

# DECISION DOCUMENT

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77-57 Vleigh Place  
Brownfield Cleanup Program  
Flushing, Queens County  
Site No. C241168  
January 2018



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

# **DECLARATION STATEMENT - DECISION DOCUMENT**

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77-57 Vleigh Place  
Brownfield Cleanup Program  
Flushing, Queens County  
Site No. C241168  
January 2018

## **Statement of Purpose and Basis**

This document presents the remedy for the 77-57 Vleigh Place site, a brownfield cleanup site. The remedial program was chosen in accordance with the New York State Environmental Conservation Law and Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York (6 NYCRR) Part 375.

This decision is based on the Administrative Record of the New York State Department of Environmental Conservation (the Department) for the 77-57 Vleigh Place site and the public's input to the proposed remedy presented by the Department.

## **Description of Selected Remedy**

The elements of the selected remedy are as follows:

### **1. Remedial Design**

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

- Considering the environmental impacts of treatment technologies and remedy stewardship over the long term;
- Reducing direct and indirect greenhouse gases and other emissions;
- Increasing energy efficiency and minimizing use of non-renewable energy;
- Conserving and efficiently managing resources and materials;
- Reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste;
- Maximizing habitat value and creating habitat when possible;
- Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals; and
- Integrating the remedy with the end use where possible and encouraging green and sustainable re-development.

## **2. Excavation**

The existing on-site building foundations will be demolished and materials which can't be beneficially reused on site will be taken off-site for proper disposal in order to implement the remedy.

Excavation and off-site disposal of contaminant source areas, including:

- grossly contaminated soil, as defined in 6 NYCRR Part 375-1.2(u); and
- soils which exceed the protection of groundwater soil cleanup objectives (PGWSCOs), as defined by 6 NYCRR Part 375-6.8 for those contaminants found in site groundwater above standards.

These source areas are defined as the soils beneath the former drycleaners establishment and the soils in the southeast corner of the site.

Excavation and off-site disposal of all on-site soils which exceed Restricted Residential SCOs, as defined by 6NYCRR Part 375-6.8 in the upper 12 feet in the majority of the site. The excavation will be extended to a depth of 20 feet-below ground surface (bgs) in the southeast corner of the site to achieve the PGWSCOs for those contaminants found in site groundwater above standards. Following the completion of the excavation, post-excavation end-point samples and side wall samples will be collected and analyzed to ensure removal of all source areas and document site conditions.

Approximately 13,010 (18,213 tons) cubic yards of contaminated soil will be removed from the site.

If encountered, excavation and removal of any underground storage tanks (USTs), underground piping or other structures associated with a source of contamination will be disposed of off-site.

## **3. Backfill**

Clean fill meeting the requirements of 6 NYCRR Part 375-6.7(d) (i.e lower of the PGWSCOs or the Protection of Public Health for Restricted-Residential SCOs) will be brought in to complete the backfilling of the excavation and establish the designed grades at the site.

## **4. Vapor Mitigation**

Any on-site buildings will be required to have a sub-slab depressurization system, or similarly engineered systems, to mitigate the migration of contaminated soil vapor into on-site buildings.

## **5. Soil Vapor Extraction**

Soil vapor extraction (SVE) will be implemented to remove volatile organic compounds (VOCs) from the subsurface. VOCs will be physically removed from the soil by applying a vacuum to wells that have been installed into the vadose zone (the area below the ground but above the water table). The vacuum draws air through the soil matrix which carries the VOCs from the soil to the

SVE well. The air extracted from the SVE wells is then treated as necessary prior to being discharged to the atmosphere.

The air containing VOCs extracted from the SVE wells will be treated by passing the air stream through activated carbon, which removes the VOCs from the air prior to it being discharged to the atmosphere. The operation of the components of the remedy will continue until the remedial objectives have been achieved, or until the agencies determine that continued operation is technically impracticable or not feasible.

## **6. Groundwater Remedy (In-Situ Chemical Oxidation)**

An in-situ chemical oxidation and a bioremediation mechanism will be implemented to treat volatile organic compounds (VOCs) in groundwater and prevent further off-site migration of contaminated groundwater. A chemical oxidant (PersulfOx) will be injected into the subsurface at multiple locations to destroy the contaminants in the southeastern portion of the site. Additional injections of the oxidant may be required based on post-injection VOC monitoring results. A bioremediation agent mixed with additives will be applied approximately 3 months following the application of the oxidant. Post-injection groundwater sampling will be conducted three months after the first injection and quarterly for a minimum of 24 months after the last injection. The effectiveness of the treatment will be evaluated at 12 months and 24 months to determine whether further injections are required.

