REMEDIAL ACTION WORK PLAN

FOR

FORMER IMPERIAL CLEANERS SITE
218 LAKEVILLE ROAD
LAKE SUCCESS, NEW YORK 11020

JUNE 2017

PREPARED FOR:
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF ENVIRONMENTAL REMEDIATION
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Professional Engineer Certification

I, Joseph M. Heaney III, P.E. certify that I am currently a New York State registered professional engineer and that this *Remedial Action Work Plan* report, dated June 28, 2017, was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

I further certify that this submittal, *Remedial Action Work Plan*, dated June 28, 2017, was prepared under my direction.

Joseph M. Heaney III, P.E. Walden Environmental Engineering, PLLC	6/27/17 Date

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1 INTRODUCTION

Walden Environmental Engineering, PLLC (Walden) has prepared this *Remedial Design Work Plan* (RAWP) on behalf of 218 Lakeville Aquisition LLC ("the Requestor") for the remedial alternative to be implemented at the Former Imperial Cleaners Site, 218 Lakeville Road, Lake Success, New York (the "Site" or "Subject Property"). The remedial alternative will address residual VOC contamination identified during a February 2016 soil vapor intrusion (SVI) investigation, as summarized in the *Soil Vapor Intrusion Investigation Summary Report* (Walden, May 4, 2017) approved by the New York State Department of Environmental Conservation (NYSDEC) and the New York State Department of Health (NYSDOH). The remedial alternative detailed in this RAWP will achieve the remedial action objectives for the Subject Property and will support Site closure and development of a Site Management Plan.

The Subject Property's previous owner, 218 Lakeville Associates L.P., entered into Voluntary Cleanup Agreement (VCA) #D1-30001-01-03 with the NYSDEC, effective April 18, 2001, to address VOC contamination associated with the former Imperial Cleaners Site. The Subject Property was assigned Voluntary Cleanup Program (VCP) Site No. V-00244-1.

The Site was sold to 218 Lakeville Aquisition LLC, the Requestor, on July 28, 2015, and the VCA was amended to reflect the change in property ownership. The Voluntary Cleanup Program is being terminated as of March 31, 2018, and the proposed remedial alternative described herein cannot be completed by this date. Therefore, in accordance with correspondence from NYSDEC dated April 24, 2017, the Requestor is submitting an application and supporting documentation to transition the Subject Property to the Brownfields Cleanup Program to complete the required remediation, site closure and post-closure management.

This RAWP was prepared in accordance with the requirements specified in NYSDEC DER-10 (*Technical Guidance for Site Investigation and Remediation)* and includes Section 4: Alternatives Analysis (prepared in accordance with DER-10 as required for the BCP application) which establishes the basis for the selected remedial alternative to achieve the remedial action objectives for the Subject Property.

2 SITE DESCRIPTION AND HISTORY

2.1 Site Description

The Subject Property location is illustrated on Figure 1. The Subject Property is a commercial center with a one-story building occupying approximately 4,250 square feet, with one active tenant (Tobacco Plaza, Ltd.) and three vacant spaces as shown on Figure 2. Residential land uses are located south and directly west of the Site. The basement of the on-site building has concrete block walls and a poured concrete floor slab. Outside the building footprint, the property is completely paved. Sanitary wastewater from the building is discharged to two on-site septic systems as there are no public sewers available near the Site. Note that there is a perched water table underlying the Site at approximately 30 feet below grade, a confining clay layer approximately 35 to 50 feet below grade, and the groundwater table is located approximately 150 feet below land surface. Groundwater flow at the Site varies from west to west-northwest.

2.2 Site History and Investigations/Remediation by Previous Owner

A release of tetrachloroethylene (PCE) at the Site was first noted in 1995. The PCE contamination was suspected to originate from floor drains within the tenant space occupied by a dry cleaner (former Imperial Cleaners) at that time and from a leaching pool and dry well on the property that were associated with the former dry-cleaner operations. A site investigation followed to identify source areas and determine the extent of contaminated soil and groundwater at the Site. The site investigation and remediation work described below was conducted by 218 Lakeville Associates L.P., the previous owners of the Subject Property, as required by NYSDEC under the VCP.

Contaminated sediments were removed from the source areas (dry well, interior floor drains, and leaching pool associated with the former Imperial Cleaners operations) in 1996 and 2000 to the extent possible without undermining the structures. Post-excavation endpoint soil sampling following the source area removal actions indicated that volatile organic compounds (VOCs) remained in the subsurface at concentrations above the NYSDEC TAGM 4046 Recommended Cleanup Objectives. However, no additional materials were removed because it was determined that further excavation would threaten the integrity of the structures. 218 Lakeville Associates L.P. then installed a soil vapor extraction (SVE) system to remove VOC vapors remaining in the soil and improve soil and groundwater quality. The SVE system which consisted of eight soil vapor extraction wells began operating in 2001. A soil, soil gas, groundwater and indoor air monitoring program was implemented to track the reductions in VOC concentrations achieved by operation of the SVE system under the VCP.

Site closure sampling (soil, soil vapor and indoor air perc badge sampling) was conducted in November 2007 – January 2008 in accordance with a NYSDEC approved work plan. The closure sampling results indicated that the SVE system had successfully reduced soil contaminant concentrations to below the NYSDEC TAGM 4046 Recommended Cleanup Objectives. Permanent shutdown of the SVE system was recommended based on the 2007-2008 closure sampling results. The SVE system was subsequently shut down circa 2008.

2.3 Requestor's February 2016 Soil Vapor Intrusion Investigation

After 218 Lakeville Aquisition LLC purchased the Subject Property from 218 Lakeville Associates L.P. in July 2015, an SVI investigation was conducted to address the potential for vapor intrusion from contaminated soil vapor and potential impacts on indoor air quality at the Site and neighboring off-site properties. The SVI investigation was completed in accordance with the NYSDEC approved *Soil Vapor Intrusion Investigation Work Plan* (Work Plan; Walden, December 2015) which was developed in accordance with the guidelines set forth in NYSDEC *DER-13: Strategy for Evaluating Soil Vapor Intrusion at Remedial Sites in New York* (issued October 18, 2006) and *NYSDOH: Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York* (dated October 2006). The field work was completed in February 2016 (during the 2015-2016 heating season) and consisted of sub-slab vapor, indoor air, and outdoor air sampling and analysis.

The February 2016 SVI investigation results and conclusions are presented in the *Soil Vapor Intrusion Investigation Summary Report* (Walden, May 4, 2017) which has been approved by NYSDEC and NYSDOH. The significant SVI investigation findings are summarized as follows:

- The sub-slab sampling results revealed that vapors (mainly PCE and breakdown products TCE and cis-1,2-DCE) attributable to the historic release of VOCs at the Former Imperial Cleaners Site remain in the subsurface. While the former SVE remedial system installed and operated at the Site by the previous owner (218 Lakeville Associates L.P.) had reduced VOC concentrations to levels acceptable to NYSDEC and NYSDOH in 2008, after which the system was shut down, the February 2016 SVI sampling results show that VOC concentrations have rebounded.

- Based on a comparison of the target compound concentrations reported for the February 2016 sub-slab and indoor air samples to the concentration ranges compared in the NYSDOH SVI decision matrices, mitigation is recommended for

218 Lakeville Road, 2 University Place and 4 University Place to address potential soil vapor intrusion impacts and prevent exposure to VOCs in indoor air.

- The NYSDOH decision matrix comparison for 220 Lakeville Road indicates that monitoring is recommended to ensure that residual VOCs do not impact indoor air at this location; no action is recommended at 216 Lakeville Road.

The May 2017 SVI summary report approved by the NYSDEC and NYSDOH recommended the following actions based on the SVI investigation results:

- Install sub-slab depressurization (SSD) systems at 218 Lakeville Road, 2 University Place and 4 University Place to prevent VOC vapor migration into the buildings.
  - Please note that the selected remedial alternative detailed in this RAWP involves soil vapor extraction (SVE) rather than SSD based on the Alternatives Analysis presented in Section 4 below.

- Conduct monitoring at 220 Lakeville Road during subsequent heating season in accordance with the October 2006, Final NYSDOH CEH BEEI, Soil Vapor Intrusion Guidance, as amended.

These recommendations guide the development of the remedial alternative detailed in this RAWP.

2.4 Exposure Assessment

The potential for exposure due to ingestion or direct contact with VOC contaminated soil is negligible given the existing Site conditions (the Site is either covered by the building footprint or paved) and the planned continued commercial use of the Subject Property. The perched water table and clay layer beneath the Site prevent the migration of VOCs to deeper groundwater.

The potential exists for exposure to VOCs remaining in the subsurface due to soil vapor intrusion, whereby soil vapors migrate through cracks in a building foundation into the basement, or lowest level of the building. Occupants who spend a significant amount of time in the lowest level of such buildings would be at risk for exposure through the inhalation of the contaminant.

Other pathways of potential exposure to VOCs remaining in the subsurface would occur if ground breaking activity disturbs soil on-site, releasing soil vapors, creating the possibility of on-site-worker exposure to contaminants due to inhalation. Such exposures can be controlled through engineering measures during construction. If institutional controls are required to restrict or prohibit certain uses or future development of the Site (based on the Site conditions), environmental easement(s) will be prepared and executed in accordance with the procedures established by NYSDEC.

3 REMEDIAL ACTION OBJECTIVES

Based on the February 2016 SVI investigation results and the Requestor's plans to continue commercial use of the Subject Property, remedial action objectives have been developed to guide the selection of an appropriate remedial alternative for the Site and to support future development of Site closure/management plans.

The State of New York does not have any Standards, Criteria and Guidance (SCG) values for concentrations of volatile chemicals in subsurface vapors, so the sub-slab vapor concentrations cannot be compared to any regulatory threshold values. However, the sub-slab vapor concentrations factor into the decision matrices contained in the NYSDOH SVI guidance. The SVI decision matrices consider the concentrations of PCE, TCE, cis-1,2-dichloroethene (cis-1,2-DCE), and several other VOCs detected in indoor air samples and sub-slab vapor samples collected concurrently at the same location. The matrices recommend actions (monitoring and/or mitigation) intended to address soil vapor intrusion exposures based on the relationship between the sub-slab vapor and corresponding indoor air concentrations at a given sampling location.

The NYSDOH SVI decision matrix evaluation based on the February 2016 sampling results recommends mitigation to prevent potential indoor air quality impacts at 218 Lakeville Road and the residences at 2 and 4 University Place. The VOCs of concern associated with the Site are PCE, TCE and cis-1,2-DCE.

The SCG values that apply to remediation of the Subject Property are as follows:

- VOC concentrations in soil are subject to the NYSDEC soil cleanup objectives for protection of public health based on commercial use (consistent with current and planned Site use and zoning) as set forth in 6 NYCRR 375-6.8(b):
    - PCE – 150 mg/kg
    - TCE – 200 mg/kg
    - Cis-1,2-DCE – 500 mg/kg

- The New York State Department of Health Final Soil Vapor Intrusion Guidance (latest update May 2017) decision matrices recommend mitigation based on indoor air and sub-slab vapor concentrations as follows:
    - PCE - indoor air concentration 10 $\mu g/m^3$ and above OR sub-slab vapor concentration 1,000 $\mu g/m^3$ and above
    - TCE - indoor air concentration 1 $\mu g/m^3$ and above OR sub-slab vapor concentration 60 $\mu g/m^3$ and above
    - Cis-1,2-DCE - indoor air concentration 1 $\mu g/m^3$ and above OR sub-slab vapor concentration 60 $\mu g/m^3$ and above

The selected remedial alternative described in this RAWP will be designed to meet the following remedial action objectives:

- Identify and excavate to the extent feasible remaining on-site hotspots of VOC contamination where PCE, TCE and/or cis-1,2-DCE exceed the SCGs based on 6 NYCRR 375-6.8(b) soil cleanup objectives for commercial Site use.

- Prevent off-site migration of VOC vapors from the Subject Property.

- Mitigate impacts to public health associated with indoor air quality impacts by preventing intrusion of soil vapors containing elevated VOC concentrations into indoor spaces, as determined based on sub-slab and indoor air concentrations of VOCs compared to the NYSDOH SVI decision matrices.

NYSDEC's April 11, 2017 letter regarding the SVI Investigation Summary Report states that further SVI investigation is needed to evaluate the potential for additional off-site impacts associated with VOC vapors from the Subject Property. An additional 16 off-site properties were identified, located in all directions from 218 Lakeville Road.

This RAWP does not propose SVI sampling at additional off-site properties at this time for the following reasons:

- The selected remedial alternative noted in Section 5 below (SVE remedial system and hotspot removal) will remove VOC mass from the subsurface and provide capture of VOC vapors on-site, thus preventing off-site migration, eliminating the source of transient vapors with the potential to impact off-site properties.

- The off-site properties (2 University Place, 4 University Place and 220 Lakeville Road) where mitigate or monitoring were the recommended actions based on the NYSDOH SVI decision matrix evaluation of the February 2016 data will be included in the SVI sampling of sub-slab vapor and indoor air to be performed as described in Section 9 to confirm the effectiveness of the remedial alternative and evaluate the need for additional action as appropriate.

- The NYSDEC and NYSDOH previously conducted a comprehensive review to evaluate potential vapor impacts associated with the Site and identified the properties immediately bordering 218 Lakeville Road which were sampled during the February 2016 SVI investigation per the NYSDEC/NYSDOH work plan.

4 ALTERNATIVES ANALYSIS

This Alternatives Analysis (AA) has been prepared in accordance with the requirements specified in NYSDEC DER-10 and establishes the basis for the selected remedial alternative to be implemented at the Subject Property.

4.1 Development & Initial Screening of Remedial Alternatives

No Further Action/Monitored Natural Attenuation (MNA)

MNA allows the biological processes already prevalent in the subsurface to naturally breakdown VOCs. A scheduled sub-slab vapor and indoor air monitoring program would be conducted to assess the effective progress of the in-situ microbial population, with focus on exposure to receptive populations. This monitoring program would be in operation during heating seasons, when risk of exposure is highest to the susceptible population.

Sub-slab Depressurization (SSD)

SSD involves installing control measures to prevent contaminated soil vapors from entering the lowest level of susceptible buildings. The SSD system design would specify individual systems consisting of fans and piping to draw vapors from beneath the building slabs at the Subject Property, 2 University Place and 4 University Place. This is intended to create an adequate vacuum to control the sub-slab VOC vapors and prevent vapors from entering the buildings to avoid indoor air quality impacts. Monitoring of sub-slab vapors and indoor air during heating seasons would be performed to gauge the effectiveness of the SSD system in each building to determine if indoor air quality impacts are controlled.

