DECISION DOCUMENT

Former Kenneth Trading Corp. Facility
Brownfield Cleanup Program
Astoria, Queens County
Site No. C241215
October 2021

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

DECLARATION STATEMENT - DECISION DOCUMENT

Former Kenneth Trading Corp. Facility
Brownfield Cleanup Program
ASTORIA, Queens County
Site No. C241215
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Statement of Purpose and Basis

This document presents the remedy for the Former Kenneth Trading Corp. Facility 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 Former Kenneth Trading Corp. Facility 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;
- Integrating the remedy with the end use where possible and encouraging green and sustainable re-development; and
- Additionally, to incorporate green remediation principles and techniques to the extent

feasible in the future development at this site, any future on-site buildings will include, at a minimum, a 20-mil vapor barrier/waterproofing membrane on the foundation to improve energy efficiency as an element of construction.

2. Excavation

The existing on-site building foundation elements 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);
- non-aqueous phase liquids;
- soil with visual waste material or non-aqueous phase liquid;
- 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; and
- any underground storage tanks (USTs), fuel dispensers, underground piping or other structures associated with a source of contamination.

All soils in the upper two feet which exceed the restricted residential soil cleanup objectives (SCOs) will be excavated and transported off-site for disposal. All on-site source material soils below two feet which exceed the protection of groundwater SCO for tetrachlorethylene (PCE) and its associated degradation products will be excavated. Approximately 13,010 cubic yards of contaminated soil will be removed from the site.

3. Backfill

On-site soil which does not exceed the above excavation criteria or the protection of groundwater SCOs for any constituent may be used below the cover system described in remedial element 4 to backfill the excavation to the extent that a sufficient volume of on-site soil is available and establish the designed grades at the site. Clean fill meeting the requirements of 6 NYCRR Part 375-6.7(d) will be brought in to complete the backfilling of the excavation and establish the designed grades at the site.

4. 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 restricted residential 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.

5. In-Situ Chemical Oxidation

In-situ chemical oxidation (ISCO) will be implemented to treat tetrachloroethylene (PCE) and its associated degradation products in groundwater. A chemical oxidant, sodium persulfate, will be injected into the subsurface to destroy the contaminants in an approximately 1,000 square foot area located along the eastern and southern halves of the site where chlorinated volatile organic compounds were elevated in the groundwater and saturated soils. The method and depth of injection will be determined during the remedial design.

Prior to the full implementation of this technology, laboratory and on-site pilot scale studies will be conducted to define design parameters more clearly. It is estimated that the chemical oxidant sodium persulfate will be injected at 14 to 15 locations during approximately three separate events. Monitoring will be conducted for contaminants of concern upgradient, downgradient and within the treatment zone.

6. In-Situ Activated Carbon and Zero Valent Iron Treatment

Activated carbon will be added to the subsurface to capture and prevent the migration of the contaminants of concern. The biological breakdown of contaminants through anaerobic reductive dechlorination will be enhanced by the inclusion of zero valent iron (ZVI). In the area of the captured contamination, conditions will be maintained that will allow anaerobic degradation of the contaminants of concern to occur. Activated carbon, including the amendment noted above, will be added to the subsurface along the west and southwest site boundaries where contaminants of concern were elevated in the groundwater via approximately 18 temporary injection wells screened from 10 to 25 feet. The method and depth of injection will be finalized during the remedial design.

7. Low Permeability Wall

A low permeability wall will serve as a permanent engineering control to limit off-site migration of residual contamination in groundwater and/or soil vapor. The low permeability wall will be constructed along the north and a portion of the west site boundary, will be downgradient with respect to groundwater flow, and extend to the bedrock surface. The construction methods and design details will be determined during remedial design. Monitoring will be conducted for contaminants of concern downgradient from the low permeability wall to assess its effectiveness.

8. Dewatering & Treatment

Dewatering and treatment will be implemented to facilitate the excavation phase of remediation. The dewatering system will be designed and installed so that the capture zone is sufficient to cover the areal and vertical extent of the source area excavation. The extracted groundwater will be treated and discharged per applicable permitting and local rules and regulations. The method of the groundwater treatment will be determined during the remedial design.

9. 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.

10. Vapor Mitigation

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

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

12. 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 site cover system discussed in Paragraph 4, the low permeability wall as discussed in Paragraph 7, the soil vapor extraction system discussed in paragraph 9, and the sub-slab depressurization system(s) discussed in Paragraph 10.

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 use restrictions;
- a provision for evaluation of the potential for soil vapor intrusion for any new buildings developed on the site, 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 4 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;
- maintaining site access controls and Department notification; and
- the steps necessary for the periodic reviews and certification of the institutional and/or engineering controls.

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

- monitoring of groundwater 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 on the site, as may be required by the Institutional and Engineering Control Plan discussed above.

c. an Operation and Maintenance (O&M) Plan to ensure continued operation, maintenance, inspection, and reporting of any mechanical or physical components of the active vapor mitigation system(s), SVE system, and low permeability wall. The plan includes, but is not limited to:
- procedures for operating and maintaining the system(s);
- compliance monitoring of treatment systems, soil vapor extraction, and/or sub-slab depressurization 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.

October 21, 2021

Date

Gerard Burke, Director
Remedial Bureau B

DECISION DOCUMENT

Former Kenneth Trading Corp. Facility
Astoria, Queens County
Site No. C241215
October 2021

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, where a contaminant is present at levels exceeding the soil cleanup objectives or other health-based or environmental standards, criteria or guidance, based on the reasonably anticipated use of the property.

