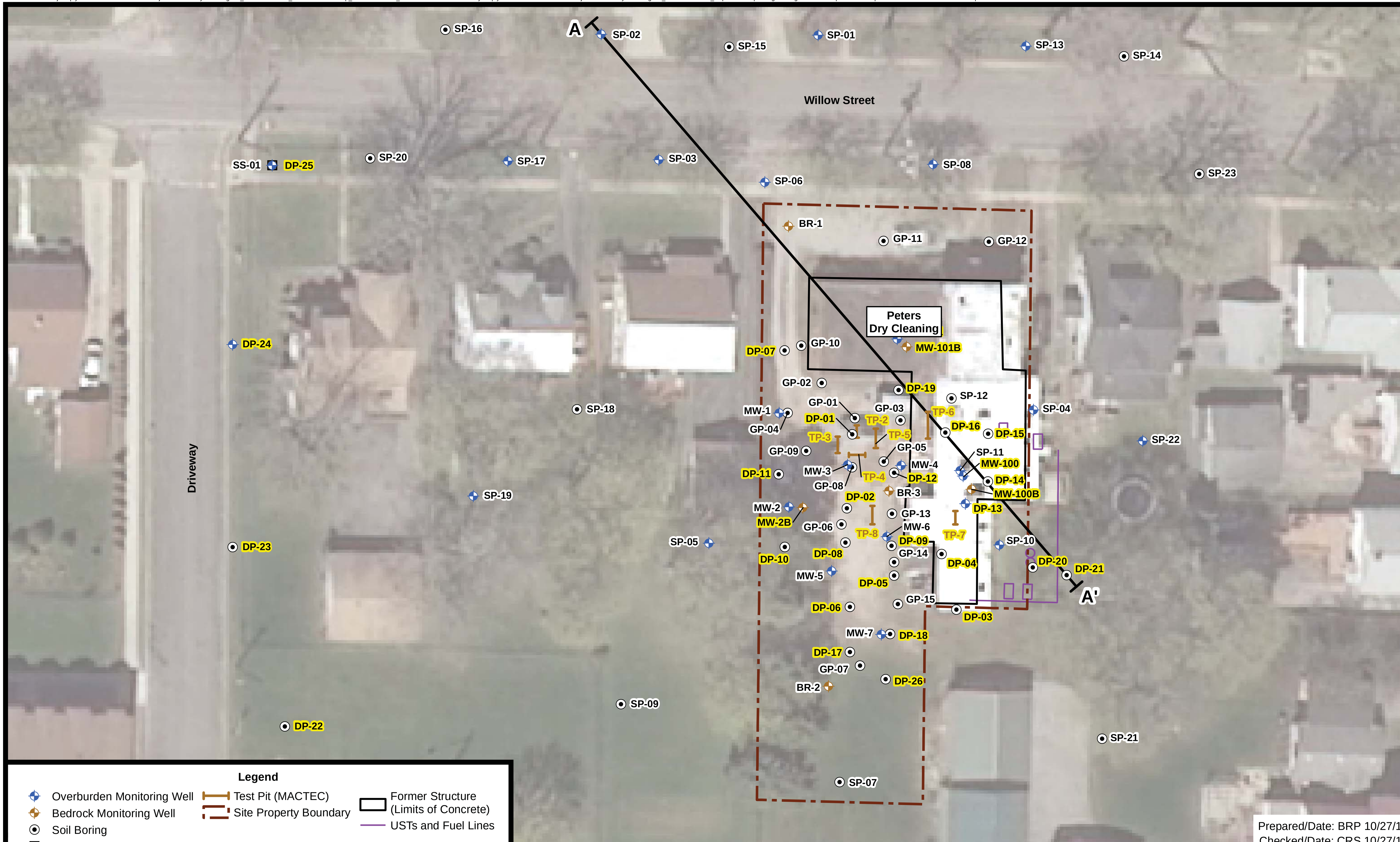


Legend

- Overburden Monitoring Well
- Bedrock Monitoring Well
- Soil Boring
- Surface Soil
- Test Pit (MACTEC)
- Site Property Boundary
- Former Structure (Limits of Concrete)
- USTs and Fuel Lines

Yellow highlights indicate MACTEC RI installed sample locations.
Post IRM Documentation sample locations shown on figure 4.2.

Niagara County color digital orthoimagery (2011) obtained from New York State GIS Clearinghouse at: http://www.nysgis.state.ny.us