Soil Vapor Extraction (SVE)

SVE systems extract gaseous phase contaminants from the soil pore space, and treats them above ground. The SVE system design would specify location of SVE wells and their radius of influence, or the effective area from which a system creates a vacuum to collect vapors. Pre-design phase environmental sampling and pilot testing would be conducted to categorize geological factors affecting the radius of influence and screen zones to capture VOC vapors. If pre-design sampling identifies any VOC hotspot areas, they shall be excavated to remove source material and reduce the overall remedial timeframe. The on-site SVE system would remove VOCs from the subsurface, encouraging the contaminants to desorb from soils and partition into the vapor phase. In addition, the SVE system would create a vacuum to capture VOC vapors within the SVE wells' zone of influence to prevent off-site migration of VOCs. Timely environmental sampling of VOCs throughout the radius of influence would be performed to determine the effectiveness of the remediation system and indicated when the system has met the remedial action objectives. The SVE alternative would also include annual monitoring of sub-slab vapors and indoor air during heating seasons to gauge the effectiveness of the SVE system in preventing indoor air quality impacts.

4.1.1 Screening Based on Protection of Public Health, Environment

No Further Action/MNA Alternative: This remedial alternative would not accelerate the treatment of contamination and would not achieve Remedial Action Objectives.

SSD Alternative: An SSD system mitigates impacts to the human health by preventing vapor phase contaminants from entering indoor spaces, achieving remedial action objectives by protecting human health. This system would not hinder the migration of subsurface contamination.

SVE Alternative: An SVE system would achieve the remedial action objectives by preventing the buildup of contaminated indoor air by creating a preferential pathway for soil vapors into extraction wells, instead of cracks in foundations. This system also prevents the migration of contaminants off-site and offers the ability to treat the on-site soil to the point of achieving the SCGs.

4.1.2 Screening Based on Contamination Sources Removal

No Further Action/MNA Alternative: This remedial alternative would not actively or fully remove contaminant sources and would not achieve Remedial Action Objectives.

SSD Alternative: SSD systems do not specifically address the contaminant sources or hot spots, allowing contamination to remain underground, but preventing it from accumulating in buildings.

SVE Alternative: SVE systems encourage the release of VOCs from soil and into the vapor phase, where the contaminants are collected and treated aboveground. This remedial strategy addresses and treats the source of impaired indoor air quality, removing it from the environment below and around the building slabs. If design phase investigation reveals VOC hot spots, further efforts would be determined for source removal.

4.1.3 Screening Based on Contamination Containment

No Further Action/MNA Alternative: This remedial alternative would not contain on-site contaminants and would not achieve Remedial Action Objectives.

SSD Alternative: The SSD remedial alternative offers no containment of subsurface PCE and its byproducts and would not create a barrier to prevent the spread of contamination in the subsurface. SSDs only offer building-by-building protection.

SVE Alternative: The radius of influence of an SVE system represents the volume of subsurface media from which all soil vapors are collected and treated by the aboveground equipment. When designing the system, the radius of influence is the most important parameter for preventing the spread of contamination. If all impacted media is covered by the radius of influence, the contamination would be effectively contained. Pre-design investigation of the Subject Property and pilot tests of the SVE system would support the design of a remedial system that removes VOC mass and contains VOC contamination.

4.1.4 Screening Based on Elimination of Exposure

No Further Action/MNA Alternative: This remedial alternative would not prevent exposure to VOCs and would not achieve Remedial Action Objectives.

SSD Alternative: Engineered controls are implemented in an SSD system to prevent exposure to VOCs. The pressure gradient effectively prevents vapors from entering the building environment for which it is designed.

SVE Alternative: SVE extraction prevents exposure to contamination by diverting the path of vapors into extraction wells, where they are collected for treatment. The vacuum created by the SVE system would prevent VOCs from migrating within the radius of influence to eliminate exposure to building occupants within the treatment zone. The SVE system would prevent off-site migration of VOCs.

4.1.5 Screening Based on Treatment of Source at Exposure

No Further Action/MNA Alternative: This remedial alternative would not treat or prevent exposure to VOC vapors, and would not achieve Remedial Action Objectives.

SSD Alternative: SSD systems prevent human exposure by preventing VOC vapors from entering buildings, but do not treat contamination.

SVE Alternative: SVE systems have two forms of treatment, the collection of volatile contaminants at the wellhead and the effect of pulling fresh air into the voids that were previously filled with contaminated soil vapor, which may also enhance bio-activity.

4.1.6 Screening Based on Groundwater Protection Measures

No Further Action/MNA Alternative: This remedial alternative would not provide groundwater protection.

SSD Alternative: This strategy does not remove VOCs from the subsurface and would not actively protect local groundwater.

SVE Alternative: By actively removing VOCs from the subsurface and encouraging the volatilization and capture of the contaminants, an SVE system would reduce subsurface VOC concentrations and protect local groundwater.

4.2 Detailed Evaluation of Remedial Alternatives

Based on the remedial alternatives screening presented in Section 4.1, the No Further Action/MNA Alternative is not carried through the detailed evaluation below because it offers no protection from exposure to VOC vapors and would not achieve the remedial action objectives. Therefore, only the other two alternatives (SSD and SVE) are evaluated in detail as follows.

4.2.1 Threshold Criteria

Overall Protection of Public Health and the Environment
The SVE Alternative provides more extensive public health and environmental protection by addressing the contamination by actively removing VOCs from the subsurface, capturing VOCs on-site, eliminating off-site migration, and preventing soil vapors from accumulating in basements.

Ability to Reach RAOs
The SSD Alternative would achieve compliance with remedial goals for indoor air quality. The SVE Alternative goes a step further to actively remove VOCs from the subsurface and potential excavation of VOC hotspots (if found during pre-design investigation/data collection) to comply with NYSDEC's soil cleanup objectives for commercial Site use.

SCG Compliance

Both alternatives would effectively reduce indoor air contaminant concentrations below the New York State Department of Health matrix threshold levels. The SVE Alternative presents the ability to achieve relevant soil SCGs for commercial use. The SSD Alternative would not expedite the reduction in soil contamination concentrations that would be achieved by monitored natural attenuation.

4.2.2 Balancing Criteria

Long-term Effectiveness and Permanence

Both alternatives would mitigate human exposures while the system is in operation, however the SVE Alternative would remove the contaminant source, eliminating the risk of long-term human and environmental health effects after system shutdown.

Reduction of Toxicity Mobility or Volume of Contaminant

The SVE Alternative would more effectively reduce the mobility and volume of contamination in the subsurface by capturing and removing VOCs.

Short-term Effectiveness

Both alternatives would be effective in preventing potential human exposures immediately upon system startup. While the SVE Alternative would require more time to complete the required pre-design investigation, SVE pilot study and full-scale design, the SSD Alternative would be subject to delays associated with negotiating long-term access agreements to work on off-site properties.

Implementation/Feasibility

Pilot tests must be completed to ensure proper SVE system design, so the SVE Alternative's design and implementation would be a lengthier process than would be required for SSD.

The SSD Alternative, however, has many administrative hurdles associated with access to private properties and obtaining consent to work on these properties to install, maintain and monitor the SSD systems. In addition, agreements would have to be negotiated with off-site property owners regarding payment of electrical costs for SSD systems. The SVE system would be designed so that all construction and O&M would be conducted on-site; off-site property access would only be required to conduct annual monitoring of sub-slab vapors and indoor air during the heating season. All SVE system equipment would be installed within a sound-proof treatment enclosure on-site.

Cost Effectiveness
The capital costs of implementing the SVE Alternative would be greater compared to SSD. The increased effectiveness of SVE in remediating subsurface contamination and removing VOC mass, while protecting against off-site migrations and soil vapor intrusion make SVE a more cost-effective option.

Anticipated Future Land Use
There is no anticipated change to the land use on-site; the Site owners intend to continue the commercial use consistent with current zoning.

Community Acceptance
This criterion will be evaluated after public review of the remedy selection process. Public comments will be gathered by the State to document the community acceptance of the proposed remedial system to grant final approval for the selected strategy. Public sentiment will be evaluated in accordance with *DER 23 - Citizen Participation Handbook.*

4.3 Selected Remedy

The SVE Alternative is the selected remedy for its preferential protection of public and environmental health, contaminant source removal, on-site containment of VOCs, prevention of off-site migration, ability to reach RAOs and SCG compliance. The SVE Alternative will provide significantly more benefit compared to the SSD option, which would simply prevent vapor intrusion but would not actively remove VOCs from the subsurface.

The SVE system will be designed to capture all on-site VOC vapors and prevent off-site migration. Full-scale design and system monitoring during SVE remedial system operation will ensure that the radii of influence of the SVE wells overlap so that all vapors are managed on-site to prevent future off-site impacts. SVE will promote VOCs in the subsurface to partition to the vapor phase for capture by the SVE wells, reducing the residual VOC mass. This benefit, coupled with removing hotspots identified based on a pre-design investigation will further reduce the source of VOC vapors and expedite the time required for the SVE system to meet the remedial action objectives. Off-site properties will be protected because the VOC vapors will be captured on-site, and the on-site SVE wells will create a vacuum extending under 2 University Place and 4 University Place to address potential vapor intrusion impacts, to be confirmed through SVI sampling as described in this RAWP.

5 SOIL VAPOR EXTRACTION REMEDIAL ALTERNATIVE

The components of the SVE remedial alternative are outlined below. The remainder of this RAWP details how this alternative will be implemented, upon approval by NYSDEC and NYSDOH.

- Conduct Pre-Design Investigation
    - Drill seven (7) soil borings to evaluate potential VOC sources remaining at the Site (leaching pool, dry wells and floor drains associated with the former dry cleaner operations) as shown on Figure 3.
    - Classify soil types in the borings to support SVE system design
    - Screen soil samples at 5-foot intervals using a PID as the borings are advanced from the invert or bottom of the structures to just above the perched water interface at approximately 30 feet below grade, or to a depth where PID response returns to background if applicable
    - Based on PID screening results and sampling observations, select a minimum of two samples from each boring for laboratory analysis of VOCs using USEPA Method 5035 or equivalent
    - Compare VOC results to NYSDEC recommended soil cleanup objectives for commercial Site use
    - If hotspot area(s) are identified, conduct additional sampling if needed to delineate source area(s) to be excavated

- Conduct SVE Pilot Test
    - Evaluate the condition of the on-site SVE wells operated as part of the former SVE remedial system installed and operated by the previous owner from 2001 until circa 2008 to determine if any are in suitable condition for re-use
    - Utilize existing SVE well (if possible) or install a new SVE well in the rear parking lot
    - If a new SVE well is installed, set well screen based on Site soil characteristics determined during pre-design investigation
    - Install four piezometers at set distances from the SVE test well to record differential subsurface pressure/vacuum measurements during the pilot test
    - Collect samples of extracted vapors for analysis of VOCs to determine treatment requirements
    - Evaluate SVE pilot test data and determine radius of influence and SVE well characteristics as the basis for full-scale design

- Design Full-Scale SVE system based on pilot test results

  - Perform engineering design calculations to determine SVE well depths, screen intervals, pumping rates and radius of influence
  - SVE wells shall be placed with overlapping radii of influence to create a vacuum barrier extending beyond the Subject Property boundaries to prevent off-site migration of VOC vapors
  - Piezometers shall be placed on-site to monitor subsurface pressures during SVE system operation
  - Granular activated carbon units shall be specified to treat the extracted soil vapors

- Install SVE system

- SVE System Start Up

- SVE System O&M and Monitoring
  - Conduct regular monitoring (weekly or bi-weekly for the first 3 months after start-up; monthly thereafter) of the SVE system to verify effective operation
  - Perform SVI sampling (sub-slab and indoor air) at 218 Lakeville Road, 2 University Place, 4 University Place, and 220 Lakeville Road (this property to be monitored per the NYSDOH decision matrix as described in the SVI Summary Report dated May 2017) during the first heating season after the SVE system has been installed and operating for at least three months.
    - If the SVI results indicate no indoor air quality impacts per the NYSDOH SVI decision matrices, continue to operate the SVE system and repeat SVI sampling annually during heating seasons until the SVE system monitoring results indicate VOC concentrations in soil vapor reach asymptotic levels, at which time approval to shut down the SVE system would be requested from NYSDEC and NYSDOH
    - If the NYSDOH SVI decision matrix evaluation of the SVI sampling results indicates potential indoor air quality impacts, evaluate the need for additional action as appropriate.

- SVE System Shut Down

- Site Management Plan/Environmental Easement

6 PRE-DESIGN INVESTIGATION

Walden proposes to conduct a pre-design phase investigation at the Subject Property to support the remedial alternative design and implementation. Data from previous investigations related to the 218 Lakeville Road Site have been utilized to develop the proposed scope of work.

The contaminants of concern at the 218 Lakeville Road Site include PCE and its breakdown products, TCE and cis-1,2-DCE. For the purpose of this RAWP, the goal of the pre-design investigation is to further evaluate potential remaining sources of PCE at the Site by collecting soil samples adjacent to the on-site building space, dry wells, and leaching pool associated with the former dry cleaning operations. Interior floor drains, a dry well and a leaching pool were cleaned out to the extent possible during the on-site remedial actions completed by the previous Site owner in 1996 and 2000. However, the contaminated soil vapors found during the February 2016 sampling suggest that source materials remain on-site. Actively locating and removing residual on-site VOC source material if it can be discovered will reduce the time it takes to achieve the remedial action objectives and ultimately Site closure. Such results are the goal of the proposed pre-design investigation described below.

6.1 Soil Sampling Locations

Historic soil data collected at 218 Lakeville Road indicate the presence of elevated PCE or TCE in an on-site drywell (which has since been converted into a catch basin), one on-site leaching pool, and two floor drains associated with the former Imperial Cleaners space. Note that during remedial actions completed at the Site from 1996 – 2000, contaminated sediments were excavated and removed from these structures to the greatest extent possible without undermining their structural integrity, and an SVE system was installed by the previous owner to extract residual VOCs that could not be removed.

Walden proposes to collect soil samples from borings drilled adjacent to the two dry wells in the rear parking lot located downgradient from the former dry cleaner space, and the leaching pool in the front of the building believed to be the historic discharge point of wastewater from the dry cleaner. Two borings are proposed on either side of each structure outside the concrete rings, one upgradient and one downgradient. In addition, one boring is proposed in the rear parking lot just outside the southernmost space which was occupied by the former Imperial Cleaners to evaluate potential VOC contamination in this area. The proposed sampling locations are shown on Figure 3.

Note that sampling of the two floor drains in the basement area is not proposed at this time due to sampling equipment access constraints; this may be revisited based on the pre-design investigation sampling results from the borings.

6.2 Soil Sampling Procedure

The soil borings will be installed utilizing a Geoprobe®. Soil samples will be collected at 5-foot intervals from the depth of the bottom/invert of each structure to just above the perched water interface at approximately 30 feet below grade, or to a depth where PID response returns to background if applicable. Walden's on-site staff will qualitatively screen soil samples for VOCs utilizing a PID headspace method. A minimum of two samples from each boring will be selected for laboratory analysis of VOCs based on the PID screening results and sampling observations. The soil sample lithology will be characterized and described to support development of the SVE system pilot test and design as discussed in Section 7. Soil boring logs will be prepared for each hole.