## **7. Cover System**

A site cover will be required to allow for restricted residential use of the site in areas where the upper two feet of exposed surface soil will exceed the applicable soil cleanup objectives (SCOs). Where a soil cover is to be used it will be a minimum of two feet of soil placed over a demarcation layer, with the upper six inches of soil of sufficient quality to maintain a vegetative layer. Soil cover material, including any fill material brought to the site, will meet the SCOs for cover material for the use of the site as set forth in 6 NYCRR Part 375-6.7(d). Substitution of other materials and components may be allowed where such components already exist or are a component of the tangible property to be placed as part of site redevelopment. Such components may include, but are not necessarily limited to: pavement, concrete, paved surface parking areas, sidewalks, building foundations and building slabs.

## **8. Institutional Control**

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

- require the remedial party or site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8 (h)(3);
- allow the use and development of the controlled property for restricted residential as defined by Part 375-1.8(g), although land use is subject to local zoning laws;
- restrict the use of groundwater as a source of potable or process water, without necessary

- water quality treatment as determined by the NYSDOH or County DOH; and
- require compliance with the Department approved Site Management Plan.

## 9. Site Management Plan

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

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

Institutional Controls: The Environmental Easement discussed in Paragraph 8 above.

Engineering Controls: The sub-slab depressurization systems or similarly engineered systems discussed in paragraph 4, the SVE system discussed in Paragraph 5, the groundwater remedial system discussed in Paragraph 6 and the cover system discussed in Paragraph 7 above.

This plan includes, but may not be limited to:

- an Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination;
  - descriptions of the provisions of the environmental easement including any land use, and groundwater restrictions;
  - a provision for evaluation of the potential for soil vapor intrusion for buildings off-site to the south and southeast, including provision for implementing actions recommended to address exposures related to soil vapor intrusion;
  - a provision that should a building foundation or building slab be removed in the future, a cover system consistent with that described in Paragraph 7 above will be placed in any areas where the upper two feet of exposed surface soil exceed the applicable soil cleanup objectives (SCOs);
  - provisions for the management and inspection of the identified engineering controls; and
  - maintaining site access controls and Department notification; and
  - the steps necessary for the periodic reviews and certification of the institutional and/or engineering controls.
- b. a Monitoring Plan to assess the performance and effectiveness of the remedy. The plan includes, but may not be limited to
    - monitoring of soil, soil vapor and groundwater to assess the performance and effectiveness of the remedy;
    - a schedule of monitoring and frequency of submittals to the Department;
    - monitoring for vapor intrusion for any buildings, as may be required by the Institutional and Engineering Control Plan discussed above; and
    - Assess the performance and effectiveness of the SVE system by monitoring for vapor migration off-site.

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

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

**Declaration**

The remedy conforms with promulgated standards and criteria that are directly applicable, or that are relevant and appropriate and takes into consideration Department guidance, as appropriate. The remedy is protective of public health and the environment.

January 24, 2018



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Date

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Gerard Burke, Director  
Remedial Bureau B

# DECISION DOCUMENT

77-57 Vleigh Place  
Flushing, Queens County  
Site No. C241168  
January 2018

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## **SECTION 1: SUMMARY AND PURPOSE**

The New York State Department of Environmental Conservation (the Department), in consultation with the New York State Department of Health (NYSDOH), has selected a remedy for the above referenced site. The disposal of contaminants at the site has resulted in threats to public health and the environment that would be addressed by the remedy. The disposal or release of contaminants at this site, as more fully described in this document, has contaminated various environmental media. Contaminants include hazardous waste and/or petroleum.

The New York State Brownfield Cleanup Program (BCP) is a voluntary program. The goal of the BCP is to enhance private-sector cleanups of brownfields and to reduce development pressure on "greenfields." A brownfield site is real property, the redevelopment or reuse of which may be complicated by the presence or potential presence of a contaminant.

The Department has issued this document in accordance with the requirements of New York State Environmental Conservation Law and 6 NYCRR Part 375. This document is a summary of the information that can be found in the site-related reports and documents.