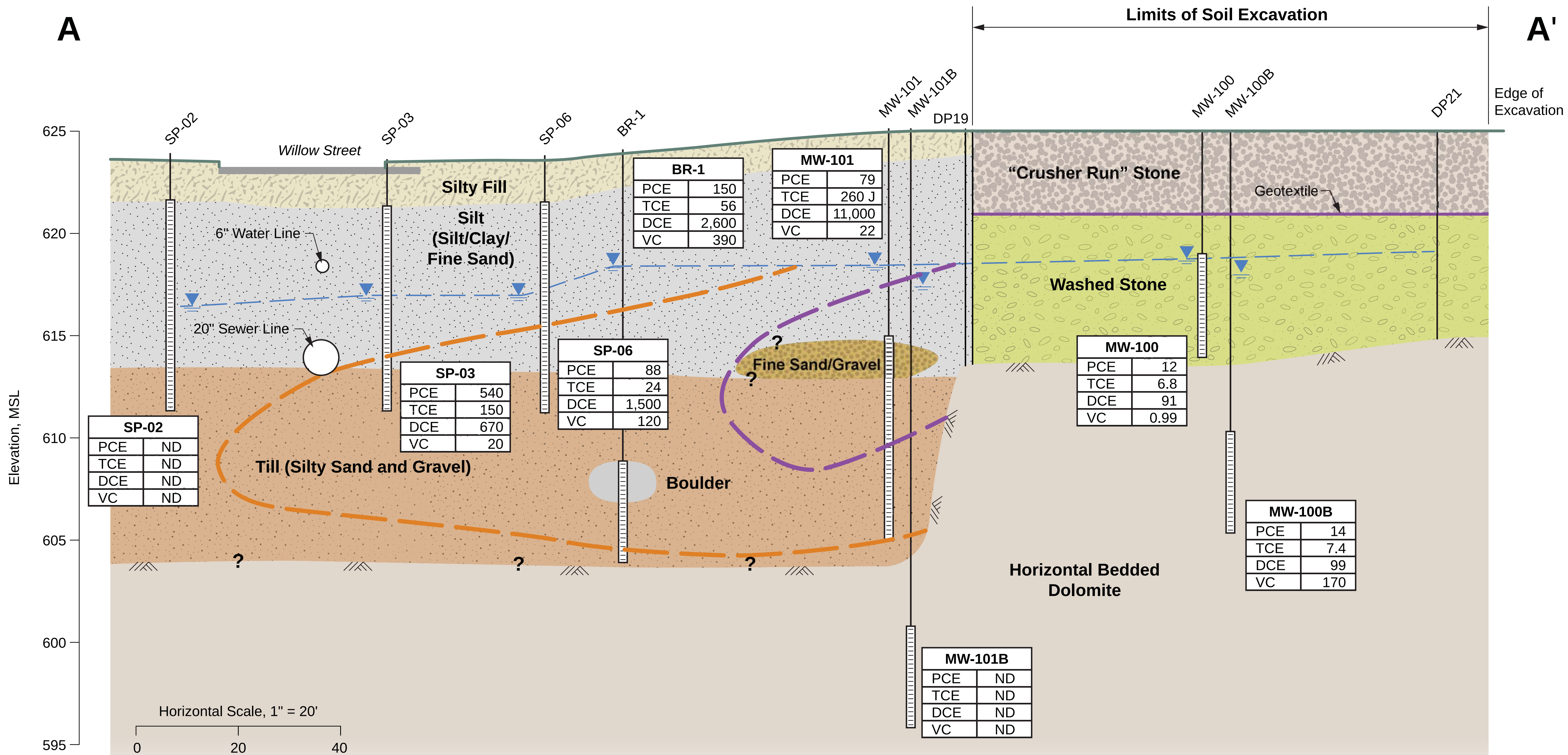
N
0 15 30 Feet

Prepared/Date: BRP 10/27/14
Checked/Date: CRS 10/27/14

NYSDEC
Peters Dry Cleaning (Site No. 932138)
Lockport, NY

MACTEC

Figure 1.2 Sample Locations



LEGEND

Monitoring Well

Groundwater Level

Note: Some borings offset

Interpreted total chlorinated VOC isoconcentration line of 10,000 ug/L

Interpreted total chlorinated VOC isoconcentration line of 1,000 ug/L

Boxes indicate select contaminant groundwater concentrations in micrograms per liter – August 2014

PCE = Tetrachloroethene
TCE = Trichloroethene
DCE = cis-1,2-Dichloroethene
VC = Vinyl Chloride
ND = Not Detected

Prepared/Date: JPH 10/07/14
Checked/Date: CRS 10/07/14

NYSDEC
Peters Dry Cleaning (Site No. 932138)
Lockport, NY

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Figure 1.3 Soil Cross Section

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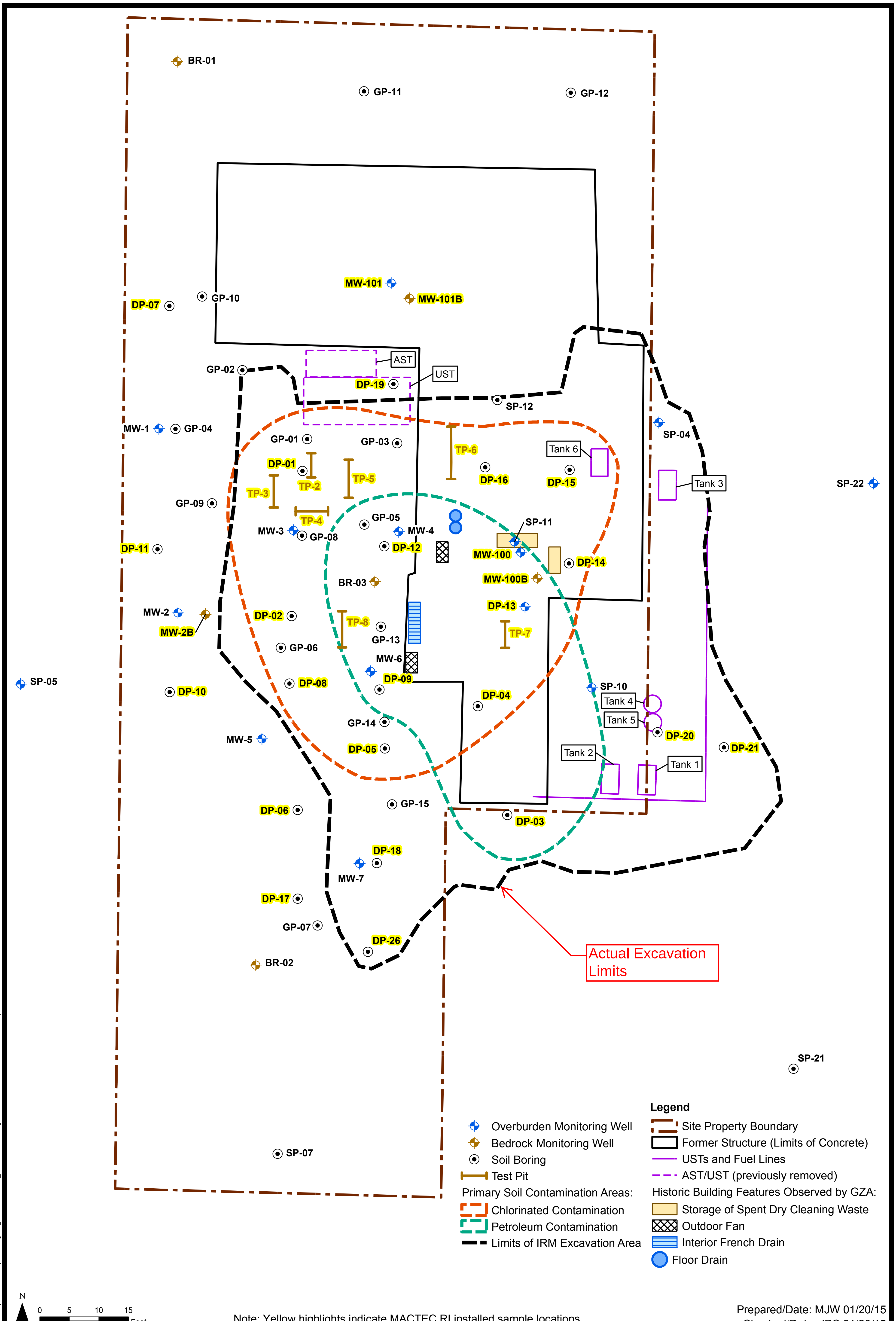