6.3 Soil Sample Handling and Analysis

The soil samples selected based on PID screening will be placed in dedicated clean glassware provided by the laboratory. Following collecting and labeling, all samples will be packed in iced coolers maintained at 4°C. Samples will be shipped to a NYSDOH ELAP CLP laboratory in such a manner as to avoid breakage during transportation and to minimize the possibility of cross-contamination. The samples will be delivered to the analytical laboratory via an overnight courier under the appropriate Chain-of-Custody protocol for VOC analysis via USEPA Method 5035 or an equivalent method.

Additional sampling and analytical requirements are detailed in the QAPP (Appendix B).

6.4 Evaluation of Pre-Design Sampling Results

The VOC analytical results reported by the laboratory will be compared to the applicable NYSDEC recommended soil cleanup objectives for commercial Site use. If the data identifies any residual source area hotspots, additional sampling may be required to delineate source area(s) to be excavated. The source material will be disposed of at an appropriate off-site disposal facility selected on the contaminant profile.

7 SOIL VAPOR EXTRACTION PILOT STUDY

The objective of soil vapor extraction (SVE) is to induce airflow into the unsaturated zone by creating a pressure gradient by withdrawing air from specifically placed wells, or vapor extraction points. The SVE gas flow enhances vaporization of VOCs dissolved in unsaturated pore water, and desorption of VOCs from the surface of soil particles. SVE system equipment includes extraction wells, piping, treatment units, vacuum blowers, moisture separator, vapor recovery system (vapor phase granular activated carbon), and electrical controls. Vapor containing contaminants is withdrawn from the unsaturated zone and passed through a vapor recovery system before being discharged to the atmosphere. The vapor recovery system reduces the moisture of the air stream and collects VOCs by passing the air stream through a granular activated carbon (GAC) medium. The spent GAC will be disposed of off-site by a licensed private firm in compliance with all rules and regulations.

SVE pilot testing will be conducted prior to the design of the soil treatment system to determine the effectiveness and the efficiency of the proposed SVE system, its optimal extraction rate, and the radius of influence (ROI). An extraction well can create varying vacuum strengths in the vadose zone. It is assumed that once an ROI is recorded, it would be typical of subsurface conditions at the Site.

If one of the on-site SVE wells remaining from the former SVE system is determined to be in good condition, it may be used for the pilot test. Otherwise, a new SVE well will be installed on the Subject Property in the rear parking area. The SVE well screen interval will be approximately 5 feet, and the screen zone and slot size will be determined based on the pre-design investigation findings. Four piezometers screened at depths consistent with the SVE test well depth will be installed at approximately 10 feet, 20 feet, 40 feet and 80 feet radial distance away from the SVE test well.

During the SVE pilot test, Walden shall record changes in soil vapor pressure (indication of vacuum effect) in the four piezometers utilizing a series of vacuum gauges. Walden shall utilize a vacuum extraction blower with fitted fresh air bypass to induce vacuum flow via the SVE well.

The SVE system shall be designed to create a barrier to capture on-site VOC vapors and prevent off-site vapor migrations. A range of air extraction flow rates will be evaluated during the SVE pilot test as determined by converting vacuum measurements recorded on a pressure gauge to scfm (flow rate) utilizing the specific pilot blower “pump curve”. The pilot study will run until subsurface vacuums recorded in all piezometers reach steady state conditions. The SVE ROI will be estimated by plotting steady state vacuum at each piezometer versus its radial distance from the SVE well. After the pilot test is completed, Walden shall submit a letter report to NYSDEC detailing the results of the pilot test.

8 SVE REMEDIAL SYSTEM DESIGN AND IMPLEMENTATION

The SVE system to be installed at the 218 Lakeville Road Site will be designed based on the SVE pilot study results. The full-scale engineering design plans and specifications will be submitted to NYSDEC/NYSDOH for review and approval upon completion of the work described in this RAWP. The plans and specifications will be sealed and certified by Joseph M. Heaney III, P.E. who is registered to practice in New York State.

8.1 SVE System Full-Scale Design

During full-scale design, the SVE extraction well parameters will be determined based on engineering design calculations, and the pre-design investigation and SVE pilot test results. The SVE pilot test extraction well's radius of influence and VOC contaminant levels measured during the pre-design investigation will be considered when determining the SVE extraction well locations, required number of SVE wells, appropriate screen intervals, slot size, and pumping rates. The SVE extraction wells will be placed near the on-site areas determined to be VOC hotspots (to be excavated during implementation to the extent possible) and along the perimeter of the Subject Property. The SVE extraction wells will be located with overlapping radii of influence to create a barrier extending beyond the Subject Property boundaries to prevent off-site migration of VOC vapors.

The SVE wells will be screened at intervals established based on the pre-design investigation soil boring analytical results. The exact construction details (i.e., location, number, screen zones and vacuum flow rates) will be established based on an evaluation of SVE pilot well performance and the Site geology/soil type/VOC concentration data gathered during the pre-design investigation. Piezometers will be installed on-site at appropriate locations determined during design to monitor subsurface pressures during SVE system operation.

Each SVE well will be connected to PVC piping to be installed by trenching to a treatment system enclosure to be located based on full-scale design. An extraction blower will be sized based on the optimum SVE flow rate determined from the pilot study results. A vacuum blower, moisture separator, flow control gauging and valves, and granular activated carbon cylinders (sized based on flow and the VOC vapor concentrations recorded during the pilot study) will be housed within the treatment enclosure. Air discharge concentrations will be adjusted to the allowable VOC discharge concentrations as defined in NYSDEC's Toxic Ambient Air Contaminants (DAR-1). It is anticipated that the new system can tie into the existing PSEG electric service drop which provided power to the former SVE system.

8.2 SVE System Installation and Operation

Walden will develop the engineering design plans and technical specifications for the full-scale SVE system. Bids will be obtained from qualified construction contractors for the system installation. Based on the bids received and a review of the contractor experience and references, a contractor will be selected to install the remediation system. Walden will perform contractor oversight to ensure that the SVE system components are installed in accordance with the design plans and specifications. The system will be started up once construction is completed. An operations, maintenance and monitoring program will be developed by Walden and implemented upon SVE system start-up to ensure that the remedial system performs effectively towards meeting the remedial action objectives.

Walden will conduct regular SVE system monitoring (weekly or bi-weekly for the first 3 months after start-up; monthly thereafter) to verify effective operations and reductions in subsurface VOC concentrations.

9 SVI SAMPLING

SVI sampling (sub-slab and indoor air) shall be performed at 218 Lakeville Road, 2 University Place, 4 University Place, and 220 Lakeville Road (this property to be monitored per the NYSDOH decision matrix recommendation as described in the SVI Summary Report) during the first heating season after the SVE system has been installed and operating for at least three months. In New York State, heating systems are generally expected to be operating routinely from November 15th to March 31st. Note that permission must be obtained to access the off-site properties for sampling. The sampling will be conducted in accordance with the procedures detailed in the *Soil Vapor Intrusion Investigation Work Plan* (Walden, December 2015) approved by NYSDEC and NYSDOH. These procedures are outlined below.

9.1 Pre-Sampling Inspection

A pre-sampling interior inspection will be performed to identify potential vapor intrusion pathways and to evaluate the sub-slab and indoor air sampling locations. To reduce the potential for interference and dilution effects of samples, the Site tenants and off-site property owners will be notified in advance of sampling to ensure that the occupants avoid the activities listed in the NYSDOH *Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York* within 24 hours prior to sampling.

9.2 SVI Sampling Locations

Sub-slab and indoor air samples will be collected concurrently inside the buildings as follows:

- 218 Lakeville Road
    - Basement beneath the former Imperial Cleaners space
    - Basement beneath Tobacco Plaza (in the unfinished area on the west side of the space)
    - Two locations beneath the basement of the former delicatessen space (this basement area is divided into two sections; samples will be collected from each section)
- 2 University Place
- 4 University Place
- 220 Lakeville Road

Two outdoor ambient air samples will be collected outside the 218 Lakeville Road building concurrently with the sub-slab and indoor air samples.

All SVI sampling will be conducted at the same time to achieve contemporaneous analytical results. The SVE remedial system will continue operating during the SVI sampling.

9.3 Sub-slab Vapor Sampling

The sub-slab sampling probes installed in February 2016 will be used if they are still intact. If necessary, new sub-slab vapor probes will be installed, at locations where the potential for ambient air infiltration from floor penetrations is minimal. The sampling probe installation procedure is as follows:

A small diameter hole (approximately one inch) will be drilled through the concrete floor slab and into sub-slab material (e.g., sand) approximately two (2) inches below the bottom of the floor slab. This will create an open cavity in the sub-slab material to prevent obstruction of probes by small pieces of gravel that may be present. Concrete and soil cuttings will be removed from the hole. Probes will be constructed as follows or by equivalent procedures in accordance with the NYSDOH SVI guidance.

<u>Permanent Probes (218 Lakeville Road)</u>
Permanent probes will be constructed from small-diameter threaded brass or stainless steel tubing and connectors/fittings installed to no greater than two (2) inches into the sub-slab material. The top of the probe will be finished with a recessed brass plug flush with the surface of the concrete slab. Porous, inert backfill material (e.g., glass beads, washed #1 crushed stone, etc.) will be added to cover approximately one (1) inch of the probe tip, and the implant will be sealed to the surface with cement. For sampling purposes, a threaded fitting connected to tubing (Teflon-lined or other inert material) will be inserted into the sampling port for connection to a Summa® canister.

<u>Temporary Probes (2 University Place, 4 University Place, 220 Lakeville Road)</u>
Temporary probes will be constructed from inert tubing (e.g. polyethylene, stainless steel, nylon, Teflon®, etc.). The implant will be sealed to the surface with non-VOC containing and non-shrinking products (e.g., permagum grout, melted beeswax, putty, etc.). All other installation specifics are the same as described for permanent probes.

9.4 Indoor Air Sampling

Indoor air samples will be collected concurrently with the sub-slab vapor samples, at approximately the same location as the sub-slab vapor samples to represent the lowest level occupied space. The indoor air samples will be collected at a height approximately three (3) feet above the floor to represent the height at which occupants normally are seated, in accordance with the NYSDOH SVI guidance.

9.5 Ambient Air Sampling

Two outdoor air samples will be collected outside the building at 218 Lakeville Road concurrently with the sub-slab and indoor air samples to obtain a sample representative of ambient (background) conditions. One sample will be collected upwind of the building and one downwind. Outdoor sample locations will be selected in the field dependent upon the wind direction observed at the time of sampling, away from wind obstructions (e.g., trees or bushes), at a height of approximately three (3) to five (5) feet above the ground to represent breathing zones. The sampling locations will be sited away from potential sources of volatile organic compounds (VOCs), such as automobiles, lawn mowers, oil storage tanks, gasoline stations, industrial facilities, and away from structures such as building HVAC outdoor air intakes, etc., in order to obtain representative samples.

9.6 Air Sampling Procedures

A laboratory provided and individually certified clean 6-liter Summa® canister will be placed adjacent to each sub-slab sampling port or at each indoor/outdoor air sampling location. Where a sub-slab vapor sample is being collected, a tee fitting will be utilized to connect the Summa® canister tubing (Teflon-lined or other inert material) to the sampling port tubing, and the third leg of the tee will be connected to a purge pump. Additionally, the weather conditions will be noted at the time of sampling (wind speed and direction, precipitation, outdoor temperature, barometric pressure, etc.).

Prior to and immediately after sampling at each point, a pressure gauge will be used to check each Summa® canister for vacuum, and the pressure will be recorded. In the case of sub-slab vapor sampling, the ground surface will be sealed in advance to prevent ambient air infiltration during purging and sample collection, and tracer gas such as helium, will be used. A regulator will be used to keep flow rates during purging and sampling below 0.2 liters per minute to minimize outdoor air infiltration during sampling.

The volume of air in each of the vapor/air sampling points (volume of sampling probe and/or tube depending on sample being secured) will be calculated, and a minimum of one to three volumes will be purged at a flow rate of 0.2 liters (or 200 mls) per minute immediately prior to sample collection. The soil gas/air samples will then be collected by opening the valve of the Summa® canister to draw air through the regulator to collect the sample at a rate of 0.2 liters per minute for the length of time specified above. All sub-slab vapor, indoor air and ambient air samples will be collected over a 24-hour period.

After the sampling is completed, the Summa® canister valve will be closed, and the pressure gauge will again be read, and the vacuum will be recorded.

9.7 Sample Analysis and Handling

The collected samples will be containerized in laboratory provided, individually certified clean Summa® canisters or laboratory provided single-use sampling glassware, as applicable. The sample containers will be labeled with the Site name, the Walden job number, sample location and identification, date, time, sampler's initials, and the parameter(s) for analysis. Samples will be transported to the laboratory in such a manner as to avoid container breakage during transportation and to minimize the possibility of cross-contamination. The samples will be picked up by the analytical laboratory or delivered via an overnight courier under the appropriate Chain-of-Custody protocol.

All samples will be submitted to a NYSDOH ELAP certified laboratory for VOC analysis by USEPA Method TO-15 with Category B deliverables. The analytical laboratory will achieve a minimum detection limit of 1.0 $\mu g/m^3$ for all VOCs in sub-slab soil vapor samples. For the indoor and outdoor air samples, the analytical laboratory will achieve a minimum detection limit of 0.25 $\mu g/m^3$ for trichloroethene (TCE) and 1.0 $\mu g/m^3$ for all other VOCs in the USEPA Method TO-15 analysis. Additional QA/QC details are described in the QAPP.

9.8 Summary Report

The laboratory analytical reports will be evaluated and compared to the NYSDOH SVI decision matrices. A summary report will be prepared and submitted to NYSDEC and NYSDOH for review.

If the SVI results indicate no indoor air quality impacts/no mitigation per the NYSDOH SVI decision matrices, the report shall recommend continuing to operate the SVE system and repeating SVI sampling annually until the SVE system monitoring results indicate VOC concentrations in soil vapor reach asymptotic levels, at which time approval to shut down the SVE system would be requested from NYSDEC and NYSDOH.

If the NYSDOH SVI decision matrix evaluation of the SVI sampling results indicates potential indoor air quality impacts, the report shall evaluate the need for additional action as appropriate.

10 REMEDIAL ALTERNATIVES IMPLEMENTATION PLANS

All proposed work will be conducted on the Subject Property; none of the work will be conducted off-site other than the SVI sampling during the heating seasons as described in Section 9. Prior to any on-site work, Walden will coordinate a private utility mark out to locate all existing utilities and buried structures to ensure they do not interfere with any portion of the pre-design investigation, SVE pilot study, of full-scale SVE system installation work.

All work associated with implementing the remedial alternative will be performed in accordance with the Health and Safety Plan (HASP), Quality Assurance Project Plan (QAPP) and Community Air Monitoring Plan (CAMP) presented in Appendices A, B and C, respectively.