## **SECTION 2: CITIZEN PARTICIPATION**

The Department seeks input from the community on all remedies. A public comment period was held, during which the public was encouraged to submit comment on the proposed remedy. All comments on the remedy received during the comment period were considered by the Department in selecting a remedy for the site. Site-related reports and documents were made available for review by the public at the following document repositories:

### Queens Library - Kew Gardens Hills

Attn: Susan Wetjen  
72-33 Vleigh Place  
Flushing, NY 11367  
Phone: (718) 278-2220

### Queens Community Board 8

Attn: Alvin Warshaviak  
197-15 Hillside Avenue  
Hollis, NY 11423  
Phone: (718) 264-7895

## Receive Site Citizen Participation Information By Email

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

### **SECTION 3: SITE DESCRIPTION AND HISTORY**

**Location:** The 77-57 Vleigh Place site is located in an urban area in Flushing, NY. The site is bordered by Vleigh Place to the west, 77th Road to the north, 78th Avenue to the south, and an apartment building to the east.

**Site Features:** The site is relatively flat and formerly contained a one story flat roofed building used as a retail/commercial strip mall with thirteen tenant spaces, including a dry cleaner operation. The building had a basement and occupied the western portion of the site along Vleigh Place, while the rear of the building to the east consists of a partially paved parking lot and an unpaved area. In late 2016 the on-site building was completely destroyed due to a fire and has been demolished. Only the foundation slab and walls remain.

**Current Zoning and Land Use:** The site is currently zoned for commercial and office use and sits within an R3-2 zoning district with a C1-2 commercial overlay. The site is currently vacant. Surrounding parcels include residential apartment buildings to the east and south and a pre-school to the west.

**Past Use of the Site:** The former on-site building was constructed in 1939 and had been used as a retail and commercial office building since it was first constructed. Past tenants included multiple retail establishments such as restaurants and a dry cleaner, which is the presumed source of the on-site contamination.

**Site Geology and Hydrogeology:** The soil in the vicinity of the site is characterized as part of the urban land complex, which indicates that the predominant soil type has been disturbed and covered with an impervious layer consisting of buildings, sidewalks, streets, and other structures. Based on soil borings, the native soils beneath the site were identified as medium to fine grained sand with pebbles to a depth of approximately 34 feet below grade. The depth to ground water is approximately 30 to 36 feet below the ground surface. Groundwater flows from the southeast to the northwest across the site based on well data, which is consistent with regional groundwater flow. The nearest body of surface water is Willow Lake, approximately 0.5 miles to the west of the site, which ultimately drains into Flushing Bay

A site location and boundary map is attached as Figure 1.

## **SECTION 4: LAND USE AND PHYSICAL SETTING**

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

A comparison of the results of the Remedial Investigation (RI) to the appropriate standards, criteria and guidance values (SCGs) for the identified land use and the unrestricted use SCGs for the site contaminants is available in the RI Report.

## **SECTION 5: ENFORCEMENT STATUS**

The Applicant under the Brownfield Cleanup Agreement is a Participant. The Applicant has an obligation to address on-site and off-site contamination. Accordingly, no enforcement actions are necessary.

## **SECTION 6: SITE CONTAMINATION**

### **6.1: Summary of the Remedial Investigation**

A remedial investigation (RI) serves as the mechanism for collecting data to:

- characterize site conditions;
- determine the nature of the contamination; and
- assess risk to human health and the environment.

The RI is intended to identify the nature (or type) of contamination which may be present at a site and the extent of that contamination in the environment on the site, or leaving the site. The RI reports on data gathered to determine if the soil, groundwater, soil vapor, indoor air, surface water or sediments may have been contaminated. Monitoring wells are installed to assess groundwater and soil borings or test pits are installed to sample soil and/or waste(s) identified. If other natural resources are present, such as surface water bodies or wetlands, the water and sediment may be sampled as well. Based on the presence of contaminants in soil and groundwater, soil vapor will also be sampled for the presence of contamination. Data collected in the RI influence the development of remedial alternatives. The RI report is available for review in the site document repository and the results are summarized in section 6.3.

The analytical data collected on this site includes data for:

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

### **6.1.1: Standards, Criteria, and Guidance (SCGs)**

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

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

### **6.1.2: RI Results**

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

tetrachloroethene (PCE)

trichloroethene (TCE)

The contaminant(s) of concern exceed the applicable SCGs for:

- groundwater
- soil
- soil vapor intrusion
- indoor air

### **6.2: Interim Remedial Measures**

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

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

### **6.3: Summary of Environmental Assessment**

This section summarizes the assessment of existing and potential future environmental impacts presented by the site. Environmental impacts may include existing and potential future exposure pathways to fish and wildlife receptors, wetlands, groundwater resources, and surface water. The RI report presents a detailed discussion of any existing and potential impacts from the site to fish and wildlife receptors.