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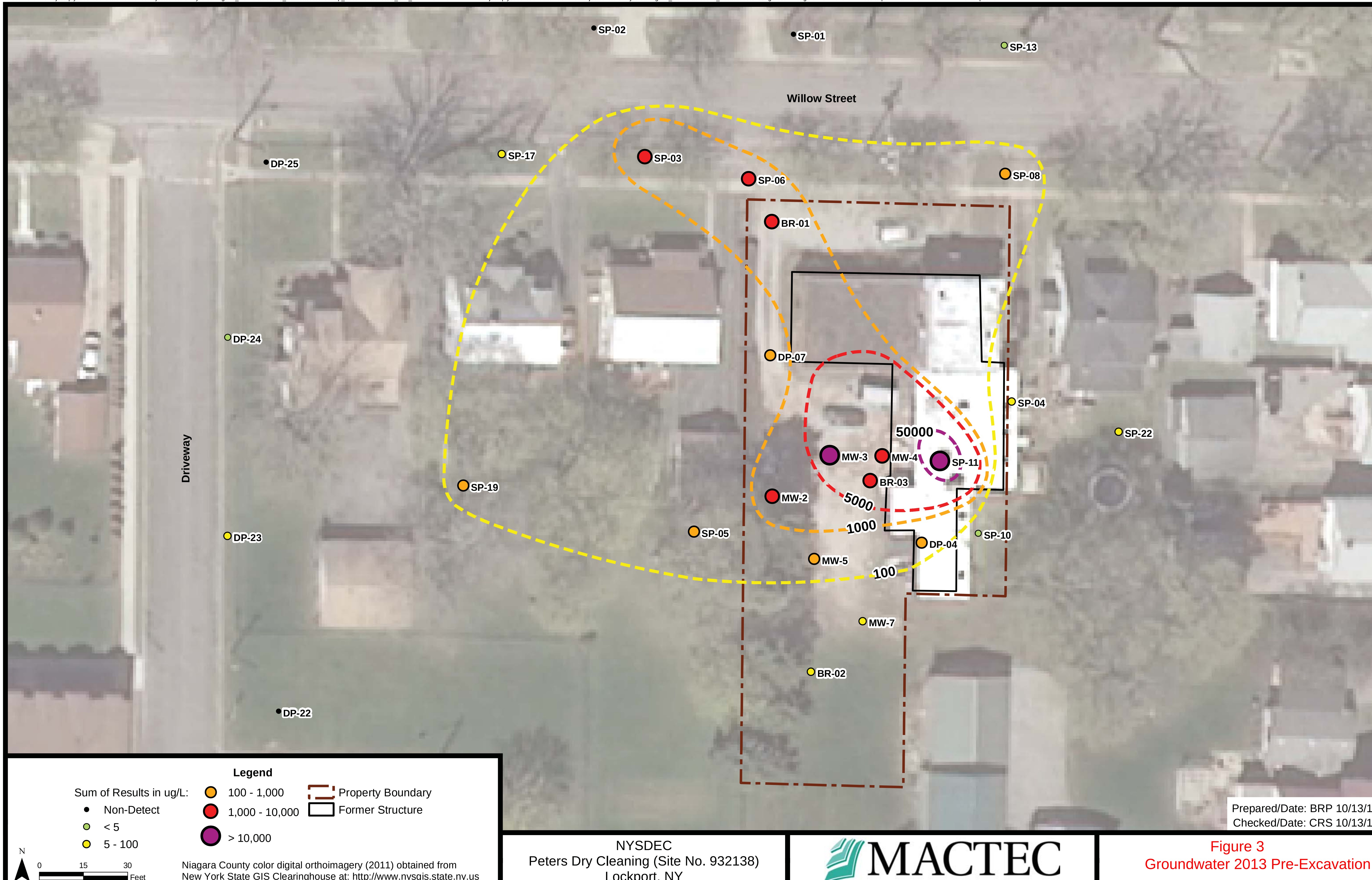
Figure 2
Interpreted Area of Source Soil Vs
Actual Source Soil Excavation Limits



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Peters Dry Cleaning (Site No. 932138)
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Figure 3
Groundwater 2013 Pre-Excavation

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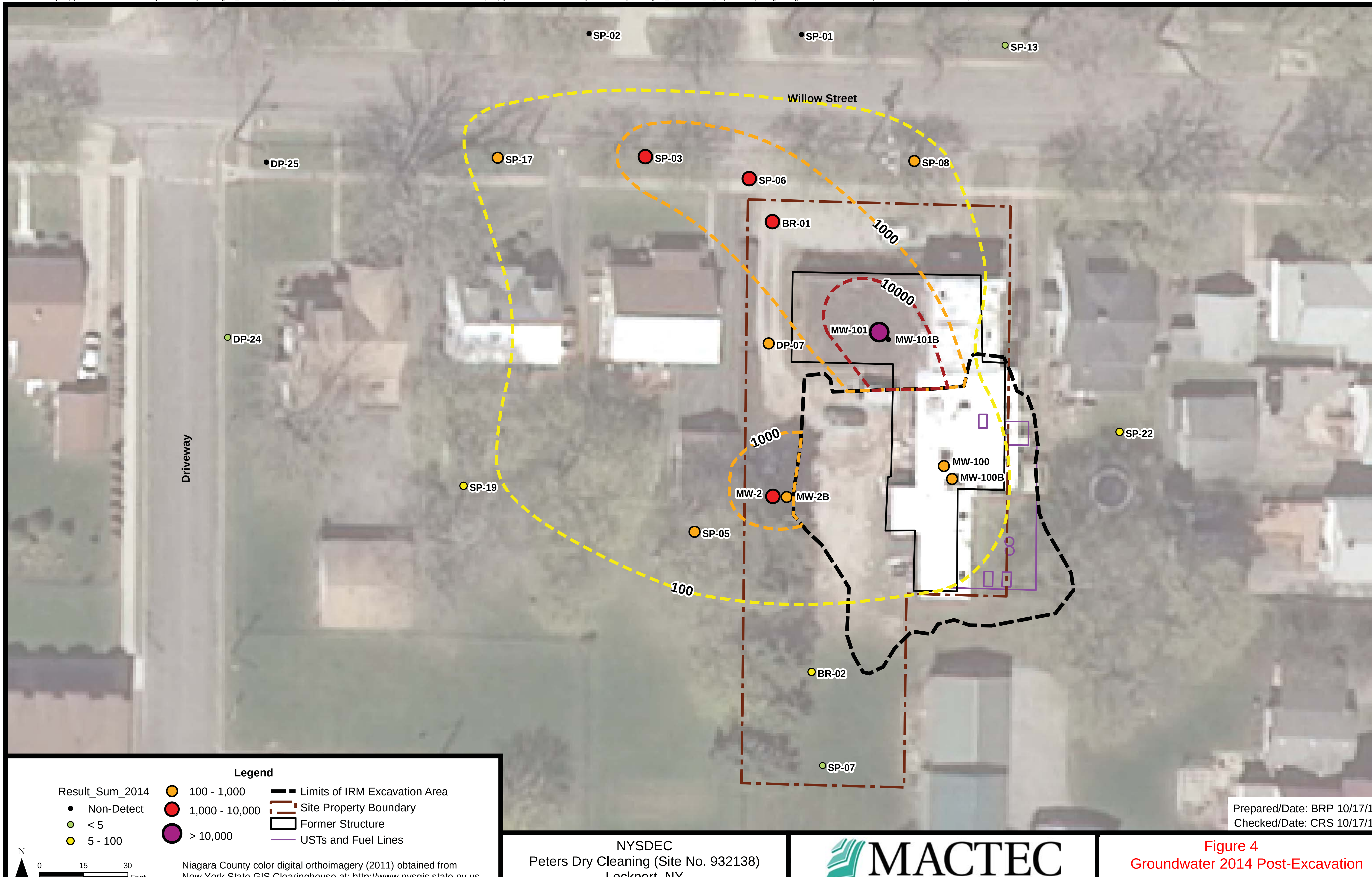