Walden will be responsible for its own health and safety program; all subcontractor(s) will be required to work under acknowledgement of the Site-specific HASP or under their own HASP approved by Walden prior to commencement of the work. All Site-related work tasks will be conducted in personnel protective equipment (PPE) Level D as appropriate for the tasks to be completed.

Walden will conduct real time air monitoring during field activities to protect Site workers and the public from airborne hazards. The primary airborne hazard associated with Site work would be volatilization of PCE, TCE, and cis-1,2-DCE from contaminated media. The primary instrument utilized for this task will be a photo ionization detector (PID). The PID air monitoring will be continuous during all field activities that are ground-intrusive. If PID readings are 0.5 ppm or greater above background in the breathing zone for a period of one minute, and the source of the reading is unknown, PPE will be upgraded to Level C. The work will be halted if PID readings exceed 5 ppm above background in the breathing zone for thirty continuous seconds per the HASP and CAMP. If this were to occur, the source would be evaluated and the HASP would be reviewed.

11 SCHEDULE

Upon NYSDEC/NYSDOH approval of this RAWP, Walden will proceed with scheduling the first phase of the work (the pre-design investigation). NYSDEC will be provided at least ten days' written notice prior to the start of any pre-design sampling, SVE pilot study, or full-scale SVE system installation activities as described herein.

When preparing for the SVI sampling, the off-site property owners (2 University Place, 4 University Place and 220 Lakeville Road) will be contacted to obtain the access needed for sampling. The field work will be scheduled to be completed during the heating season, between November 15th and March 31st.

It is anticipated that full-scale SVE system installation will begin upon NYSDEC approval of the engineering plans and specifications, and subsequent contractor bidding. The 218 Lakeville Road SVE system will operate until the remedial action objectives are achieved, or monitoring data indicates that the system has reduced concentrations to the maximum extent possible.

The following table outlines the tentative work phasing and time of completion:

TASK	APPROXIMATE COMPLETION TIME
RAWP Approval by NYSDEC & BCP Application Acceptance; Finalization of BCP Conditions and Public Comment	To be Determined
Pre-Design Investigation Field Work, Data Evaluation and Reporting	Estimated 6 Weeks
SVE Pilot Study Implementation, Data Evaluation and Reporting	Estimated 8 Weeks
Full-Scale SVE System Design, Plans and Specifications	Estimated 12 Weeks
SVE System Construction	Estimated 8 Weeks
Issuance of Engineering Certificate/Development of O&M Plan/SVE System Startup	Estimated 6 Weeks

The above schedule depends on NYSDEC/NYSDOH review periods and does not take into account work delays related to on-site tenant and off-site property owner approvals.

12 SITE MANAGEMENT PLAN AND ENVIRONMENTAL EASEMENT

Upon completion of the remedial activities described in this RAWP, a Final Engineering Report will be prepared documenting the remedial actions performed at the Site per work plans approved by NYSDEC and NYSDOH. In addition, a Site Management Plan will be developed describing how any contamination remaining at the Site will be managed, and establishing any engineering controls to be implemented consistent with the proposed Site use. If institutional controls are required to restrict or prohibit certain uses or future development of the Site (based on the Site conditions), environmental easement(s) will be prepared and executed in accordance with the procedures established by NYSDEC.

Reports documenting the completion of all work described in this RAWP will be submitted to NYSDEC for approval as required to receive a Certificate of Completion (COC) indicating that the remedial action objectives for the BCP Site have been achieved.

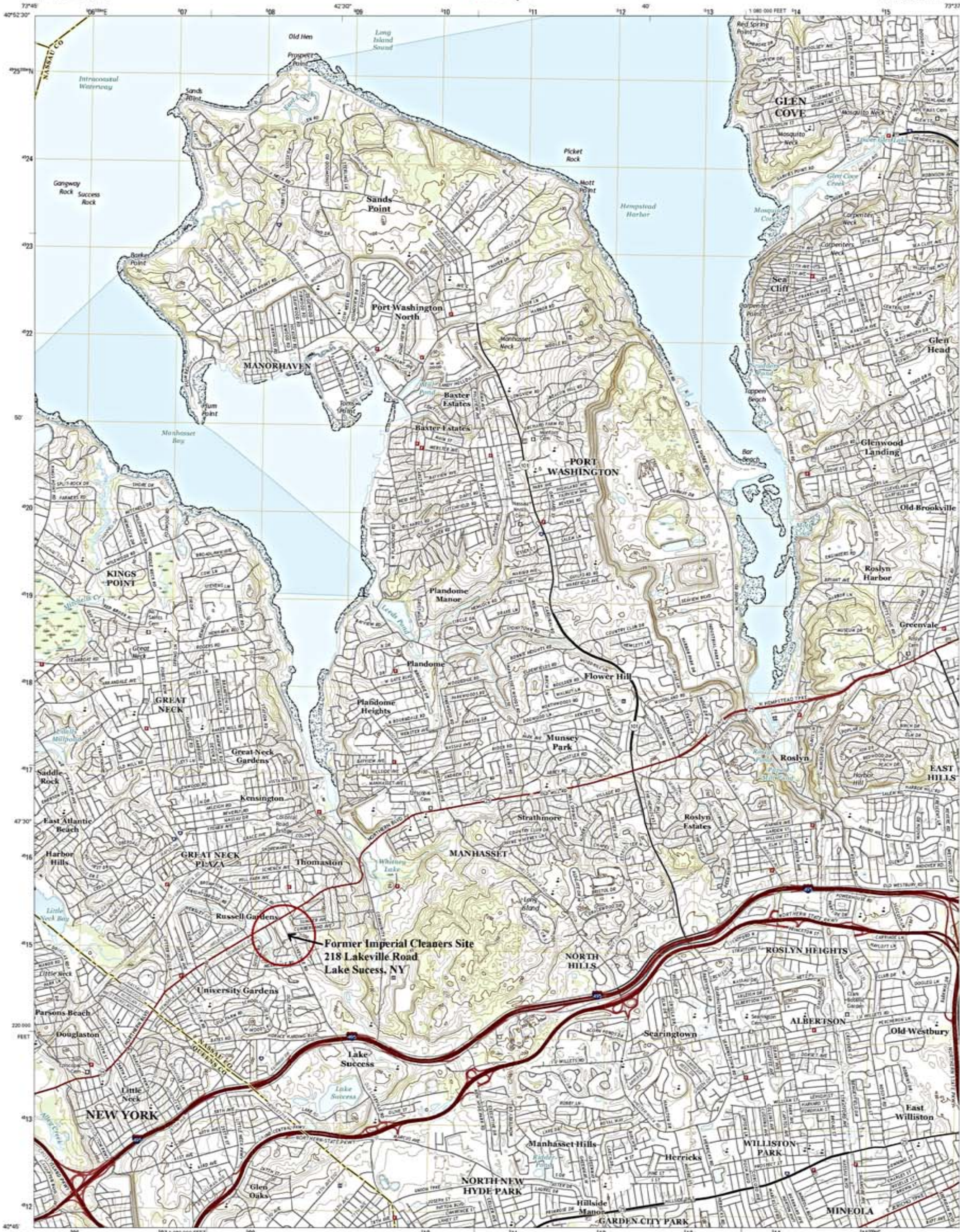
FIGURES

USGS
science for a changing world

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

The National Map
US Topo

SEA CLIFF QUADRANGLE
NEW YORK
7.5-MINUTE SERIES



Produced by the United States Geological Survey

North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and 1 000-meter grid: Universal Transverse Mercator, Zone 18T
10 000-foot ticks: New York Coordinate System of 1983 (long island and east zones)

This map is not a legal document. Boundaries may be generalized for this map scale. Private lands within government reservations may not be shown. Obtain permission before entering private lands.

Imagery.....NAIP, June 2013
Roads.....U.S. Census Bureau, 2015 - 2016
Names.....GNIS, 2016
Hydrography.....National Hydrography Dataset, 2013
Contours.....National Elevation Dataset, 2015
Boundaries.....Multiple sources; see metadata file 1972 - 2016

Wetlands.....FWS National Wetlands Inventory 1977 - 2014

UTM GRID AND 2016 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

U.S. National Grid
100,000-m Square ID
XL
Grid Zone Designation
18T

SCALE 1:24 000

CONTOUR INTERVAL 10 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with the National Geospatial Program US Topo Product Standard, 2011.
A metadata file associated with this product is draft version 0.6.19

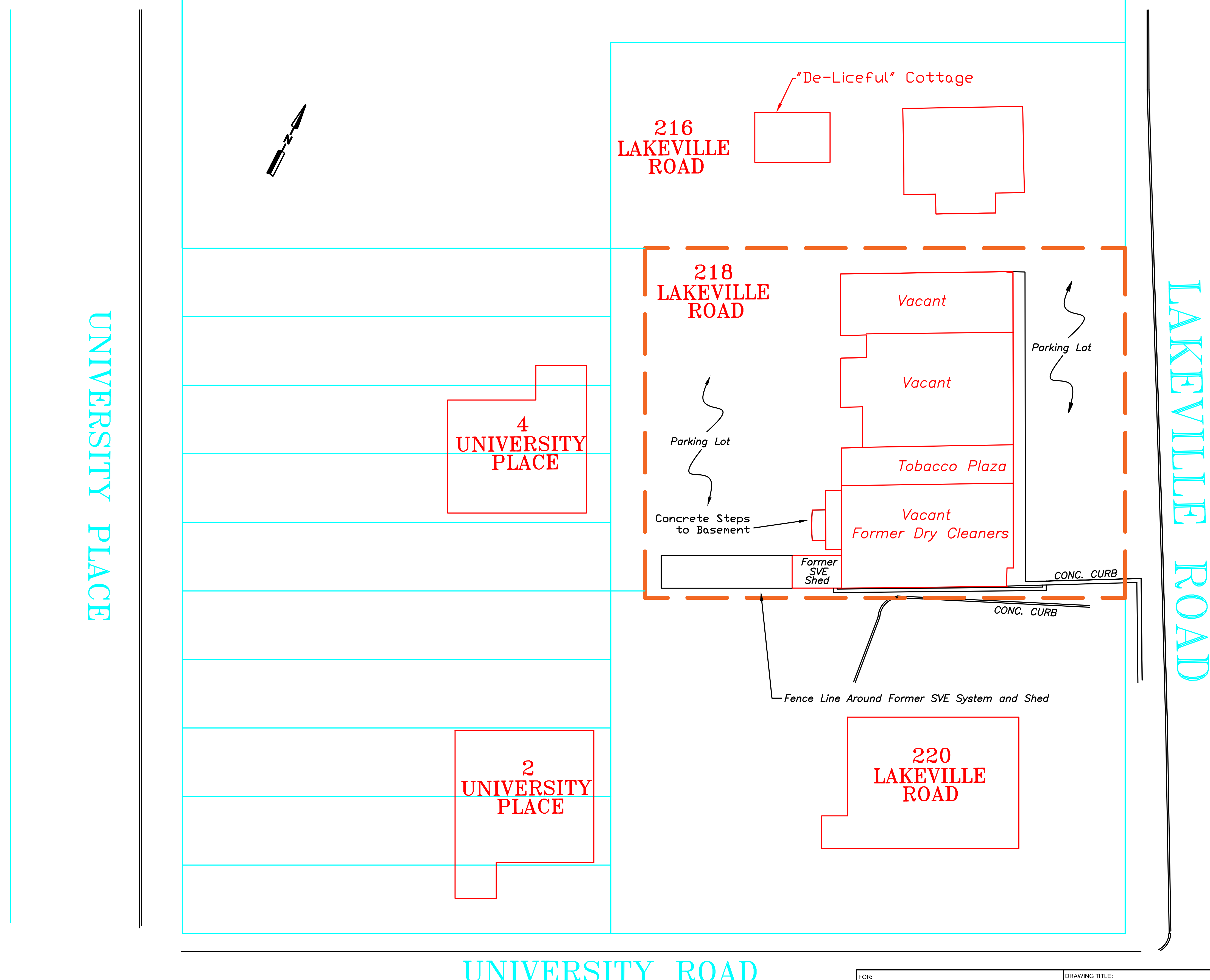
QUADRANGLE LOCATION

ADJOINING QUADRANGLES
1 Mount Vernon
2 Mamaroneck
3 Bayville
4 Flushing
5 Hicksville
6 Jamaica
7 Lynbrook
8 Freeport

ROAD CLASSIFICATION
Expressway
Secondary Hwy
Ramp
Local Connector
Local Road
4WD
Interstate Route
US Route
State Route

SEA CLIFF, NY
2016

NSN. NGA REF NO. USGSX24K71545



LEGEND

- PROPERTY LINE OF PROPOSED BROWNFIELD SITE
- PROPERTY LINE

0' 15' 30' 45' 60'

SCALE: 1" = 30'

NOTES

1. Site base map was derived from a property survey prepared by Welsh Engineering & Land Surveying, P.C., 343 Manville Road, Pleasantville, NY 10570, revised on 7/14/00.