#### Nature and Extent of Contamination:

Soil and groundwater were analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), metals, polychlorinated biphenyls (PCBs), and pesticides. Soil vapor, sub slab vapor, indoor air and outdoor ambient air were analyzed for VOCs. The primary contaminants of concern detected in all media were tetrachloroethylene (PCE) and trichloroethylene (TCE).

**Soil:** PCE was detected at 15 of the 24 soil probe locations at the various depths, with the highest concentration of 94 parts per million (ppm) at 10 to 12 feet below ground surface in the southeast corner of the site. This concentration is above the Unrestricted Use Soil Cleanup Objectives (UUSCOs) of 1.3 parts per million (ppm) and the Restricted Residential Use SCO (RRUSCOs) of 19 ppm. A former on-site dry-cleaning establishment was the most likely source of the PCE. The soil contamination did not appear to extend under the sidewalks or off-site to adjacent properties. TCE was detected at 2.1 ppm in the southeast corner of the site, which exceeds the UUSCO of 0.47 ppm.

**Groundwater:** Chlorinated VOCs, primarily PCE and TCE were found in 14 of the 15 monitoring wells installed, with most on-site and off-site groundwater samples exceeding the groundwater quality standard (GQS) of 5 parts per billion (ppb). The maximum concentration of 11,000 ppb of PCE was found in the southeastern corner of the site, likely due to the overlying PCE contaminated soil. The maximum TCE concentration detected was 75 ppb in MW-11.

Groundwater flows from southeast to northwest across the site. The contaminant plume extends off-site to the southeast and northwest, with a PCE high off-site of 130 ppb in MW-12 and 2.5 ppb of TCE.

**Soil vapor, sub slab vapor, and indoor air:** Samples collected during the RI from soil vapor points installed on and off-site identified chlorinated VOCs. These included PCE and TCE, which were detected in all on-site and most off-site soil vapor samples. PCE was the most abundant compound detected in on-site soil vapor and was detected up to 740,000 (micrograms per cubic meter) mcg/m<sup>3</sup>. TCE was detected up to 2,300 mcg/m<sup>3</sup> in on-site soil vapor. PCE and TCE were detected up to 26,000 mcg/m<sup>3</sup> and 2,300 mcg/m<sup>3</sup>, respectively, in sub-slab soil vapor. The samples of the indoor air from the former on-site building were collected and PCE was detected from 94 to 1,100 mcg/m<sup>3</sup> and TCE was detected from 3.9 to 57 mcg/m<sup>3</sup>. These levels are above the NYSDOH's Air Guidelines for each of these chemicals of 30 mcg/m<sup>3</sup> and 2 mcg/m<sup>3</sup> respectively. The contaminated soil and groundwater are the source of the PCE and TCE in the soil vapor. Sub slab vapor samples and indoor air samples were also collected from an adjacent building to the west and from buildings to the south and southeastern side of the site as part of supplemental RI work. Based on the results, no further action is necessary at the adjacent building to the west of the site. Results obtained from the buildings to the south and southeast indicate additional sampling is needed.

Although none were encountered during the remedial investigation, underground storage tanks (USTs), fuel dispensers, underground piping or other structures associated with a source of contamination may exist.

#### **6.4: Summary of Human Exposure Pathways**

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

People may come into contact with contaminated soil if they dig below the surface. Contaminated groundwater at the site is not used for drinking or other purposes and the site is served by a public water supply that obtains its water from a different source that is not affected by this contamination. Volatile organic compounds in soil vapor (air spaces within the soil) may move into the overlying buildings and affect the indoor air quality. This process similar to the movement of radon gas from the subsurface into the indoor air of buildings, is referred to as soil vapor intrusion. Because the site is vacant, the inhalation of site-related contaminants due to soil vapor intrusion does not represent a current concern. The potential exists for the inhalation of site contaminants due to soil vapor intrusion in any future buildings developed on the site. No actions are needed to address soil vapor intrusion in buildings west of the site. Additional investigation is needed to evaluate whether further actions are needed at buildings south and southeast of the site.

#### **6.5: Summary of the Remediation Objectives**

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

The remedial action objectives for this site are:

##### **Groundwater**

###### **RAOs for Public Health Protection**

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

###### **RAOs for Environmental Protection**

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

##### **Soil**

###### **RAOs for Public Health Protection**

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

###### **RAOs for Environmental Protection**

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

## **Soil Vapor**

### **RAOs for Public Health Protection**

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

## **SECTION 7: ELEMENTS OF THE SELECTED REMEDY**

The alternatives developed for the site and the evaluation of the remedial criteria are presented in the Alternative Analysis. The remedy is selected pursuant to the remedy selection criteria set forth in DER-10, Technical Guidance for Site Investigation and Remediation and 6 NYCRR Part 375.