Niagara County color digital orthoimagery (2011) obtained from New York State GIS Clearinghouse at: http://www.nysgis.state.ny.us

Prepared/Date: BRP 10/17/14
Checked/Date: CRS 10/17/14

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Peters Dry Cleaning (Site No. 932138)
Lockport, NY

MACTEC

Figure 4
Groundwater 2014 Post-Excavation

EXHIBITS

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 categories; volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides/ polychlorinated biphenyls (PCBs), and inorganics (metals and cyanide). 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.

This section will present the findings of the RI or post IRM and represent site conditions. The section identifies the contamination found at the site and then, by environmental media, the individual contaminants in each environmental media that are associated with the operations identified at the site. Each media discussion includes a table that compares the site data to the appropriate Unrestricted SCGs for each media. In addition, the soil tables should include a comparison of the analytical data to the appropriate Restricted SCO found in Part 375-6.8 (b) for each individual contaminant. The Restricted SCO will be the lower of, 1) the Protection of Public Health SCO where Section 4 has identified a restricted land use for the site which is to be considered in the evaluation of alternatives, or 2) the Protection of Groundwater SCO where groundwater impacts can be attributed to soil contamination, or 3) the Protection of Ecological Resources SCO where ecological resource as described in Section 6.3 are potentially impacted.

Source Areas

As described in the RI report, source materials in the form of contaminated soil were identified at the site and *we*re impacting groundwater, soil, and soil vapor.

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 were substantial quantities of contaminants are found which can migrate and release significant levels of contaminants to another environmental medium. Source areas were identified at the site include soils contaminated with waste dry cleaning solvents that include PCE and its breakdown products along with petroleum products from former underground fuel tanks and Stoddard chemicals which are petroleum based dry cleaning solvents.

The source area was identified as the area behind and under portions of the former building, Refer to Figure 2.

The source area identified at the site was addressed by the IRM described in Section 6.2.

Groundwater

Groundwater samples were collected during several sampling events; in October 2013, prior to the IRM, and in August 2014, post-IRM. October 2013 groundwater results for VOCs are presented in Figure 3 shows October 2013 groundwater concentration contours for total PCE, trichloroethene (TCE), cis-1,2-dichloroethene (cis-1,2-DCE), and vinyl chloride (VC). August 2014 groundwater results for VOCs are presented in Figure 4 shows August 2014 groundwater concentration contours for total PCE, TCE, cis-1,2-DCE, and VC. Statistical results for frequency of exceedance of SCGs for August 2014 samples are presented on Table 1. Complete analytical results are presented in the RI/FS Report. PCE and its degradation compounds (e.g., TCE, cis-1,2-DCE, and VC) are the primary contaminants in groundwater at concentrations above SCGs. In October 2013, prior to the IRM, the maximum concentrations detected in groundwater were from a sample from SP-11, located in center of the Site in the vicinity of the soil source area, and included PCE, TCE, and cis-1,2-DCE detected at concentrations of 50,000 parts per billion (ppb), 16,000 ppb, and 18,000 ppb, respectively, compared to a groundwater standard for each compound of 5 ppb.

In addition to chlorinated compounds, petroleum related compounds, primarily ethylbenzene, toluene, and xylene, were also detected in overburden and bedrock groundwater in the central portion of the site at concentrations above their respective groundwater standard.

With the soil source area removed, the maximum concentrations of chlorinated compounds detected in groundwater in August 2014 were 1100 ppb for PCE (MW-2), 260 ppb for TCE (MW-101), 11,000 ppb for cis-1,2-DCE (MW-101), and 390 ppb for VC (BR-01). Concentrations of chlorinated compounds detected in groundwater at locations outside the soil removal IRM in August 2014 (i.e. after the IRM) were similar to those detected prior to the IRM.

Groundwater samples were collected from overburden and bedrock monitoring wells. The samples were collected to assess groundwater conditions on and off-site. The results indicate that contamination in overburden and bedrock groundwater at the site exceeds the SCGs for volatile organic compounds.

Based on the findings of the RI, the presence of PCE and its breakdown products has resulted in the 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: tetrachloroethylene (PCE), trichloroethylene (TCE), cis-1,2-Dichloroethene, vinyl chloride and trans-1,2-Dichloroethene.

Table #1 – Groundwater (post IRM)							
Contaminants of Concern	**Concentration Range Detected (ppb) [a]**			**SCG [b] (ppb) [a]**	**Frequency of Exceeding SCG**		
Volatile Organic Compounds (VOCs)							
1,1-Dichloroethene	0.47	-	16	5	1	/	22
1,2,4-Trimethylbenzene	0.9	-	1600	5	2	/	22
1,3,5-Trimethylbenzene	5.1	-	420	5	2	/	22
2-Butanone	4	-	4	50	0	/	22
4-iso-Propyltoluene	3.8	-	48	5	1	/	22
Benzene	1.1	-	1.1	1	1	/	22
Chloroform	0.36	-	0.36	7	0	/	22
Cis-1,2-Dichloroethene	1.9	-	11000	5	14	/	22
Cyclohexane	0.48	-	27		0	/	22
Ethyl benzene	7.3	-	11	5	2	/	22
Isopropylbenzene	54	-	62	5	2	/	22
Methyl cyclohexane	0.63	-	80		0	/	22
Naphthalene	11	-	11	10	1	/	22
n-Butylbenzene	12	-	14	5	2	/	22
Propylbenzene	65	-	130	5	2	/	22
sec-Butylbenzene	34	-	34	5	1	/	22
tert-Butylbenzene	6.7	-	6.7	5	1	/	22
Tetrachloroethylene	0.67	-	1100	5	12	/	22
Toluene	0.82	-	0.82	5	0	/	22
trans-1,2-Dichloroethene	1.7	-	170	5	5	/	22
Trichloroethene	0.49	-	260	5	13	/	22
Vinyl chloride	2.5	-	390	2	10	/	22
Xylene, o	2.3	-	2.7	5	0	/	22
Xylenes (m&p)	0.91	-	160	5	2	/	22
Xylenes, Total	0.91	-	160	5	3	/	22

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 theNew York State Sanitary Code (10 NYCRR Part 5).