2. The Welsh Enineegering north area was corrected based on 1999 Nassau County GIS basemap.

Walden Associates

Walden Environmental Engineering, PLLC
16 Spring Street
Oyster Bay, New York 11771
P: (516) 624-7200 F: (516) 624-3219
www.waldenenvironmental.com

FOR:
NYSDEC
625 Broadway, 11th Floor,
Albany, New York 12233

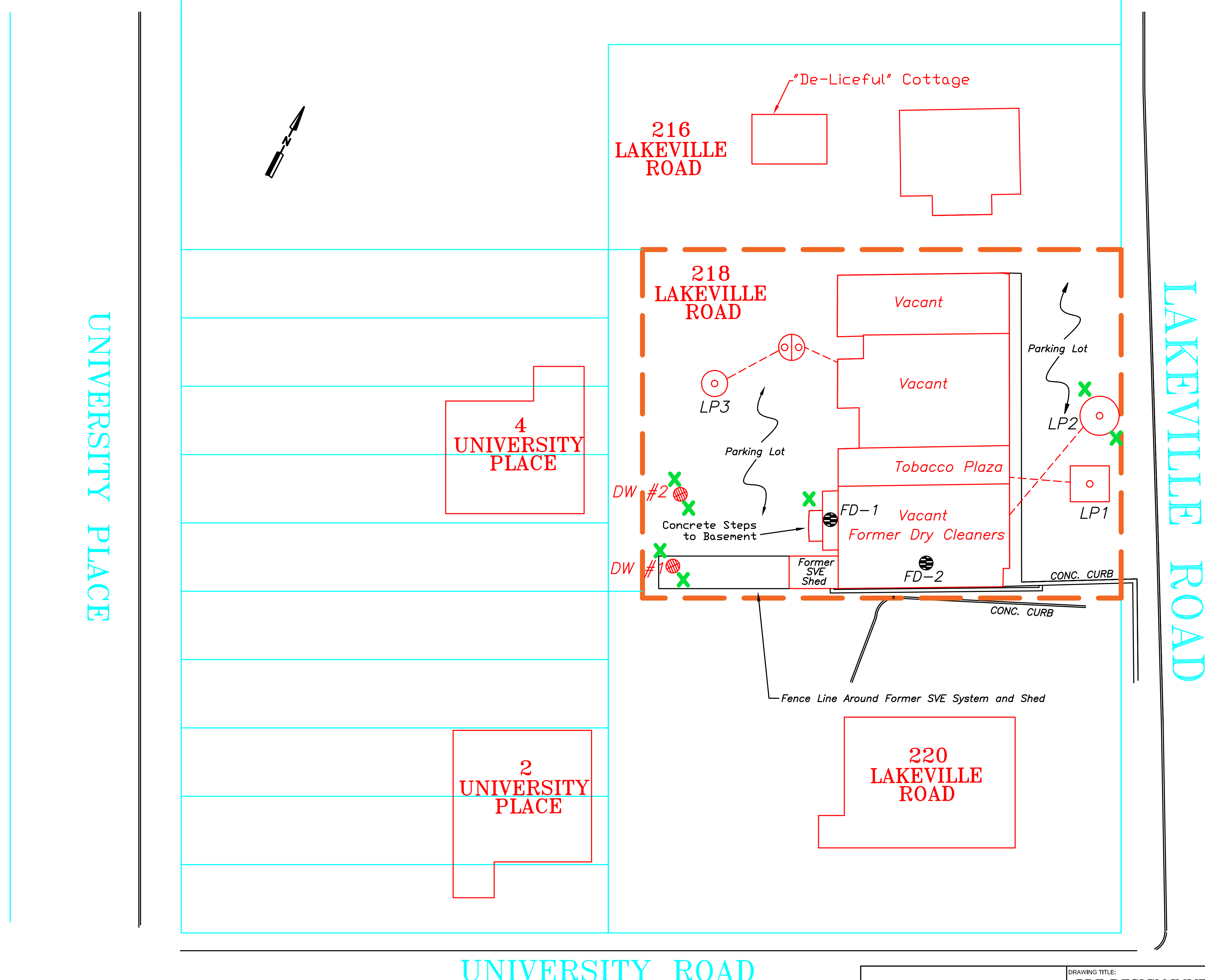
DRAWING TITLE:
SITE PLAN
218 LAKEVILLE ROAD,
LAKE SUCCESS, NEW YORK

DRAWING NO: 1

JOB NO: IMPL0115.5

DATE: June 27, 2017

CAD FILE NAME: Z:\IMPL0115 (Imperial Cleaners)\IMPL0115.5 BCP Application\Brownfield Application\Sample Exceedances.dwg



LEGEND

- PROPERTY LINE OF PROPOSED BROWNFIELD SITE
- PROPERTY LINE
- DW #1 — STORMWATER DRYWELL
- LP — LEACHING POOL
- FD-1 — FLOOR DRAIN
- PROPOSED SOIL BORING LOCATION
- APPROXIMATE SANITARY SYSTEM PIPING CONNECTION

0' 15' 30' 45' 60'

SCALE: 1" = 30'

NOTES

1. Site base map was derived from a property survey prepared by Welsh Engineering & Land Surveying, P.C., 343 Manville Road, Pleasantville, NY 10570, revised on 7/14/00.

2. The Welsh Enineegring north area was corrected based on 1999 Nassau County GIS basemap.

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Walden Associates

PROPOSED PRE-DESIGN INVESTIGATION
SOIL BORING LOCATIONS

DRAWING TITLE:
PRE-DESIGN INVESTIGATION
218 LAKEVILLE ROAD,
LAKE SUCCESS, NEW YORK

DRAWING NO: 1

JOB NO: IMPL0115.5 | DATE: June 28, 2017

CAD FILE NAME: Z:\IMPL0115 (Imperial Cleaners)\IMPL0115.5 BCP Application\Brownfield Application\Sample Exceedances.dwg

APPENDICES

APPENDIX A
Health and Safety Plan (HASP)

HEALTH AND SAFETY PLAN

FOR

Former Imperial Cleaners Site
218 Lakeville Road
Lake Success, New York 11020

June 2017

Walden Environmental Engineering, PLLC
16 Spring Street
Oyster Bay, New York 11771
Phone: (516) 624-7200
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Walden Associates

Table of Contents

Appendices

1.0 Statement of Commitment to Worker Health and Safety

Walden Environmental Engineering, PLLC (Walden) employees may be exposed to risks from site-related hazardous conditions while performing field activities at the Former Imperial Cleaners Site located at 218 Lakeville Road, Lake Success, NY. Walden's policy is to minimize the possibility of work-related injury through aware and qualified supervision, health and safety training, medical monitoring and the use of appropriate Personal Protective Equipment (PPE). Walden has established a guidance program to implement this corporate policy in a manner that protects personnel to the maximum reasonable extent.

This site-specific Health and Safety Plan (HASP) applies to all Walden personnel, owners' representatives, subcontractors, and the New York State Department of Environmental Conservation (NYSDEC) personnel and/or its representatives on the job site where operations involve actual or potential physical and chemical hazards that have been identified by Walden or others. This HASP is also intended to inform and guide all personnel (Walden employees and/or owner representatives and/or NYSDEC representatives and/or subcontractors) entering the exclusion zone, ensuring that each person sign and acknowledge the site hazards on the acknowledgement form provided in Appendix I. Walden and/or the owner's subcontractors are retained as independent contractors and, as such, are responsible for ensuring the safety of their employees.

Walden may require that on-site personnel take certain precautions in accordance with this HASP, and Walden may request that others protect their personnel in a manner that they deem necessary or sufficient.

2.0 General

2.1 Site Information

Owner Name: 218 Lakeville Aquistion LLC
Location: 218 Lakeville Road, Lake Success, New York
Walden Job #: IMPL0115

2.2 Project Personnel

Primary Consultant: Walden Environmental Engineering, PLLC
16 Spring Street, Oyster Bay, New York
(516) 624-7200 (phone)
(516) 624-3219 (fax)
On-Site Safety Coordinator: Jessica Bluth
On-Site Health and Safety Officer: Jessica Bluth

2.3 Project Description

The Former Imperial Cleaners site is located at 218 Lakeville Road, immediately south of Northern Boulevard (New York State Route 25A) and west of Lakeville Road in Lake Success, New York (Figure 1). The one-story commercial building on-site has one active tenant (Tobacco Plaza) and three vacant tenant spaces. A release of tetrachloroethylene (PCE) at the 218 Lakeville Road Site was first noted in 1995. A site investigation followed to identify source areas and determine the extent of contaminated soil and groundwater at the Site (note that there is a perched water table underlying the site at approximately 30 feet below grade). Contaminated sediments were removed from the source areas (dry wells and leaching pools) to the extent possible without undermining the structures. Post-excavation soil sampling results indicated that volatile organic compounds (VOCs) remained in the subsurface following the source area removal actions. A soil vapor extraction (SVE) system was installed to remove VOC vapors remaining in the soil and improve soil and groundwater quality. A soil, soil gas, groundwater and indoor air monitoring program was implemented to track the reductions in VOC concentrations achieved by operation of the SVE system. The SVE system was shut down several years ago when on-site soil sampling results indicated that the SVE system had successfully reduced soil contaminant concentrations to below the NYSDEC TAGM 4046 Recommended Cleanup Objectives. All of this site investigation and remediation work was conducted by the previous owners of the Site as required by NYSDEC and NYSDOH under the Voluntary Cleanup Program (VCP).

Sub-slab vapor sampling and indoor/outdoor air sampling was performed under the VCP. Walden was retained by 218 Lakeville Acquisition LLC to perform this work in accordance with NYSDEC and NYSDOH requirements.

Further on-site soil sampling for VOC sampling and geological characterization shall be performed by Walden in accordance with NYSDEC and NYSDOH requirements. In addition, a SVE pilot test will be conducted, and an SVE remedial system will be installed and operated on-site. Sub-slab vapor and indoor/outdoor air sampling will be performed to evaluate soil vapor intrusion and indoor air quality impacts.

2.4 Training

All site-related workers entering the exclusion zone must be trained in accordance with 29 CFR 1910.120 E3 and E4, and all others must have at least 29 CFR 1910.120 E3.

Documentation of Walden personnel training is maintained on files and each Walden employee will have copies of his/her applicable 40-Hour OSHA Training, 8-Hour Refresher and Supervision Training Certificates on-site (maintained by the job health and safety officer or designee).

Each subcontractor working on the job must provide the site safety officer with training documentation for its personnel.

2.5 Affidavit

All Walden personnel and subcontractors who enter site-related exclusion zones must sign the attached Safety Plan Acknowledgment form (**Appendix I**). Walden personnel and site-related subcontractors must also read and comply with Walden's generic HASP.

2.6 Alternative Work Practices

Underground utilities must be identified before commencing any subsurface work. Blowers may be employed to reduce and disperse any releases of toxic gases. If items proposed within the work plan are modified based on changes in field conditions, they would be evaluated and an addendum would be prepared to cover these alternative work practices.

3.0 <u>Hazardous Substances</u>

Hazardous substances are defined as the suspected or known hazardous substances stored, within any media (contaminated), etc.

In soil and sub-slab soil vapor: The Volatile Organic Compounds (VOCs) Tetrachloroethylene (PCE), Trichloroethylene (TCE) and cis-1,2 Dichloroethylene have been identified in soil and sub-slab soil vapor at the Site.

3.1 Hazard Assessment

Defined as toxic effects, including Threshold Limit Values (TLVs), Immediately Dangerous to Life or Health's (IDLHs), reactivity, stability, flammability and operational hazards with sampling, decontaminating, etc.

The major route of exposure to potential contaminants will be respiratory; however, dermal exposure may also be possible. Inhalation of vapors and contaminated dusts would provide the mechanism for respiratory exposure. Skin contact with soils and groundwater would result in dermal exposure. PCE is the compound of highest concern. The program will use engineering controls and Personal Protective Equipment (PPE) to reduce the amount of potential exposure. Continuous air monitoring and personal protection devices will serve to prevent exposure to chemicals.

All field personnel, except for the equipment operator, must remain away from the equipment while work is taking place. All field personnel, including the operator, must wear steel-toe boots. All persons unrelated to the project must remain outside the exclusion zone while work is taking place. If persons other than Walden personnel or associated contractors have business in the exclusion area, they must remain at a safe distance away from Walden personnel during slab drilling activities and as determined by the site health and safety officer.

During typical work activities, surfaces can be expected to become uneven and slippery, causing unsure footing and requiring additional care by personnel engaged in operations. Additional site hazards are presented by the possibility of airborne and waterborne transport of hazardous materials and the presence of contaminated materials and equipment. Other site hazards include those that exist on all sites where construction type operations take place, e.g., dangers from falling equipment, cuts, abrasions, and contusions.

4.0 Site Work Zones

Site work zones are defined as the designated exclusion zone, contaminant reduction zone and support zone. These work zones will be determined based on the degree of danger present. To the extent possible, the support and contaminant reduction zones will be established outside of the exclusion zone.

4.1 Support Zone

The support zone will be located outside of the exclusion zone. Personnel allowed in this area include all site personnel, visitors and representatives of regulatory agencies and observers. No particular training or PPE equipment are needed in the support zone/clean area.

4.2 Contaminant Reduction Zone

The contaminant reduction zone will be located between the support zone and the designated exclusion zone. In this area authorized personnel will don protective equipment, as needed in the exclusion zone. When exiting the contaminant reduction zone, personnel will remove contaminated PPE.

4.3 Exclusion Zone

The exclusion zone is in the immediate work area and that adjacent area as defined by the safety coordinator. Attempts will be made so that equipment and site activities taking place in the exclusion zone are situated so that personnel are upwind of sources. Fans or blowers will be used, if necessary, to disperse gases released during site-related activities.

4.4 Task Specific Level of Protection

See Table 1 for levels of personal protective equipment (PPE) requirements.

4.5 Communications

In the event that Level C respiratory protection is used, hand signals will be developed for communication. At this point, all proposed site-related work would be conducted in Level D PPE.

TABLE 1

PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS

LOCATION	LEVEL OF PROTECTION/TASKS	DESCRIPTION
Support Zone	D	Steel toe boots and work clothes
Exclusion Zone and Contamination Reduction Zone	To be determined by the site safety officer based on contamination present	
	D (modified)	Steel toe boots, nitrile or latex gloves, hard hat, safety glasses
	C	Full face respirator fitted with organic vapor cartridge and Level D

5.0 Site Access

In the event of an emergency, the project personnel and subcontractors should assemble at the predetermined assembly area, designated by the site safety officer.

The predetermined assembly area for this site or task is the southwestern corner of the parking lot behind 218 Lakeville Road. The project manager or on-site health and safety officer may relocate this area, if necessary.

6.0 Monitoring Procedures

Monitoring will be conducted at the Site to identify contaminants and contaminant concentrations in all media as follows:

Direct reading instruments will be used in active work areas in order to enable rapid field decisions regarding levels of respiratory protection, as well as indicate the need for increased monitoring frequency at the edge of the exclusion zone.

A Photo Ionization Detector (PID), which will be calibrated daily and adjusted to give maximum sensitivity to the contaminants of concern, will be used to monitor the air on a continuous basis while soil vapor and air sampling activities are performed.

6.1 Task Specific Air Monitoring Action Levels

See Table 2 for air monitoring action levels.

TABLE 2

AIR MONITORING ACTION LEVELS

INSTRUMENT	HAZARD MONITORED	INSTRUMENT READING	ACTION REQUIRED
PID	Organic Vapors	5 ppm or greater above background in the breathing zone for 1 minute and the source of the reading is unknown.	PPE will be upgraded to Level C.

7.0 Decontamination and Disposal

Decontamination procedures apply to all contaminated personnel, surfaces, materials, instruments, equipment, etc. PPE will be removed prior to removing any respiratory protection. All personnel will thoroughly wash their hands and face before leaving the site. Subsurface tools will be steam-cleaned or washed with Alconox detergent and water, then followed by a deionized water rinse and/or air-drying.

Disposal procedures also apply to all contaminated equipment, supplies, disposable items and wash water. Any PPE will be bagged and contained in a drum designated for PPE disposal. All decontamination water and materials will also be drummed and disposed of off-site.

8.0 Emergency Procedures

Free and clear egress from the work areas shall be provided. Preparatory meetings will be held to ensure that procedures for reporting and responding to emergency incidents are compatible with emergency response of local, state, and federal agencies. The emergency response plan will be rehearsed prior to start-up of site activities.

8.1 Personnel Exposure

In event of personnel exposure (skin contact, inhalation, ingestion, specific procedures for specific chemicals):

- Skin Contact: Wash with soap and water.
- Inhalation: Remove to fresh air, monitor for ABCs (Airway, Breathing and Circulation).
- Ingestion: Call Poison Control Center and monitor ABCs.
- Eye Exposure: Repeated eye flush, monitor ABCs and transport to hospital.