The selected remedy is a Track 4: Restricted use with site-specific soil cleanup objectives remedy.

The selected remedy is referred to as the Soil Excavation, Soil Vapor Extraction, In-Situ Chemical Oxidation, and Cover System remedy.

The elements of the selected remedy, as shown in Figure 2, 3 and 4, are as follows:

### **1. Remedial Design**

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

- Considering the environmental impacts of treatment technologies and remedy stewardship over the long term;
- Reducing direct and indirect greenhouse gases and other emissions;
- Increasing energy efficiency and minimizing use of non-renewable energy;
- Conserving and efficiently managing resources and materials;
- Reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste;
- Maximizing habitat value and creating habitat when possible;
- Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals; and
- Integrating the remedy with the end use where possible and encouraging green and sustainable re-development.

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The existing on-site building foundations will be demolished and materials which can't be beneficially reused on site will be taken off-site for proper disposal in order to implement the remedy.

Excavation and off-site disposal of contaminant source areas, including:

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These source areas are defined as the soils beneath the former drycleaners establishment and the soils in the southeast corner of the site.

Excavation and off-site disposal of all on-site soils which exceed Restricted Residential SCOs, as defined by 6NYCRR Part 375-6.8 in the upper 12 feet in the majority of the site. The excavation will be extended to a depth of 20 feet-below ground surface (bgs) in the southeast corner of the site to achieve the PGWSCOs for those contaminants found in site groundwater above standards. Following the completion of the excavation, post-excavation end-point samples and side wall samples will be collected and analyzed to ensure removal of all source areas and document site conditions.

Approximately 13,010 (18,213 tons) cubic yards of contaminated soil will be removed from the site.

If encountered, excavation and removal of any underground storage tanks (USTs), underground piping or other structures associated with a source of contamination will be disposed of off-site.

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Clean fill meeting the requirements of 6 NYCRR Part 375-6.7(d) (i.e lower of the PGWSCOs or the Protection of Public Health for Restricted-Residential SCOs) will be brought in to complete the backfilling of the excavation and establish the designed grades at the site.

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The air containing VOCs extracted from the SVE wells will be treated by passing the air stream through activated carbon, which removes the VOCs from the air prior to it being discharged to the atmosphere. The operation of the components of the remedy will continue until the remedial

objectives have been achieved, or until the agencies determine that continued operation is technically impracticable or not feasible.

## **6. Groundwater Remedy (In-Situ Chemical Oxidation)**

An in-situ chemical oxidation and a bioremediation mechanism will be implemented to treat volatile organic compounds (VOCs) in groundwater and prevent further off-site migration of contaminated groundwater. A chemical oxidant (PersulfOx) will be injected into the subsurface at multiple locations to destroy the contaminants in the southeastern portion of the site. Additional injections of the oxidant may be required based on post-injection VOC monitoring results. A bioremediation agent mixed with additives will be applied approximately 3 months following the application of the oxidant. Post-injection groundwater sampling will be conducted three months after the first injection and quarterly for a minimum of 24 months after the last injection. The effectiveness of the treatment will be evaluated at 12 months and 24 months to determine whether further injections are required.

## **7. Cover System**

A site cover will be required to allow for restricted residential use of the site in areas where the upper two feet of exposed surface soil will exceed the applicable soil cleanup objectives (SCOs). Where a soil cover is to be used it will be a minimum of two feet of soil placed over a demarcation layer, with the upper six inches of soil of sufficient quality to maintain a vegetative layer. Soil cover material, including any fill material brought to the site, will meet the SCOs for cover material for the use of the site as set forth in 6 NYCRR Part 375-6.7(d). Substitution of other materials and components may be allowed where such components already exist or are a component of the tangible property to be placed as part of site redevelopment. Such components may include, but are not necessarily limited to: pavement, concrete, paved surface parking areas, sidewalks, building foundations and building slabs.

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- allow the use and development of the controlled property for restricted residential as defined by Part 375-1.8(g), although land use is subject to local zoning laws;
- restrict the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYSDOH or County DOH; and
- require compliance with the Department approved Site Management Plan.

## **9. Site Management Plan**

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- a. an Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the site and details the steps and media-specific requirements necessary

to ensure the following institutional and/or engineering controls remain in place and effective:

Institutional Controls: The Environmental Easement discussed in Paragraph 8 above.