NA = not available

Soil

Surface and subsurface soil samples were collected at the site during the RI and during previous investigations. The results indicate that a portion of the soils at the site exceeded the unrestricted SCG for volatile and semi-volatile organics.

Site investigations indicated that the primary contaminant at the Site was PCE and its breakdown products, as well as petroleum related compounds. Soil samples were collected during the RI from across the Site and adjacent properties to evaluate the extent of this soil contamination. Analytical results for SVOC, pesticides, PCBs, metals, and petroleum hydrocarbons analyses are presented in the RI.

Although several potential source areas were identified, no specific source area/entry point into the environment for the chlorinated solvent contamination was confirmed. The highest concentrations of chlorinated solvents were detected in the vicinity of the center of the Site building, and the highest concentrations of petroleum compounds were detected in the vicinity of the southern section of the Site building. The approximate areas where chlorinated solvents and petroleum related compounds were identified in soil above un-restricted use SCOs are shown on Figure 2. The petroleum fingerprint in this area indicated likely Stoddard solvent, as well as potentially mixtures of weathered kerosene and number six fuel oil. Discharges to the environment may have resulted from 1) breaks in utility lines (e.g., floor drain/sewer lines, lines from USTs, 2) leaking USTs, 3) spills/discharges to the floor of the building, which migrated through cracks/holes in the foundation, 4) condensation to the ground from the exterior waste fans, or 5) spills/discharges to the ground surface just outside the building. Petroleum contamination was identified around some of the USTs and UST piping indicating that leaks of these systems contributed to the Site contamination. In addition, based on some concentrations of PCE detected in shallow soils in the vicinity of the former parking area in the central portion of the Site property, spills/discharges may also have occurred to the ground surface in the former parking area.

Concentrations of PCE, the primary chlorinated compound of concern, were detected as high as 40 parts per million (ppm) and as high as 1,900 ppm in a soil sample from 8 to 10 ft bgs in the source area, compared to the SCO for unrestricted use of 1.3 ppm. In addition, petroleum related compounds were also detected at concentrations above their applicable SCOs. Examples include xylene detected at a concentration as high as 69 ppm (DP-3 from 5-6 ft bgs), compared to the SCO for unrestricted use of 0.26 ppm, and 1,2,4-trimethylbenzene detected at a concentration as high as 200 ppm (SP-11 from 8 to 10 ft bgs).

Although several SVOCs, pesticides and metals were detected above the SCO for unrestricted use, concentrations did not exceed the SCOs for residential use.

Based on a review of the RI and historic data, a soil removal IRM was conducted. The IRM consisted of the removal of approximately 4,447 tons of soil from the central portion of the Site. Soil was removed to the top of bedrock, which was present from approximately 9 to 12 ft bgs. The IRM soil removal area is shown on Figure 2. Boring/well locations shown inside the boundaries of the IRM have been removed.

The goal of the IRM was to remove soil from the Site that exceeded the SCOs for residential use (at a minimum) and soil from neighboring properties that exceeded the SCOs for unrestricted use.

Documentation sampling was conducted along the side walls of the excavation (ESW-1 to ESW-15; however due to analytical results, the area surrounding ESW-5 was later excavated as well). The sidewall documentation samples indicated that the IRM met the cleanup objectives for the Site.

Four documentation samples were also collected of remnant soil that could not be scraped off the top of bedrock (i.e. bottom of excavation) (ESB-1 to ESB-4). PCE was detected at a concentration of 15 ppm at location ESB-2 (collected 12 ft below grade), which exceeded its SCO for residential use of 5.5 ppm. This location was in the vicinity of the highest historic detected concentrations of PCE in soil. This elevated detection of PCE is considered inconsequential and requires no further action. No other detected compounds in the bottom soil samples exceeded their SCO for residential use. The site soil statistical evaluation is found below in Exhibit A, Table 2.

The Soil Removal Interim Remedial Measure – Completion Report can be found in Appendix E of the RI/FS report dated February 2015.

In summary, based on the findings of the Remedial Investigation and previous investigations, the presence of PCE and its breakdown products along with petroleum products has resulted in the contamination of a portion of the site soil. The soil contamination identified in the RI and previous investigations was excavated and disposed off-site during the performance of the IRM as described in Section 6.2. Sampling of the excavation limits indicated most contamination above the residential SCO's was successfully removed, however some limited soil above the residential SCOs may remain at the soil bedrock interface not requiring further action due to its limited extent and depth.

Table #2 Soil

Contaminants of Concern	Concentration Range Detected (ppm) [a]			Unrestricted SCO [b] (ppm) [a]	Frequency of Exceeding Unrestricted SCO			Residential SCO [b] (ppm) [a]	Frequency of Exceeding Residential SCO		
Volatile Organic Compounds (VOCs)											
1,1-Dichloroethene	0.00068	-	0.00089	0.33	0	/	28	100	0	/	28
1,2,4-Trimethylbenzene	0.0025	-	20	3.6	2	/	17	47	0	/	17
1,3,5-Trimethylbenzene	0.001	-	5.4	8.4	0	/	17	47	0	/	17
2-Hexanone	0.81	-	0.81	NA	0	/	28	NA	0	/	28
4-iso-Propyltoluene	0.00061	-	2.6	NA	0	/	17	NA	0	/	17
Acetone	0.0045	-	0.017	0.05	0	/	28	100	0	/	28
Benzene	0.0016	-	0.0016	0.06	0	/	28	2.9	0	/	28
Cis-1,2-Dichloroethene	0.0016	-	1.3	0.25	4	/	28	59	0	/	28
Cyclohexane	0.0035	-	0.098	NA	0	/	28	NA	0	/	28
Ethyl benzene	0.00038	-	0.029	1	0	/	28	30	0	/	28
Isopropylbenzene	0.00093	-	1	NA	0	/	28	NA	0	/	28
Methyl cyclohexane	0.00075	-	0.94	NA	0	/	28	NA	0	/	28
Methylene chloride	0.0038	-	0.091	0.05	1	/	28	51	0	/	28