8.2 Personnel Injury

In the event of personnel injury:

Check ABCs (Airway, Breathing and Circulation). Perform first aid, if required. Contact local ambulance if professional help is needed.

8.3 Potential or Actual Fire or Explosion

In event of potential or actual fire or explosion:

If a fire or explosion occurs leave the site and contact the appropriate emergency team (i.e. fire or police).

8.4 Environmental Accident

In event of environmental accident (spread of contamination outside site):

Stop spread of chemical as best as possible and notify Walden, NYSDEC, associated contractors and Nassau County Health Department at first opportunity.

8.5 Emergency Services

Emergency Medical Facility:	North Shore University Hospital
Location:	300 Community Drive Manhasset, NY 11030
Telephone:	(516) 562-0100

Directions to hospital from site (Refer to Appendix V): Make left onto Lakeville Road and head north to Northern Boulevard (Route 25A). Make right onto Northern Boulevard heading east. Take Northern Boulevard 0.7 miles and turn right onto Community Drive heading south. Continue 0.3 miles on Community Drive and arrive at North Shore University Hospital (300 Community Drive, Manhasset, NY).

Ambulance Service:	911
Fire Department:	911
Police Department:	911
North Shore University Hospital (Non-emergency):	(516) 562-0100
National Response Center:	(800) 424-8802
Poison Control Center:	(516) 542-2323
NYSDEC Spills Hotline:	(800) 457-7362

APPENDICES

Appendix I: Site Safety Plan Acknowledgement Form

I have read and understand the procedures set forth in this Health and Safety Plan for the the Former Imperial Cleaners Site, 218 Lakeville Road, Lake Success, NY.

Printed Name	Signature	Representing	Date

Appendix II: Heat Stress

Heart rate (HR) should be monitored by the radial pulse for 30 seconds as soon as possible in the resting period. If at the beginning of the rest period a worker's radial pulse is measured and his heart rate exceeds 100 beats per minute, the worker's next work period should be reduced by 33%. Therefore, if the original work period was one hour, the following work cycle should be reduced to 40 minutes.

Heat Stroke is a true medical emergency. First aid should be directed toward immediate measures to cool the body quickly, as well as seeing that the victim receives medical attention as soon as possible.

Prior to medical treatment, remove as much clothing as possible and proceed to cool the victim's body, taking care not to overchill the victim once his temperature falls below 102^0F. One of the following cooling measures should be taken:

a) Sponge the bare skin with cool water;
b) Apply cold packs continuously;
c) Wrap the victim in a sheet soaked with water;
d) Immerse the victim in a tub of cold water, while closely monitoring the victim's level of consciousness.

Prior to site activity, the Site Safety Officer may make arrangements for heat stress monitoring (i.e., monitoring heart rate, body temperature and body water loss) during actual site work if conditions warrant these measures. In addition, the Site Safety Officer would want to ensure that the team members have been acclimatized to the particular environmental conditions and that personnel are aware of the signs and symptoms of heat sickness and have been adequately trained in first aid procedures. As Site Safety Officer, one should also make sure that sufficient personnel are on-site, so as to rotate work assignments, schedule work during hours of reduced temperatures, and ensure personnel do not consume alcoholic or caffeinated beverages but rather drink moderate levels of an electrolyte solution and eat well prior to commencing site work.

Workers may experience a condition of heat rash. Allow workers to rest and relieve the itching associated with heat rash rather than return to work too soon. Itching workers may not follow stringent decon procedures or scratch where it itches on-site and risk cross contamination.

Keeping the skin clean and dry will reduce the incidence of heat rash. This can be accomplished by wearing cotton garments (or other materials that absorb perspiration) underneath protective clothing. Upon removing the protective clothing, the worker should wash and dry his skin thoroughly.

The sense of thirst is not an adequate regulator of water replacement during heat exposure. Therefore, as a general rule, the amount of water administered should replace the amount of water lost, and it should be administered at regular intervals throughout the day. For every ½ pound of water loss, 8 ounces of water should be ingested. Water should be replaced by drinking 2 to 4 ounce servings during every rest period. A recommended alternative to water is an electrolyte drink diluted 50/50 with water.

Although there is no specific test given during a baseline physical that would identify a person's intolerance to heat, there are physical factors and personal habits which may indicate possible intolerance to heat, such as whether or not an individual smokes, one's dietary habits, body weight, as well as predisposing physical conditions such as high blood pressure, heart conditions, diabetes, or one's medication, that may influence an individual's ability to tolerate excessive heat.

Heat cramps are caused by profuse perspiration with inadequate fluid intake and salt replacement. Heat cramps most often afflict people in good physical condition who overwork in conditions of high temperature and humidity. Heat cramps usually come on suddenly during vigorous activity. Untreated, heat cramps may progress directly to heat exhaustion or heat stroke. First aid treatment: remove victim to a cool place and give sips of salted water (1 teaspoon of salt to 1 quart of water) - 4 ounces every 15 minutes over a period of one hour. A commercial preparation, e.g., Gatorade, may be used if diluted 50/50 with water.

Salted water or solution should mitigate the cramps. Manual pressure should not be applied to the cramped muscles.

Required Frequency of Heat Stress Monitoring for workers in Impermeable Clothing

Adjusted [(2)] Temperature (^{0}F)	**Work Time Allowed Before Monitoring Break (min.)**
90 or above	15
87.5-90	30
82.5-87.5	60
77.5-82.5	90
72.5-77.5	120

(1) Adapted from Eastern Research Group and National Institute for Occupational Safety and Health, Occupational Safety and Health Guidance Manual for Super Activities. September 26, 1984, pp. 8-75.

(2) Calculate the adjusted air temperature (Ta adj) by using this equation:

$$\text{Ta adj } ^0\text{F} = \text{Ta } ^0\text{F} + (13 \text{ x } \% \text{ sunshine})$$

Measure air temperature (Ta) with a standard thermometer, with the bulb shielded from radiant heat. Then estimate percent sunshine (100 percent sunshine = no cloud cover and a sharp, distinct shadow; 0 percent sunshine = no shadows).

Heat Stress Signs and Symptoms

Heat Stress Indicator	**When to Measure**	**If Exceeds . . .**	**Action**
Heart rate (pulse)	Beginning of rest period	110 beats per minute	Shorten next work period by 33%
Oral temperature	Beginning of rest period	99^{0}F (after thermometer is under tongue for 3 minutes) or	Shorten next work period by 33%
		100.6 ^{0}F or greater	Prohibit work in impermeable clothing and shorten next work period by 33%
Body weight	1. Before workday begins (a.m.) 2. After workday ends (p.m.)	Decreases more than 5%	Increase fluid intake

Appendix III: Cold Stress (Hypothermia)

Cold stress is a function of cold, wetness and wind. A worker's susceptibility to cold stress can vary according to his/her physical fitness, degree of acclimatization to cold weather, age and diet.

Prevention

Institute the following steps to prevent overexposure of workers to cold:

1. Maintain body core temperature at 96.8^{0}F or above by encouraging workers to drink warm liquids during breaks (preferably not coffee) and wear several layers of clothing. Wool is recommended since it can keep the body warm even when the wool is wet.
2. Avoid frostbite by adequately covering hands, feet, and other extremities. Clothing such as insulated gloves or mittens, earmuffs, and hat liners should be worn. To prevent contact frostbite (from touching metal and cold surfaces below 20^{0}F) workers should wear anti-contact gloves. Tool handles and control bars should be covered with insulating material.
3. Adjust work schedules if necessary, providing adequate rest periods. When feasible, rotate personnel and perform work during the warmer hours of the day.
4. Provide a heated enclosure for workers close to their work area. Workers should remove their outer layer(s) of clothing while in the shelter to allow sweat to evaporate.
5. In the event that wind barriers are constructed around an intrusive operation (such as drilling), the enclosure must be properly vented to prevent the build-up of toxic or explosive gases or vapors. Care must be taken to keep any heat source away from flammable substances.
6. Using a wind chill chart such as the one attached, obtain the equivalent chill temperature (ECT) based on actual wind speed and temperature. Refer to the ECT when setting up work warm-up schedules, planning appropriate clothing, etc. Workers should use warming shelters at regular intervals at or below an ECT or 20^{0}F. For exposed skin, continuous exposure should not be permitted at or below an ECT of -35 ^{0}F.

7. Workers who become immersed in water or whose clothing becomes wet (from perspiration, rain, etc.) must immediately be provided a change of dry clothing whenever the air temperature is 25.6^{0}F or below.
8. Maintain an optimal level of worker fitness by encouraging regular exercise, proper diet, etc. If possible, acclimatize workers to site conditions for several days before work begins.

Monitoring

Personnel should be aware of the symptoms of cold stress. If the following symptoms of systemic hypothermia are noticed in any worker, he/she should immediately go the warm shelter:

- Heavy, uncontrollable shivering;
- Excessive fatigue or drowsiness;
- Loss of coordination;
- Difficulty in speaking;
- Frostbite (see below).

Frostbite is the generic term for local injury resulting from cold. The stages of frostbite and their symptoms are as follows:

- Frostbite or incipient frostbite: sudden blanching or whitening of the skin.
- Superficial frostbite: waxy or white skin which is firm to the touch (tissue underneath is still resilient).
- Deep frostbite: tissues are cold, pale and solid.

Wind-chill Chart

Wind Speed (mph)	Actual thermometer Reading (^0F)									
	50	40	30	20	10	0	-10	-20	-30	-40
	Equivalent Temperature (^0F)									
calm	50	40	30	20	10	0	-10	-20	-30	-40
5	48	37	27	16	6	-5	-15	-26	-36	-47
10	40	28	16	4	-9	-21	-33	-46	-58	-70
15	36	22	9	-5	-18	-36	-45	-58	-72	-85
20	32	18	4	-10	-25	-39	-53	-67	-82	-96
25	30	16	0	-15	-29	-44	-59	-74	-88	-104
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109
35	27	11	-4	-20	-35	-49	-67	-82	-98	-113
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116
>40 (Little added effect)	Little Danger (for properly clothed person)				Increasing Danger (Danger from freezing of exposed flesh)			Great Danger		

Appendix IV: Chemical Hazards

TETRACHLOROETHENE or PERCHLOROETHENE (PCE)

Introduction

Tetrachloroethylene is a man-made substance widely used for dry cleaning fabrics and textiles and for metal-degreasing operations. It is also used as a starting material (building block) for the production of other man-made chemicals. Other names that may be used for tetrachloroethylene include perchloroethylene, perc, PCE, perclene, and perchlor. Although tetrachloroethylene is a liquid at room temperature, some of the liquid can be expected to evaporate into the air producing an ether-like odor; evaporation increases as temperature increases.

Exposure Pathways

Humans can be exposed to tetrachloroethylene from environmental, consumer product, and occupational sources. Common environmental levels of tetrachloroethylene (often called background levels) are usually several thousand times lower than levels found in some workplaces. Background levels found in the air we breathe and in the food and water we consume probably result from evaporation from industrial or dry-cleaning operations or from releases from areas where chemical wastes are stored. Tetrachloroethylene has been found in at least 330 of the 1117 National Priorities List (NPL) hazardous waste sites.

In general, tetrachloroethylene levels in air are higher in urban and industrialized areas than in more rural or remote areas. Higher-than-background concentrations of tetrachloroethylene have occasionally been measured in air close to chemical waste sites and in water taken from nearby wells.

Exposure to tetrachloroethylene may also occur from some consumer products. Products that may contain tetrachloroethylene include auto brake noise-reducers and cleaners, suede protectors, water repellants, silicone lubricants, belt lubricants and dressings, specialized aerosol cleaners, ignition wire driers, fabric finishers, spot removers, adhesives and wood cleaners. Although uncommon, small amounts of tetrachloroethylene have been found in food.

The levels of tetrachloroethylene in air in dry-cleaning shops, textile and chemical processing operations and degreasing operations can result in exposures that are much higher than those found in the outside environment. Levels of tetrachloroethylene in the workplace are usually measured in parts of tetrachloroethylene per million parts of air (ppm), while common environmental levels are usually measured in parts per billion (ppb) or parts per trillion (ppt).

Metabolism

Because tetrachloroethylene evaporates quickly, the most common exposure to tetrachloroethylene comes from breathing air containing it. This is certainly true for individuals who work with the chemical, but it is probably also true for those who live in industrial and commercial areas where large amounts of the compound are used or disposed of. Tetrachloroethylene may also enter the body through drinking contaminated water or eating contaminated food. Because tetrachloroethylene does not pass through the skin to any significant extent, entry into the body by this path is of minimal concern, although skin irritation may result from repeated or prolonged contact with the undiluted liquid. Scientific reports indicate that tetrachloroethylene is present (and may in fact be concentrated) in the breast milk of mothers who have been exposed to the chemical.

Health Effects

In high concentrations in air, particularly in closed, poorly ventilated areas, single exposures to tetrachloroethylene can cause central nervous system (CNS) effects leading to dizziness, headache, sleepiness, confusion, nausea, difficulty in speaking and walking and possibly unconsciousness and death. As might be expected, these symptoms occur almost entirely in work (or hobby) environments. The potential long-term health effects that might occur in humans from breathing lower levels of tetrachloroethylene than those that produce CNS effects or from ingesting very low levels of the chemical found in some water supplies have not been identified. The effects of exposing infants to tetrachloroethylene through breast milk are unknown.

Animal studies, conducted with amounts much higher than typical environmental levels, have shown that tetrachloroethylene can cause liver and kidney damage, liver and kidney cancers and leukemia. Developmental effects in fetuses have been observed but only at tetrachloroethylene exposure levels that also produce toxicity in the maternal animal.

The U.S. Department of Health and Human Services has determined that tetrachloroethylene may reasonably be anticipated to be a carcinogen. Based on evidence from animal studies, tetrachloroethylene is thought to be capable of causing cancer in humans. It should be emphasized, however, that currently available information is not sufficient to determine whether tetrachloroethylene causes cancer in humans.

Short-term exposures to air containing more than 100 ppm of tetrachloroethylene have produced harmful effects in both humans and animals and more prolonged exposures to approximately 9 ppm caused harmful liver effects in mice. It should be pointed out that some of the highest environmental levels of tetrachloroethylene ever recorded (at waste disposal sites, for example) were still 150 times smaller than the concentrations shown to produce symptoms of toxicity in animals after repeated exposure. Drinking (or eating) the equivalent of approximately 60 to 80 mg (less than a spoonful) of undiluted tetrachloroethylene per kg; of body weight (I kg = 2.2 pounds) has produced effects similar to drinking alcohol. Tetrachloroethylene was used in the past as a medicine to eliminate worms in humans, but safer and more effective drugs are now available. More prolonged exposures in animals have produced harm to the liver at doses of approximately 100 mg/kg/day. These levels of exposure are more than 1,000 times higher than would be expected even if humans ingested the most contaminated drinking water ever reported.