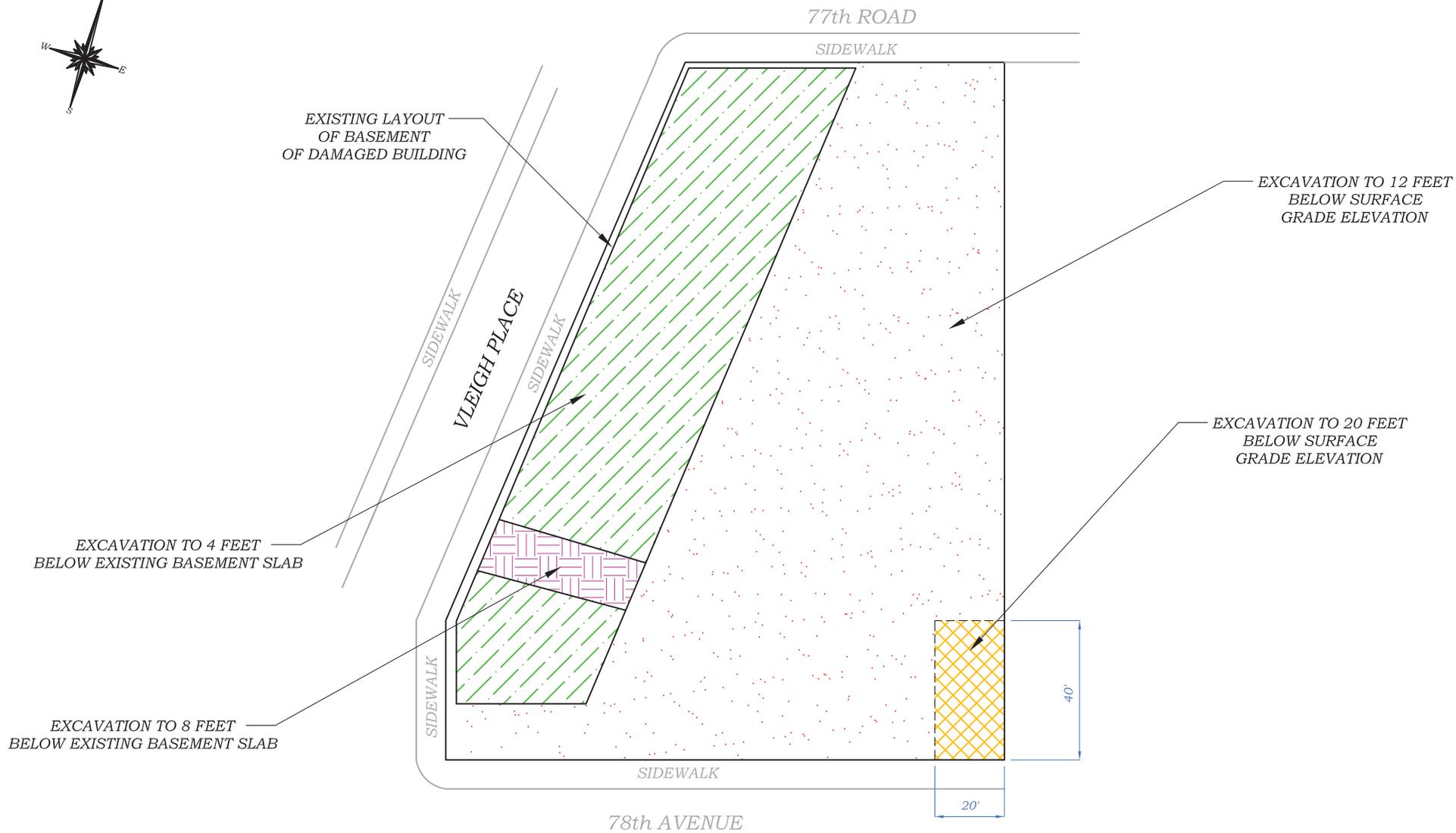
Engineering Controls: The sub-slab depressurization systems or similarly engineered systems discussed in paragraph 4, the SVE system discussed in Paragraph 5, the groundwater remedial system discussed in Paragraph 6 and the cover system discussed in Paragraph 7 above.