Contaminants of Concern	Concentration Range Detected (ppm) [a]			Unrestricted SCO [b] (ppm) [a]	Frequency of Exceeding Unrestricted SCO			Residential SCO [b] (ppm)	Frequency of Exceeding Residential SCO		
Volatile Organic Compounds (VOCs)											
Naphthalene	0.0015	-	0.15	12	0	/	17	100	0	/	17
n-Butylbenzene	0.0023	-	1.8	12	0	/	17	100	0	/	17
Propylbenzene	0.0011	-	2.5	3.9	0	/	17	100	0	/	17
sec-Butylbenzene	0.002	-	1.9	11	0	/	17	100	0	/	17
tert-Butylbenzene	0.00066	-	0.2	5.9	0	/	17	100	0	/	17
Tetrachloroethylene	0.00052	-	15	1.3	2	/	28	5.5	1	/	28
Toluene	0.00041	-	0.0018	0.7	0	/	28	100	0	/	28
trans-1,2-Dichloroethene	0.00053	-	0.02	0.19	0	/	28	100	0	/	28
Trichloroethene	0.00094	-	0.53	0.47	1	/	28	10	0	/	28
Trichlorofluoromethane	0.0022	-	0.0022	NA	0	/	28	NA	0	/	28
Vinyl chloride	0.001	-	0.14	0.02	2	/	28	0.21	0	/	28
Xylene, o	0.0013	-	0.0082	0.26	0	/	17	100	0	/	17
Xylenes (m&p)	0.0023	-	0.78	0.26	1	/	17	100	0	/	17
Xylenes, Total	0.0023	-	0.78	0.26	1	/	28	100	0	/	28

Contaminants of Concern	Concentration Range Detected (ppm) [a]			Unrestricted SCO [b] (ppm) [a]	Frequency of Exceeding Unrestricted SCO			Residential SCO [b] (ppm) [a]	Frequency of Exceeding Residential SCO		
Semivolatile Organic Compounds (SVOCs)											
2-Methylnaphthalene	0.0026	-	0.034	NA	0	/	19	NA	0	/	19
Acenaphthene	0.0028	-	0.014	20	0	/	19	100	0	/	19
Acenaphthylene	0.012	-	0.025	100	0	/	19	100	0	/	19
Acetophenone	0.23	-	3.4	NA	0	/	19	NA	0	/	19
Anthracene	0.012	-	0.033	100	0	/	19	100	0	/	19
Benzaldehyde	0.11	-	0.11	NA	0	/	19	NA	0	/	19
Benzo(a)anthracene	0.094	-	0.094	1	0	/	19	1	0	/	19
Benzo(a)pyrene	0.0067	-	0.19	1	0	/	19	1	0	/	19
Benzo(b)fluoranthene	0.0098	-	0.12	1	0	/	19	1	0	/	19
Benzo(ghi)perylene	0.047	-	0.062	100	0	/	19	100	0	/	19
Benzo(k)fluoranthene	0.004	-	0.049	0.8	0	/	19	1	0	/	19
Biphenyl	0.011	-	0.011	NA	0	/	19	NA	0	/	19
Bis(2-Ethylhexyl)phthalate	0.15	-	0.8	NA	0	/	19	NA	0	/	19

Contaminants of Concern	Concentration Range Detected (ppm) [a]			Unrestricted SCO [b] (ppm) [a]	Frequency of Exceeding Unrestricted SCO			Residential SCO [b] (ppm) [a]	Frequency of Exceeding Residential SCO		
Semivolatile Organic Compounds (SVOCs)											
Butylbenzylphthalate	0.099	-	0.099	NA	0	/	19	NA	0	/	19
Carbazole	0.0058	-	0.011	NA	0	/	19	NA	0	/	19
Chrysene	0.012	-	0.083	1	0	/	19	1	0	/	19
Dibenz(a,h)anthracene	0.0068	-	0.0095	0.33	0	/	19	0.33	0	/	19
Dibenzofuran	0.0043	-	0.0094	7	0	/	19	14	0	/	19
Fluoranthene	0.011	-	0.097	100	0	/	19	100	0	/	19
Fluorene	0.0048	-	0.027	30	0	/	19	100	0	/	19
Indeno(1,2,3-cd)pyrene	0.014	-	0.076	0.5	0	/	19	0.5	0	/	19
Naphthalene	0.0037	-	0.18	12	0	/	19	100	0	/	19
Phenanthrene	0.017	-	0.13	100	0	/	19	100	0	/	19
Pyrene	0.0083	-	0.11	100	0	/	19	100	0	/	19

Contaminants of Concern	Concentration Range Detected (ppm) [a]			Unrestricted SCO [b] (ppm) [a]	Frequency of Exceeding Unrestricted SCO			Residential SCO [b] (ppm) [a]	Frequency of Exceeding Residential SCO		
Metals											
Aluminum	2890	-	5280	NA	0	/	14	NA	0	/	14
Arsenic	1.3	-	4.8	13	0	/	14	16	0	/	14
Barium	21.5	-	78.3	350	0	/	14	350	0	/	14
Beryllium	0.15	-	0.28	7.2	0	/	14	14	0	/	14
Cadmium	0.11	-	0.36	2.5	0	/	14	2.5	0	/	14
Calcium	25300	-	69200	NA	0	/	14	NA	0	/	14
Chromium	3.9	-	8.7	1	14	/	14	22	0	/	14
Cobalt	3.3	-	6.7	NA	0	/	14	NA	0	/	14
Copper	9.5	-	35.7	50	0	/	14	270	0	/	14
Iron	6470	-	12900	NA	0	/	14	NA	0	/	14
Lead	2.7	-	11.4	63	0	/	14	400	0	/	14
Magnesium	5040	-	14400	NA	0	/	14	NA	0	/	14
Manganese	373	-	645	1600	0	/	14	2000	0	/	14

Contaminants of Concern	Concentration Range Detected (ppm) [a]			Unrestricted SCO [b] (ppm)	Frequency of Exceeding Unrestricted SCO			Residential SCO [b] (ppm) [a]	Frequency of Exceeding Residential SCO		
Metals											
Mercury	0.012	-	0.012	0.18	0	/	14	0.81	0	/	14
Nickel	6.9	-	13	30	0	/	14	140	0	/	14
Potassium	516	-	1120	NA	0	/	14	NA	0	/	14
Selenium	0.44	-	0.64	3.9	0	/	14	36	0	/	14
Sodium	76.9	-	125	NA	0	/	14	NA	0	/	14
Vanadium	6.6	-	11.3	NA	0	/	14	NA	0	/	14
Zinc	22.4	-	104	109	0	/	14	2200	0	/	14

a - ppm: parts per million, which is equivalent to milligrams per kilogram, ppm, 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 Residential Use, unless otherwise noted.

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 the building in the impacted area a full suite of samples were collected to evaluate whether. Actions were needed to address exposures related to soil vapor intrusion.

Soil vapor samples were collected from the sub-slab of structures located on the former Peter's Dry Cleaning site and in several adjacent residential properties. Indoor air and outdoor air samples were also collected at this time. The samples were collected to assess the potential for soil vapor intrusion. The results indicate tetrachloroethylene (PCE) was detected in on-site and an adjacent home sub-slab vapor.