Cancer: From data in animals, EPA has estimated that if people breathe air containing 1 ppm tetrachloroethylene all day every day for 70 years, there would be an added risk of 66 additional cases of cancer in a population of 10,000 people (or 65,5 00 additional cases in a population of 10,000,000) over the number of cases that would be observed in a population not exposed to tetrachloroethylene. If people consume 1.0 mg tetrachloroethylene/kg/day in food and water every day for 70 years, there would be at the most a risk of 5 10 additional cases of cancer in a population of 10,000, or 5 10,000 additional cases in a population of 10,000,000. It should be noted that these risk values are plausible upper-limit estimates. Actual risk levels are unlikely to be higher and may be lower.

Regulations

The government has made recommendations to limit the exposure of the general public to tetrachloroethylene in drinking water and the exposure of workers to tetrachloroethylene in the workplace.

The Environmental Protection Agency (EPA) has developed the following health advisories to describe concentrations of tetrachloroethylene in drinking water at which no adverse effects are anticipated to occur: 2.0 milligrams per liter of water (mg/L) for short-term exposure of children, 1.4 mg/L for longer term exposure of children, and 5.0 mg/L for long-term exposure of adults. In addition, a drinking water equivalent level (DWEL) of 0.5 mg/L has been established.

The Occupational Safety and Health Administration (OSHA) has a legally enforceable exposure limit of 25 ppm tetrachloroethylene in air for an 8-hour workday, 40-hour workweek based on non-cancer health considerations. The National Institute for Occupational Safety and Health (NIOSH) has classified tetrachloroethylene as a potential occupational carcinogen and recommends that workplace exposure be limited to the lowest possible level.

perchloroethylene. (tetrachloroethylene). CAS: 127-18-4. C12C:CC12.

Properties:
Colorless liquid, ether-like odor, extremely stable, resists hydrolysis, d 1.625 (20/20C), bp 121C, fp -22AC,
bulk d 13.46 lb/gal (26C), refr index 1.5029 (25C), flash p none. Miscible with alcohol, ether, and oils; insoluble in water.
Non-flammable.

Derivation:

(1) By chlorination of hydrocarbons and pyrolysis of the carbon tetrachloride also formed,
(2) from acetylene and chlorine via trichloroethylene.

Method of purification: Distillation.
Grade: Purified, technical, USP, as tetrachloroethylene, spectrophotometric.
Hazard: Irritant to eyes and skin. TLV: 50 ppm in air.
Use: Dry-cleaning solvent, vapor -degreasing solvent, drying agent for metals and certain other solids, vermifuge, heat transfer medium, manufacture of fluorocarbons.

APPENDIX B
Quality Assurance Project Plan (QAPP)

Quality Assurance Project PLAN

for

Former Imperial Cleaners Site
218 Lakeville Road
Lake Success, New York 11020

June 2017

Walden Environmental Engineering, PLLC
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Walden Associates

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1.0 Project Organization and Responsibilities

Walden Environmental Engineering, PLLC (Walden) maintains company policies and procedures to ensure that all sample collection and analyses meet a high degree of quality. These policies and procedures provide confidence that the resulting data provide an accurate representation of the matrix being sampled. Quality Assurance/Quality Control (QA/QC) starts with the design of the sampling program and ends with the summarized analytical data submitted in the final report. This Quality Assurance Project Plan (QAPP) describes these QA/QC policies and procedures.

The project Quality Assurance Officer (QAO) is responsible for ongoing surveillance of project activities, for ensuring conformance to this QAPP, and for evaluating the effectiveness of its requirements. The QAO has access to any personnel or subcontractors, as necessary, to resolve technical problems and take corrective action as appropriate and has the authority to recommend that work be stopped when there are factors present that may jeopardize quality. The QAO will be available to respond to immediate QA/QC problems.

The primary responsibilities of the QAO are as follows:

- Monitor the correction of QC problems and alert task leaders to where similar problems might occur.
- Develop and maintain project QA files for sampling, monitoring, and field QA records.
- Participate in QA audits.
- Recommend changes to the project manager to improve the effectiveness of the project in reaching its QA objectives for field sampling and monitoring activities.
- Review proposed additions and changes to this QAPP.

The project QA will be maintained under the direction of Ms. Jessica Bluth (see attached resume), who will be assigned as the project’s QAO, in accordance with this QAPP. QC for specific tasks will be the responsibility of Walden and its subcontractors, which shall be selected at the time the work is required under the direction of Ms. Bluth.

2.0 Quality Assurance Project Plan Objectives

2.1 Overview

Overall project goals are defined through the development of Data Quality Objectives (DQOs), which are qualitative and quantitative statements that specify the quality of the data required to support decisions. Data quality is measured by how well the data meet the QA/QC goals of the project. In this plan, "Quality Assurance" and "Quality Control" are defined as follows:

- Quality Assurance - The total integrated program for assuring reliability of monitoring and measurement data.
- Quality Control - The routine application of procedures for obtaining prescribed standards of performance in the monitoring and measurement process.

As stated in the Guidance for Data Quality Objectives Process (EPA QA/G-4), DQOs are derived from the outputs of each step of the DQO process that:

- Classify the study objective;
- Define the most appropriate type of data to collect;
- Determine the most appropriate conditions from which to collect the data; and
- Specify acceptable levels of decision errors that will be used as the basis for establishing the quantity and quality of data needed to support the decision (USEPA, 1994).

A non-probabilistic (judgmental) sampling approach will be used to select the specific sampling locations for the areas of concern. A judgmental sampling design consists of directed samples at specific sampling locations to confirm the existence of contamination at these chosen locations based on visual or historical information (i.e., discoloration, staining, and deterioration).

Total study error is the combination of sampling and measurement error. Total study error is directly related to decision error. These decision errors can be controlled through the use of hypothesis testing. For this sampling, the null hypothesis (baseline condition) is that the parameter of interest exceeds the cleanup levels. This decision has the smallest degree of decision error. In addition, measurement error is reduced by analyzing individual samples using more precise laboratory and sampling methods. The soil, sub-slab vapor, and indoor/outdoor air sampling will be performed with dedicated equipment and following the appropriate standard operating procedures for sample handling.

2.2 QA/QC Requirements

QA elements to be evaluated include accuracy, precision, sensitivity, representativeness and completeness. Reporting of the data must be clear, concise and comprehensive. The data generated by the analytical laboratory for this project is required to be sensitive enough to achieve detection levels low enough to meet Contract Required Quantitation Limits (CRQLs) as specified in NYSDEC Analytical Services Protocol (NYSDEC ASP) for Superfund CLP and EPA SW-846 methods performed in accordance with NYSDEC ASP protocol. The analytical results meeting the CRQLs will provide data sensitive enough to meet the objectives of the work described in the *Remedial Action Work Plan* (Walden, June 2017). The QC elements that are important to this project are blank contamination, instrument calibration, completeness of field data, sample-holding times, sample preservation and sample chain of custody.

2.3 Initial Instrument Calibration

Calibration curves will be developed for each of the compounds to be analyzed. Standard concentrations and a blank will be used to produce the initial curves. The development of calibration curves and initial calibration response factors must be consistent with method requirements presented in the most recent version of SW-846 and the NYSDEC's Analytical Services Protocol (ASP).

2.4 Continuing Instrument Calibration

The initial calibration curve will be verified every 12 hours by analyzing one calibration standard. The standard concentration will be the midpoint concentration of the initial calibration curve. The calibration check compound must come within 25% relative percent difference (RPD) of the average response factor obtained during initial calibration. If the RPD is greater than 25%, then corrective action must be taken as provided in the specific methodology.

2.5 Method Blanks, Field Blanks and Trip Blanks

Method blank or preparation blank is prepared from an analyze-free matrix, which includes the same reagents, internal standards and surrogate standards as the related samples. It is carried through the entire sample preparation and analytical procedure. A method blank analysis will be performed once for each 12-hour period during the analysis of samples for Volatile Organic Compounds (VOCs). The method blank will be used to demonstrate the level of laboratory background and reagent contamination that might result from the analytical process itself.

Field blanks and trip blanks will also be collected to ensure no contamination arises from sampling equipment or the transportation and handling methods.

2.6 Duplicates

Duplicate samples are two or more samples considered representative sub-samples of the same source. The samples are identically processed throughout the measurement system. For the SVI monitoring, laboratory duplicate analyses will consist of one (1) sub-slab vapor sample, one (1) indoor air sample, and one (1) outdoor air sample for every batch of field samples. For the pre-design soil investigation, one (1) duplicate sample will be collected per day of sampling. Duplicate samples will be analyzed as per appropriate methodology. Duplicate analyses for Target Compound List (TCL) compounds will be associated with matrix spike and matrix spike duplicate analyses. The results of the duplicate analyses will be used to assess the precision of the measurement systems.

2.7 Surrogate Spike Analysis

Surrogate standard determinations will be performed on all samples and blanks analyzed by the analytical laboratory. All samples and blanks will be spiked with the appropriate surrogate compounds (as indicated by the methodology) before purging or extraction in order to monitor preparation and analyses of samples. Surrogate spike recoveries shall fall within the advisory limits in accordance with the SW-846 protocols for samples falling within the quantitation limits without dilution.

2.8 Matrix Spike/Matrix Spike Duplicate/Matrix Spike Blank Analysis

Matrix Spike (MS) and Matrix Spike Duplicate (MSD) analyses will be performed to evaluate the matrix effect of the sample upon the analytical methodology along with the precision of the instrument by measuring recoveries. The MS/MSD samples will be analyzed for each group of samples of a similar matrix, at a rate of one for every batch of field samples. The Relative Percent Difference (RPD) will be calculated from the difference between the MS and MSD. Matrix spike blank (MSB) analysis will be performed to indicate the appropriateness of the spiking solution(s) used for the MS/MSD.

2.9 Accuracy

Accuracy is defined as the nearness of a result or the mean (x) of a set of results to the true value. Accuracy is assessed by means of reference samples and percent recoveries. Accuracy includes both precision and recovery, and is expressed as Percent Recovery (% REC). The MS sample is used to determine the percent recovery. The matrix spike % REC is calculated by the following equation:

$$\%REC = \frac{SSR - SR}{SA}$$

where:

SSR = measurement from spiked sample

SR = measurement from un-spiked sample

SA = actual data of spike added

2.10 Precision

Precision is defined as the measurement of agreement of a set of replicate results among themselves without assumption of any prior information as to the true result. Precision is assessed by means of duplicate/replicate sample analyses. Analytical precision is expressed in terms of Relative Percent Difference (RPD) which is calculated using the following equation:

$$RPD = \frac{D_1 - D_2}{(D_1 + D_2)/2}$$

where:
RPD = Relative Percent Difference
D_1 = larger sample value
D_2 = smaller sample value (duplicate)

2.11 Sensitivity

The sensitivity objectives for this plan require that data generated by the analytical laboratory achieve detection levels low enough to meet the CRQLs as specified by SW-846 methods. The Method Detection Limits (MDL) for target compounds and target analyses will be established by the analytical laboratory to be well below the remedial objectives and submit appropriate documentation to Walden as required by the QAO.

2.12 Representativeness

Representativeness is a measure of the relationship of an individual sample taken from a particular site to the remainder of the site and the relationship of a small aliquot of the sample (i.e., the one used in the actual analysis) to the sample remaining on-site. A blind duplicate is used to accomplish this task, as well as assessing the precision of the data. The RPD between the two samples should be less than 50%. The use of standardized techniques and statistical sampling methods influences the representativeness of an aliquot of sample to the sample at the site. The representativeness of samples is assured by adherence to sampling procedures presented in this document, therefore no specific representativeness samples are to be collected.

2.13 Completeness

Completeness is a measure of the quantity of data obtained from a measurement system as compared to the amount of data expected from the measurement system. Completeness is defined as the percentage of all results that are not affected by failing QC qualifiers and should be between 90% and 100% of all analyses performed. The objective of completeness in laboratory reporting is to provide a thorough data support package. The laboratory data package provides documentation of sample analysis and results in the form of summaries, QC data and raw analytical data. The laboratory will be required to submit data packages that follow SW-846 reporting format, which, at a minimum, will include the following components:

1. All sample chain-of custody forms.
2. The case narrative(s) presenting a discussion of any problems and/or procedural changes required during analyses. Also presented in the case narrative are sample summary forms.
3. Documentation demonstrating the laboratory's ability to attain the contract specified detection limits for all target analyses in all required matrices.
4. Tabulated target compound results and tentatively identified compounds.
5. Surrogate spike analysis results (organics).
6. Matrix spike/matrix spike duplicate results.
7. QC checks sample and standard recovery results.
8. Blank method results.
9. Internal standard area and RT summary.

2.14 Comparability

Comparability is the degree to which analytical data generated from an individual laboratory can be compared with those from another laboratory, in terms of use of standardized industry methods and equivalent instrumentation techniques. No laboratory split samples will be taken for this project.

3.0 <u>Calibration and Maintenance Procedures of Field Equipment</u>

Walden follows manufacturer's recommendations and guidelines with regard to field instrument calibration procedures. The calibration of each instrument will be checked prior to each day's use. The date and time of the calibration check, serial number, model number and signature of the calibrating technician will be entered into the field logbook. If the instrument readings are incorrect, the instrument will be either recalibrated by the technician or returned to the Walden's office where it will be further evaluated and/or repaired. If field instruments require major overhauls, the instruments will be returned to the appropriate manufacturer.

Preventive maintenance of field equipment is performed routinely before each sampling event and more extensive maintenance is performed based on hours of use. The Walden equipment coordinator has overall responsibility for the preventive maintenance program. However, certain maintenance programs are overseen by the project manager. Routinely, manually operated sampling equipment is checked to ensure it operates properly and that excessive wear has not occurred. If necessary, equipment is taken out of service for repair or replacement.

Soil sampling equipment will be decontaminated with a water and alconox solution before every sample is taken.

4.0 Tracer Gas Monitoring for SVI Sampling

A tracer gas will be used as a quality assurance/quality control (QA/QC) measure to verify the integrity of the soil vapor probe seal. This measure will be used to determine that the soil vapor sample has not been diluted by ambient air. Plastic sheeting will be placed around the sampling probes and sealed around the edges to create an adequate surface seal to prevent outdoor air infiltration. Helium tracer gas will be introduced under the plastic sheeting through a small opening to enrich the atmosphere in the immediate vicinity of the sampling probes with the tracer gas. A portable helium monitoring device will be used to analyze a soil vapor sample for the helium tracer gas to confirm the integrity of the probe seals before vapor samples were collected in Summa® canisters. The helium detector will serve to purge the points of 1 to 3 volumes of air prior to sampling.