This plan includes, but may not be limited to:

- an Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination;
  - descriptions of the provisions of the environmental easement including any land use, and groundwater restrictions;
  - a provision for evaluation of the potential for soil vapor intrusion for buildings off-site to the south and southeast, including provision for implementing actions recommended to address exposures related to soil vapor intrusion;
  - a provision that should a building foundation or building slab be removed in the future, a cover system consistent with that described in Paragraph 7 above will be placed in any areas where the upper two feet of exposed surface soil exceed the applicable soil cleanup objectives (SCOs);
  - provisions for the management and inspection of the identified engineering controls; and
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- monitoring of soil, soil vapor and groundwater to assess the performance and effectiveness of the remedy;
  - a schedule of monitoring and frequency of submittals to the Department;
  - monitoring for vapor intrusion for any buildings, as may be required by the Institutional and Engineering Control Plan discussed above; and
  - Assess the performance and effectiveness of the SVE system by monitoring for vapor migration off-site.
- c. an Operation and Maintenance (O&M) Plan to ensure continued operation, maintenance, optimization, monitoring, inspection, and reporting of any mechanical or physical components of the remedy. The plan includes, but is not limited to:
- procedures for operating and maintaining the remedy;
  - compliance monitoring of treatment systems to ensure proper O&M as well as providing the data for any necessary permit or permit equivalent reporting;
  - maintaining site access controls and Department notification; and providing the Department access to the site and O&M records.