The primary soil vapor contaminant is tetrachloroethylene (PCE) which is associated with the Peter's Dry cleaning operation. The soil vapor contamination was found under the on-site building and an adjacent home above State guidelines. Therefore, mitigation was necessary for the on-site buildings and the adjacent home. To address this potential for soil vapor intrusion, sub-slab depressurization systems (SSDS) were installed in the Peter's Dry Cleaning building and the adjacent home. The system in the Peter's building was removed during the building demolition and the system at the adjacent home continues to operate. The state through the Superfund program will continue to maintain the system in the adjacent property until it is no longer necessary.

Based on the findings of the previous investigation, the presence of PCE 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: tetrachloroethylene (PCE), trichloroethene (TCE), cis-1,2-Dichloroethene, vinyl chloride and trans-1,2-Dichloroethene.

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.

Alternative 1: No Further Action

The No Further Action Alternative recognizes the remediation of the site completed by the IRM(s) described in Section 6.2 This alternative leaves the site in its present condition and does not provide any additional protection of the environment.

Alternative 1 was developed as a baseline against which to compare other RAs. This alternative involves no further actions to protect human health or the environment and does not meet the RAOs because it lacks remedial measures that would reduce groundwater contamination at the Site. Although this alternative includes the continued operation, maintenance and certification of the off-site residential SSDS installed prior to the implementation of the RI and Soil Removal IRM, no environmental monitoring would be conducted as part of this alternative.

Alternative 2: Monitored Natural Attenuation and Site Management

Alternative 2 includes long-term groundwater monitoring to evaluate changes in VOC concentrations over time due to natural attenuation. In addition Institutional Controls (ICs) in accordance with NYCRR Part 375 Residential Use would be used to prevent exposure to any contamination left in-place.

Long-term groundwater monitoring would be conducted semi-annually for the first two years and annually thereafter.

ICs would be implemented to restrict future use of the Site as part of an environmental easement or other similar instrument. Implementation of the environmental easement or equivalent would include the development of a Site Management Plan (SMP) which would set forth the ICs necessary to manage exposure to contamination remaining at a Site. ICs would likely include prohibiting installation of drinking water wells in the area of contamination. The existing SSDS at the adjacent property would continue to operate; however, associated costs are not captured herein since this would be conducted regardless of any future RA.

Site soil meets the residential soil clean objectives listed in Part 375-6.8 (a). This alternative would include periodic groundwater monitoring to assess the natural attenuation process and maintain the SSDS at the adjacent property.

Present Worth: $437,000

Capital Cost:..$411,000

Annual Costs:...$28,000

Alternative 3: In-Situ Enhanced Biodegradation

Alternative 3 consists of:

- pre-design investigation
- full-scale injection implementation of amendments to enhance biodegradation
- performance monitoring
- annual reporting
- Long term monitoring (LTM)

Pre-design investigation would be conducted to refine the extent of groundwater contamination to be addressed under this alternative. Laboratory studies would be conducted to determine the appropriate biological amendments and associated dosages, and implementation methodology for the full-scale program.

Full-scale implementation of in-situ enhanced biodegradation would consist of the addition of the chosen biological reagent into the contaminated aquifer. Following full-scale implementation, performance monitoring using existing wells would be conducted semi-annually for two years, then annually thereafter to ascertain the effectiveness of the remedy and whether additional reagents are warranted.

LTM would be conducted to evaluate the effectiveness of the enhanced biodegradation remedy within the treatment area and to evaluate MNA outside of the treatment area.

The existing SSDS at the adjacent property would continue to operate; however, associated costs are not captured herein since this would be conducted regardless of any future RA.

This alternative would also include ICs, as described under Alternative 2, to prevent exposure to groundwater contamination that remains at the site until the remedial goals are achieved.

Present Worth: $734,000

Capital Cost:..$200,000

Annual Costs:...$36,000

Alternative 4: Combined In-Situ Chemical Oxidation and Enhanced Biodegradation

Alternative 4 consist of similar components as Alternative 3, described in Subsection 10.1.3 above, including:

- pre-design investigation
- treatability studies
- full-scale injection implementation of in-situ chemical oxidation
- full-scale injection implementation of amendments to enhance biodegradation
- performance monitoring

- annual reporting
- LTM

Pre-design investigation would be conducted to refine the extent of groundwater contamination to be addressed under this alternative. Laboratory and/or field studies would be conducted to determine the appropriate chemical oxidant(s), oxidant dosage, the appropriate biological amendments and associated dosages, and implementation methodology for the full-scale program.

Full-scale implementation of in-situ chemical oxidation would consist of the addition of the chosen chemical oxidant into the contaminated aquifer. Application of the biological reagent would be done once the geochemistry at the site attenuates towards baseline conditions. Following full-scale implementation, performance monitoring would be conducted semiannually for two years, then annually thereafter to ascertain the effectiveness of the remedy and whether additional oxidants are warranted.

LTM would be conducted to evaluate the effectiveness of the chemical oxidation and biological ammendment remedies within the treatment area and to evaluate MNA outside of the treatment area. This alternative would also include ICs, as described under Alternative 2, to prevent exposure to contamination that remains at the site until the RGs are achieved.

The existing SSDS at the adjacent property would continue to operate; however, associated costs are not captured herein since this would be conducted regardless of any future RA.

This alternative would also include ICs, as described under Alternative 2, to prevent exposure to groundwater contamination that remains at the site until the remedial goals are achieved.

Present Worth: $1,069,000

Capital Cost:..$535,000

Annual Costs:...$36,000

Alternative 5: In-Situ Thermal Treatment

Alternative 5 consists of:

- pre-design investigation
- full-scale installation and in-situ thermal of system start-up
- performance monitoring
- LTM
- operation and maintenance (O&M)

Pre-design investigation prior to the introduction of in-situ thermal treatment would be conducted to refine the extent of groundwater contamination to be addressed under this alternative. Laboratory and field studies, and possibly pilot testing depending on the type of thermal treatment to be implemented, would be conducted to evaluate the effectiveness of the proposed thermal treatment system prior to implementing a full system.

Following full-scale implementation, performance monitoring would be conducted approximately semi-annually for two years, and LTM would be conducted at an annual rate from years 3-10. This alternative would also include ICs, as described under Alternative 2, to prevent exposure to contamination that remains at the site until the RGs are achieved.

The existing SSDS at the adjacent property would continue to operate; however, associated costs are not captured herein since this would be conducted regardless of any future RA.

This alternative would also include ICs, as described under Alternative 2, to prevent exposure to groundwater contamination that remains at the site until the remedial goals are achieved.