5.0 Sample Custody

5.1 Overview

The handling of samples in the field and in the laboratory will conform to the sample custody procedures presented in this section. Field custody procedures involve proper sample identification, chain-of-custody forms, packaging and shipping procedures. Laboratory custody begins with the receipt of samples by the laboratory and continues through sample storage, analysis, data reporting and data archiving. This section provides the procedures that will be followed during the course of the project to ensure proper sample custody.

5.2 Field Custody Procedures for Off-Site Laboratory

The following elements are important for maintaining the field custody of samples:

- Sample identification
- Sample labels
- Custody records
- Shipping records
- Packaging procedures

Sample labels will be attached to all sampling containers before field activities begin. Each label will contain an identifying number and each number will have a suffix that identifies the site and where the sample was collected. Approximate sampling locations will be marked on a map with a description of the sample location. The number, type of sample and sample identification will be entered into the field logbook. A chain-of-custody form will accompany the sampling containers from the laboratory into the field. Upon receipt of the samples and cooler, the sampler will sign and date the first “received” blank space. After each sample is collected and appropriately identified entries will be made on the chain-of-custody form that will include:

- Site name and address
- Samplers’ names and signatures
- Names and signatures of persons involved in chain of possession
- Sample number
- Number of containers
- Sampling station identification
- Date and time of collection
- Type of sample and the analyses requested
- Preservatives used (if any)
- Pertinent field data (if any)

After sampling has been completed, the samplers will return/ship the samples to the laboratory. The sampler will sign and date the next "relinquished" blank space. One copy of the custody form will remain with the field personnel and the remaining copies will accompany the samples to the laboratory. The samples will be shipped to the laboratory within 24 hours of collection. Samples will be received by laboratory personnel, who will assume custody of the samples and sign and date the next "received" blank.

5.3 Laboratory Custody Procedures

Upon receipt by the analytical laboratory, samples will proceed through an orderly processing sequence specifically designed to ensure continuous integrity of both the sample and its documentation.

All samples will be received by the laboratory's sample control group and will be carefully checked for label identification and completed accurate chain-of-custody records. The sample will be tracked from storage through the laboratory system until the analytical process is completed and the sample is returned to the custody of the sample control group for disposal. Generally, access to NYSDOH ELAP certified laboratories is restricted to prevent any unauthorized contact with samples, extracts, or documentation.

6.0 Sample Preparation and Analytical Procedures

Containers, preservation and holding times of environmental samples will be applied as detailed in the NYSDEC ASP. The holding time of samples for VOC analysis of air samples will be 30 days from the Verified Time of Sample Receipt (VTSR). Analyses of environmental samples will be performed by the protocol requirements of the SW-846.

A summary of analyses and related QA/QC samples would be performed on the samples collected at the site are described in the *Remedial Action Work Plan* (Walden, June 2017). Organic compounds will be analyzed by the following methods:

- Soil
  - TCL VOCs by USEPA Method 5035
- Sub-slab Soil Vapor and Indoor/Outdoor Air Samples
  - TCL VOCs by USEPA Method TO-15

If any modifications or additions to the standard procedures are anticipated, and if any nonstandard sample preparation or analytical protocol is to be used, the modifications and the nonstandard protocol will be explicitly defined and documented. Prior approval by Walden's QAO is necessary for any nonstandard analytical or sample preparation protocol used by the laboratory.

7.0 Data Reduction, Validation, Review and Reporting

7.1 Overview

The process of data reduction, review, and reporting ensures that assessments or conclusions based on the final data accurately reflect actual site conditions. This plan presents the specific procedures, methods, and format that will be employed for data reduction, review and reporting of each measurement parameter determined in the laboratory and field. Also described in this section is the process by which all data, reports and work plans are proofed and checked for technical and numerical errors prior to final submission.

7.2 Data Reduction

Data reduction is the process by which raw analytical data generated from the laboratory instrument systems are converted into usable mass concentrations. The raw data, which may take the form of summation of areas under the curve instrument responses, or observations is processed by the laboratory and converted into concentrations expressed in micrograms per kilogram for soil samples and in micrograms per cubic meter for sub-slab vapor and air samples. The analytical laboratory will be required to follow SW-846 data reduction procedures.

Data reduction also includes the process by which raw field data is summarized into tables and graphs, from which quantitative or qualitative assessments can be derived by filter integration and evaluation. Field data that is anomalous will be thrown out to create a linear interpretation of the data that depicts a more accurate trend.

Field data obtained during sampling is summarized on appropriate field forms. This information will be used to assess field conditions at the time of sampling and is summarized and analyzed along with the chemistry data in the final report. Occasionally, the reduction of actual field data requires correcting measurement data for the measurement system's baseline value. The data will be adjusted only after the raw data has been submitted to Walden’s QAO and prior to preparation of the final report.

7.3 Walden Data Review

7.3.1 Laboratory Data

The QAO or a designee under the project manager’s supervision, will review each analytical data package for completeness (i.e., have all the analyses requested been performed?) and general protocol compliance, such as holding times, detection limits, spike recoveries and surrogate recoveries. The results of this review will be summarized and submitted to the independent validator with the data package. If information is found to be missing from the data package the analytical laboratory will be contacted and requested to submit any missing information.

7.3.2 Data Usability Report

Walden's QAO will evaluate all of the analytical laboratory data according to the NYSDEC Division of Environmental Remediation (DER) Data Usability Summary Report (DUSR) guidelines to determine if the data presented by the laboratory meets the project specific criteria for data quality and use. Taking into account protocols for sampling, transport, analysis, reduction, and reporting, the QAO will use this information and his/her own experience to establish whether the results of each analysis can be used for the purpose intended. Data deficiencies, analytical protocol deviations, and quality control problems are identified and the effect on the data is evaluated. It will be determined whether the final results can be used as reported, qualified to indicate limitations, or rejected outright.

7.4 Data Validation

Data validation is the systematic process by which data quality is determined with respect to data quality criteria that are defined in project and laboratory QC programs and within the referenced analytical methods. The data validation process consists of an assessment of the acceptability or validity of project data with respect to the stated project goals and the requirements for data usability. Ideally, data validation establishes the data quality in terms of project DQOs. Data validation consists of data editing, screening, checking, auditing, certification, review and interpretation.

The purpose of data validation is to define and document analytical data quality and determine whether the laboratory data quality is sufficient for the intended use(s) of the data. An approved independent data evaluator will not review data prior to its use in reports prepared by Walden unless requested by the NYSDEC. Both the field and laboratory data will be subjected to a level of data validation commensurate with the required data quality level. If required, the data will be validated in accordance with the following document: "Functional Guidelines for Evaluating Inorganic Analyses" and the "Functional Guidelines for Evaluating Organic Analyses" (Technical Directive Document No. HQ-8410-01, USEPA). The validator will evaluate the analytical laboratory's ability to meet the DQOs provided in this QAPP. Noncompliant data will be flagged in accordance with the NYSDEC ASP and corrective action will be undertaken to rectify any problems.

7.5 Reporting

7.5.1 Field Data Reporting

All field real-time measurements and observations will be recorded in project logbooks or field data records. Field measurements may include temperature, wind speed and direction, and PID results, if applicable. All data will be recorded directly and legibly into field logbooks. If entries are changed, the change will not obscure the original entry and the correction will be signed. Field data records will be organized into standard formats whenever possible and retained in permanent files.

7.5.2 Laboratory Data Reporting

All sample data packages submitted by the analytical laboratory will be required to be reported in conformance to the SW-846 deliverable requirements as applicable to the method utilized.

7.6 Data Usage

The soil data will be used to evaluate and determine contamination extent on the site based on the regulatory levels and project cleanup objectives. The sub-slab and indoor air sampling data will be used to monitor indoor air quality impacts.

8.0 Internal Quality Control

8.1 Overview

QC checks will be performed to ensure the collection of representative and valid data. Internal QC refers to all data compilation and contaminant measurements. QC checks will be used to monitor project activities to determine whether QA objectives are being met. All specific internal QC checks to be used are identified in this section.

8.2 Laboratory Quality Control

The analytical laboratory is required to exercise internal control in a manner consistent with the requirements of this QAPP. Control checks and internal QC audits are required by the NYSDEC ASP methods. These include reference material analysis, blank analysis, MS/MSD analysis, cleanups, instrument adjustments and calibrations, standards and internal audits. One qualified professional will proof and check all final reports for transcription and/or calculation errors. Twenty percent of all final reports will be subsequently checked again by a qualified professional. All data tables will be checked to ensure no transcription errors have occurred. Data tables will also be checked to see that any criteria cited for comparison purposes is appropriate and correctly referenced. All calculations will be checked to ensure that they will be properly presented and that resulting values are achievable. If any results cannot be duplicated the calculations will be independently checked for accuracy.

9.0 Performance and System Audits

Performance audits, when performed, will be used to monitor project activities to assure compliance with project DQOs. Walden periodically conducts internal audits of field activities. Walden's on-site project manager will routinely monitor all field activities to ensure that work is done correctly. All sampling and analytical work will be reviewed routinely by the project manager. All data sheets obtained in the field will be initialed and dated by project manager after review and acceptance of the services performed. A field audit will include monitoring and evaluation of sample collection, sample holding times, preservation techniques, field QC and equipment calibration. These audit forms will be kept on file with the Walden project manager for a period of at least one (1) year after completion of the project, then will be transferred to storage and held for an additional five (5) years.

10.0 Analytical Corrective Action

10.1 Laboratory Corrective Action

Corrective actions will be implemented if unsatisfactory performance and/or system audit results indicate that problems exist. Corrective action may also be implemented if the result of a data assessment or internal QC check warrants such action.

11.0 Analytical Methods/Quality Assurance Summary Table

Parameter	Information
Matrix Type	Soil
Number of Samples to be Collected	Seven (7) borings, minimum two (2) samples per boring
Number of Field Blanks	1 per day of sampling
Number of Trip Blanks	1 per trip
Analytical Parameters	VOCs
Analytical Methods	USEPA Method 5035
Number of Matrix Spike Samples and Matrix Spike Duplicate to be Collected	To be determined after consultation with selected laboratory
Number and Type of Duplicate Samples to be Collected	1 per day of sampling
Sample Preservation	None
Sample Container Volume and Type	per USEPA Method 5035
Sample Holding Time	per USEPA Method 5035

Parameter	Information
Matrix Type	Sub-Slab Soil Vapor
Number of Samples to be Collected	Approx. 6 Sub-Slab Samples
Number of Field Blanks	1 per sampling event
Number of Trip Blanks	1 per trip
Analytical Parameters	VOCs
Analytical Methods	USEPA Method TO-15
Number of Matrix Spike Samples and Matrix Spike Duplicate to be Collected	To be determined after consultation with selected laboratory
Number and Type of Duplicate Samples to be Collected	1 per day of sampling
Sample Preservation	None
Sample Container Volume and Type	per USEPA Method TO-15
Sample Holding Time	per USEPA Method TO-15

Parameter	Information
Matrix Type	Indoor Air
Number of Samples to be Collected	Approx. 6 Indoor Air Samples
Number of Field Blanks	1 per sampling event
Number of Trip Blanks	1 per trip
Analytical Parameters	VOCs
Analytical Methods	USEPA Method TO-15
Number of Matrix Spike Samples and Matrix Spike Duplicate to be Collected	To be determined after consultation with selected laboratory
Number and Type of Duplicate Samples to be Collected	1 per day of sampling
Sample Preservation	None
Sample Container Volume and Type	per USEPA Method TO-15
Sample Holding Time	per USEPA Method TO-15

QUALITY ASSURANCE OFFICER RESUME

WALDEN ENVIRONMENTAL ENGINEERING

Jessica Bluth

Project Geologist

Ms. Bluth is one of Walden Associates' highly knowledgeable project geologists. She specializes in groundwater investigations, landfill post-closure and environmental monitoring, compliance inspections, tank removal, permitting and violation resolution. She has worked with a diverse clientele, including municipal, commercial, industrial and state markets. Ms. Bluth has conducted numerous soil/groundwater quality and sub-surface investigations and has also performed UST-related services for many commercial and industrial petroleum distribution sites throughout New York state.

EDUCATION

M.S. in Geology
University of Pittsburgh, 2004

B.S. Geology
State University of New York at Binghamton, Harpur College of Arts and Sciences, 2001
cum laude

LICENSE/ CERTIFICATIONS

American Institute of Professional Geologists (AIPG)

Certified Professional Geologist (CPG) certification in progress

OSHA 40-hour HAZWOPER Health and Safety Training

Current Loss Prevention System (LPS) Training

Long Island Association of Professional Geologists

EXPERIENCE

- Coordinates and performs field activities including groundwater and soil sampling, soil boring/well installations, well abandonments, subsurface utility mark-outs and waste disposal oversight.
- Prepares technical hydrogeologic reports (Subsurface Investigation Reports, Site Conceptual Models, Exposure Assessments, Well Abandonment Reports, etc.).
- Analysis, interpretation and reporting of data (utilizing EQuIS and GAMA for data management purposes).
- Procurement and review of subcontractor proposals.
- Performs groundwater, soil/sediment, sub-slab/soil vapor, indoor air sampling activities at developed and undeveloped residential, commercial, industrial and municipal sites in accordance with Phase II and other investigations as well as on-going monitoring programs.
- Coordinates and directs subcontractors performing excavation and remedial activities, soil boring and well installation activities, utility mark-outs and ground-penetrating radar surveys.
- Performs and manages monitoring and remedial activities at New York State Brownfield, Inactive Hazardous Waste Disposal (Superfund), Voluntary Cleanup and Solid Waste Management Program sites throughout Long Island and New York City.
- Develops Spill Response and Prevention Plans including flow diagrams for possible spill outcomes, first response methods, management responsibilities and instructions for spill reporting.
- Performs tightness tests on petroleum UST in accordance with Nassau County Fire Marshal (NCFM).
- Conducts UST removals, compliance testing, permitting and violation resolutions for a variety of clients.

APPENDIX C
Community Air Monitoring Plan (CAMP)

APPENDIX C

New York State Department of Health
Generic Community Air Monitoring Plan

The following discussion is taken from NYSDEC's DER-10 Technical Guidance for Site Investigation and Remediation Appendix 1A (May 2010).

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical- specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for volatile organic compounds (VOCs) and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate NYSDEC/NYSDOH staff.

Continuous monitoring will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. "Periodic" monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

- If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

- If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

- If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

All 15-minute readings must be recorded and be available for State (DEC and DOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m3 above the upwind level and provided that no visible dust is migrating from the work area.

- If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m3 of the upwind level and in preventing visible dust migration.

All readings must be recorded and be available for State (DEC and DOH) personnel to review.

Summary

As noted above, air monitoring activities for the Former Imperial Cleaners Site (218 Lakeville Road) site activities described in the *Remedial Action Work Plan* (Walden, June, 2017) will be appropriate for the soil sampling, SVE pilot testing, SVE remedial system installation, and periodic sub-slab vapor, indoor and outdoor air sampling to be conducted. Therefore, the CAMP will encompass periodic VOC monitoring using a PID.