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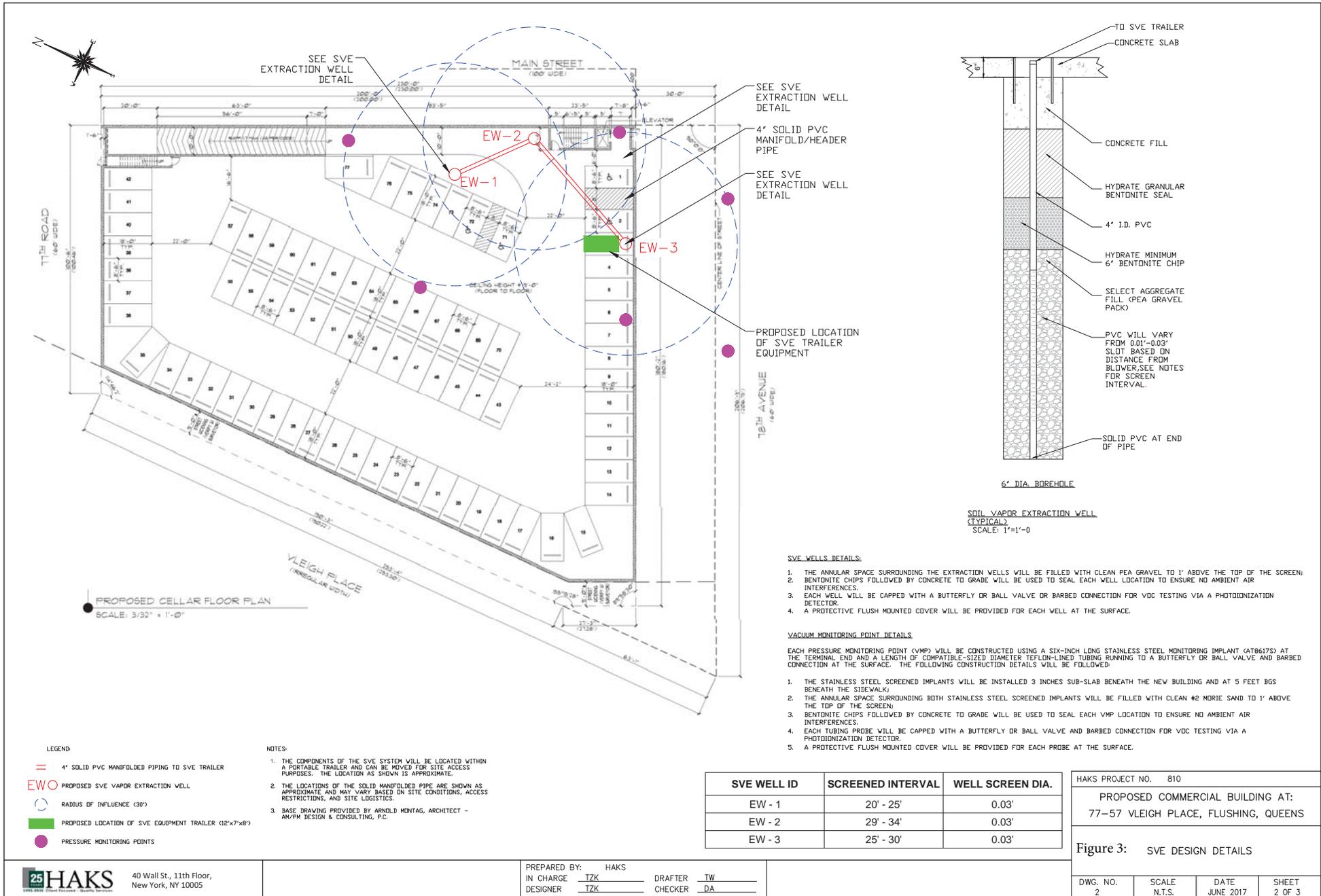
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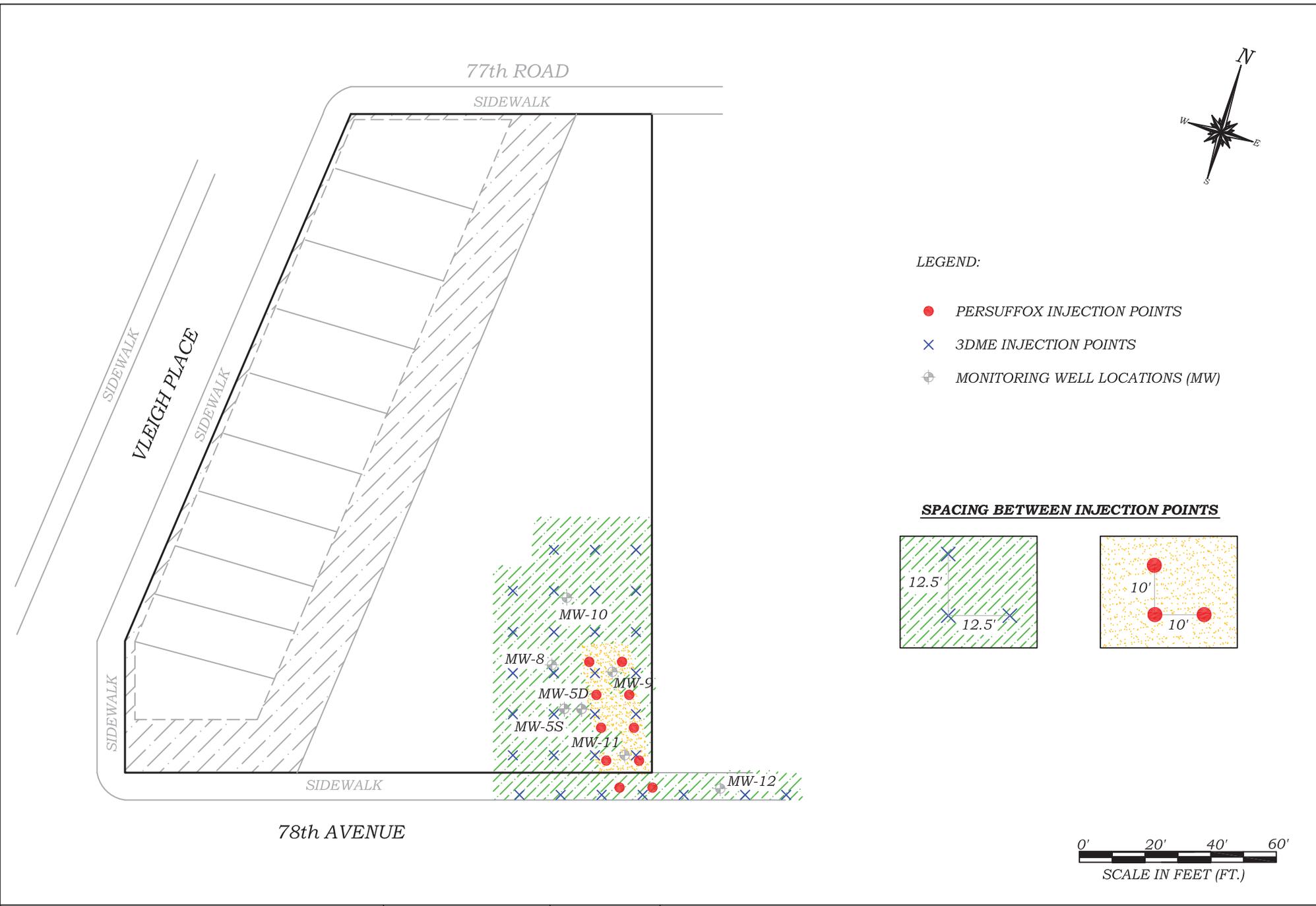
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Flushing, NY  
HTE Job# 170213

Drawn By: P.M.  
Reviewed By: P.M.  
Approved By: M.R.  
Date: 10/17/17  
Scale: AS NOTED

TITLE:

FIGURE 2 : MAP OF SITE EXCAVATION DEPTH





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 Scale: AS NOTED

TITLE:

FIGURE 4: REMEDIAL INJECTION MAP