Present Worth: $2,226,000

Capital Cost:..$1,810,000

Annual Costs:..$20,000

Exhibit C

Remedial Alternative Costs

Remedial Alternative	Capital Cost ($)	Annual Costs ($)	Total Present Worth ($)
Alternative 1: **No Further Action**	0	0	0
Alternative 2: **Monitored Natural Attenuation and Site Management**	$26,000	$28,000	$437,000
Alternative 3: **In-Situ Enhanced Biodegradation**	$200,000	$36,000	$734,000
Alternative 4: **Combined In-Situ Chemical Oxidation and Enhanced Biodegradation**	$535,000	$36,000	$1,069,000
Alternative 5: **In-Situ Thermal Treatment**	$1,810,000	$20,000	$2,226,000

Exhibit D

SUMMARY OF THE PROPOSED REMEDY

The Department is proposing Alternative 3, In-Situ Enhanced Biodegradation as the remedy for this site.

Based on the detailed analysis and comparison of alternatives, it is recommended that the Alternative 3: In-situ Enhanced Biodegradation is proposed as the preferred alternative for groundwater remediation at the Peters Dry Cleaning site. Alternatives 1 and 2 do not provide means to decrease contaminant mass beyond natural attenuation. While Alternative 5 would provide a more certain degree of contaminant removal, the high capital cost and associated high energy usage required for this alternative is not justified, given that there are no direct exposure pathways to impacted groundwater. Although chemical oxidants (Alternative 4) are often recommended over biological amendments in higher concentration areas, the oxidants must come in contact with the impacted groundwater prior to being consumed by the soil's natural oxidant demand. Alternative 3 will provide appropriate soil microbes and nutrients to breakdown the organic contaminants. The microbes travel with groundwater so they do not require instant contact with contaminants, and they are long lasting. Monitoring data collected after implementation of the chosen remedy may suggest additional rounds of injections are required, at which time concentration trends will be used to evaluate whether additional biological amendments are appropriate or if chemical oxidants would prove to be more effective. The elements of this remedy are also described in Section 7.

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 RI/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.

Although there is limited direct exposure pathways that exist under current and foreseeable uses of the site, Alternative 3, In-Situ Enhanced Biodegradation would reduce levels of total VOCs in groundwater by conducting in-situ enhanced biodegradation of contaminated groundwater at the Site. Similar to Alternative 2, this alternative would control potential human exposure pathways through implementation of ICs until which time RAOs are met.

The proposed remedy Alternative 3, In-Situ Enhanced Biodegradation would satisfy this criterion by reducing the levels of VOC's in the groundwater. Alternative 1 (No Action) does not provide any protection to public health and the environment and will not be evaluated further. Alternative 2, Monitored Natural Attenuation with Site Management would also be expected to result in reduced VOC's in the groundwater but would require significant additional time to achieve the

RAO's, if at all. Alternatives 4 Combined In-Situ Chemical Oxidation and Enhanced Biodegradation and 5 In-Situ Thermal Treatment also comply with this criterion and would likely be the shortest time frame to achieve the RAO's. The potential for soil vapor intrusion will be significantly reduced by Alternatives 2, 3, 4 and 5. The potential for soil vapor intrusion will remain high under Alternatives 1. Soil vapor mitigation of one adjacent building is required under all Alternatives in order to protect human health.

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 In-Situ Enhanced Biodegradation would reduce the time necessary to comply with Chemical-specific SCGs by use of in-situ enhanced biodegradation to reduce contaminant concentrations within the plume.

Alternative 3 In-Situ Enhanced Biodegradation complies with SCGs to the extent practicable. It addresses groundwater contamination and creates the conditions necessary to restore groundwater quality. Alternatives 4, and 5 also comply with this criterion but at a significantly higher cost.

Because Alternatives 2, 3, 4, and 5 satisfy the threshold criteria, the remaining criteria are particularly important in selecting a final remedy for the site.

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.

All alternatives evaluated will be effective in the long term however, with significantly different timeframes.

Alternative 3 In-Situ Enhanced Biodegradation includes in-situ enhanced biodegradation of VOCs in groundwater. However, given that the source of contamination has been removed during the Soil Removal IRM, the reductions realized through enhanced biodegradation would be permanent. The time needed to achieve the remediation goals is the shortest for Alternative 5 and the longest for Alternative 2.

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 & 5 will include actions to reduce the toxicity, mobility or volume or the groundwater. Alternative 2 will simply monitor an expected natural reduction in contaminant levels.

Alternative 3 In-Situ Enhanced Biodegradation will reduce the toxicity and volume of groundwater contamination through in-situ enhanced biodegradation. Implementation of this alternative requires injection of a significant volume of solution, which must be closely monitored.

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.

Alternative 3 In-Situ Enhanced Biodegradation includes the addition of amendments using direct push technology at the Site, as well as injection via one existing monitoring well; therefore, there would be potential short-term adverse impacts and risks of the remedy upon construction workers and nearby occupants. These risks would be addressed through coordination and communication with the property owner(s) and preparation and implementation of a construction HASP.

Alternatives 2 through 5 all have short-term impacts which could easily be controlled, however, Alternative 2 would have the least impact. Alternative 5 would have the greatest short term impacts due to the equipment and facilities necessary to implement.

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.

The technologies used for implementation of Alternative 3 In-Situ Enhanced Biodegradation are well developed and would not be difficult to implement. Special considerations would need to be employed to consider the proximity of the excavation zone with respect to the injection points. In general, the amendments used for in-situ enhanced biodegradation are long-lasting and migrate with groundwater flow, and therefore are expected to reach the impacted area located down gradient of the site. A comprehensive utility survey would be conducted prior to the installation of injections wells, and injection points that are within or near a suspected utility area would be pre-cleared either by hand or with vacuum excavation prior to installation. Services or materials required to implement this alternative are readily available.

Alternative 2 is the most easily implemented alternative as it uses existing monitoring points. Alternative 4 will be very similar to alternative 3. Alternative 5 will require significant work to install monitoring points and equipment necessary to implement this remedy.

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 capital cost of Alternative 3 In-Situ Enhanced Biodegradation is $200,000. The Net Present Worth of this Alternative is $734,000. A summary of the costs associated with this alternative is presented in Exhibit C.

The costs of the alternatives vary significantly. Alternative 2 has a low cost, but will take the longest to achieve the remedial goals. Alternative 4 is very similar to Alternative #3 In-Situ Enhanced Biodegradation but the addition of In-Situ Chemical Oxidation will increase cost but will likely not achieve the remedial goals any sooner than Alternative 3 would. Alternative 5 is the most expensive remedy to implement but would achieve the remedial goals in the shortest time frame.

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.

The current and reasonably anticipated future land use of the Site is for residential purposes. Alternatives 2, 3, 4 and 5 are all compatible with the future anticipated land use. All alternatives would include ICs to prevent use of the groundwater for drinking until such time that the SCOs have been met.

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 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