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:

DECInfo Locator - Web Application
https://gisservices.dec.ny.gov/gis/dil/index.html?rs=C241215

Queens Library at Astoria
14-01 Astoria Blvd
Astoria, NY 11102
Phone: (718) 278-2220

Queens Community Board 1
45-02 Ditmars Boulevard; LL Suite 125
Astoria, NY 11105
Phone: (718) 626-1021

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 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 0.23-acre site is located at 11-35 31st Drive in an urban area of Astoria, NY. The site is bound by a multi-story residential building with parking garage to the north, 31st Drive and residential and light industrial buildings to the south, multi-family residential buildings and parking lot to the east, and an outdoor private recreation area to the west. The site is identified as Block 41 and Lot 503 on the New York City Tax Map. The site is 500 feet east of the East River.

Site Features:
The site is currently covered by a concrete slab, undeveloped and vacant. Previously, a one-story slab on grade, cement block and brick masonry warehouse-type building constructed in 1959 occupied the site. It was subsequently demolished in 2019.

Current Zoning and Land Use:
The site is zoned residential, R7A/R5B, and is vacant. The surrounding area is a mixture of residential and light industrial. A private outdoor recreation area associated with the nearby multi-family residential buildings is to the west of the site.

Past Use of the Site:
The site was initially developed for residential use. The site was later used for commercial purposes including a metal fabrication/manufacturing facility, from at least 1962 until 2010. In manifests obtained for the prior steel works operation at the site, the facility generated spent chlorinated solvents as well as other chemicals.

Site Geology and Hydrogeology:
Soils beneath the site consist of tan to brown fine to medium sand which transition to brown silt at depths of 15 to 25 feet below ground surface (ft-bgs). No distinctive historic fill layer was identified. Based on soil borings, bedrock beneath the site is Harrison Gneiss and encountered at depths ranging from 23 to 34 ft-bgs.

Monitoring well data indicates groundwater beneath the site is present between 8 to 13 ft-bgs. Groundwater flow is westerly towards the nearest surface water body, the East River, which is located approximately 500 feet to the northwest.

A site location map is attached as Figure 1 and a site plan is attached as Figure 2.

SECTION 4: LAND USE AND PHYSICAL SETTING

The Department may consider the current, intended, and reasonably anticipated future land use of the site and its surroundings when evaluating a remedy for soil remediation. For this site, alternatives (or an alternative) that restrict(s) the use of the site to restricted-residential use (which allows for commercial 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(s) under the Brownfield Cleanup Agreement is a/are Volunteer(s). The Volunteer(s) does/do not have an obligation to address off-site contamination. The Department has determined that this site poses a significant threat to human health and the environment and there are off-site impacts that require remedial activities; accordingly, enforcement actions are necessary.

The Department has sought to identify any parties (other than the Volunteer(s)) known or suspected to be responsible for contamination at or emanating from the site, referred to as Potentially Responsible Parties (PRPs). The Department has attempted to bring an enforcement action against the PRPs. If an enforcement action cannot be brought, or does not result in the initiation of a remedial program by any PRPs, the Department will evaluate the off-site contamination for action under the State Superfund. The PRPs are subject to legal actions by the State for recovery of all response costs the State incurs or has incurred.

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
- 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:

trichloroethene (TCE)
tetrachloroethene (PCE)
1,2,4-trimethylbenzene
1,1,1-trichloroethane
1,1-dichloroethene
perfluorooctanoic acid (PFOA)
1,4-dioxane
carbon tetrachloride
indeno(1,2,3-cd)pyrene
benzo(k)fluoranthene
chrysene
lead
chromium
cis-1,2-dichloroethene (cis-1,2-DCE)
vinyl chloride
1,3,5-trimethylbenzene
xylene
chloroform
perfluorooctanesulfonic acid (PFOS)
benzo(a)pyrene
benzo(b)fluoranthene
benzo(a)anthracene
1,4-dioxane
arsenic
mercury

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

- groundwater
- soil

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), pesticides, per- and polyfluoroalkyl substances (PFAS), and 1,4-dioxane. Soil vapor was analyzed for VOCs. The primary contaminants of concern detected in all media were tetrachloroethylene (PCE), trichloroethylene (TCE), and cis-1,2-dichloroethene (cis-1,2-DCE). Contaminants in the following media are of environmental concern:

Soil:
The following chlorinated VOCs were detected above the applicable restricted residential (RRSCOs) and/or protection of groundwater soil cleanup objectives (PGWSCOs): PCE up to 7,900 parts per million (ppm) (PGWSCO of 1.3 ppm), TCE up to 830 ppm (PGWSCO of 0.47 ppm), cis-1,2-DCE up to 500 ppm (PGWSCO of 0.25 ppm). Elevated detections of these contaminants were present primarily in the source area in the northern portion of the site at the location of the former dipping tanks and spray booth. Other VOCs detected above their respective SCOs include xylenes up to 36 ppm (PGWSCO of 1.6), 1,3,5-trimethylbenzene up to 29 ppm (PGWSCO of 8.4 ppm), 1,2,4-trimethylbenzene up to 53 ppm (PGWSCO of 3.6 ppm), 1,1,1-trichloroethane up to 470 ppm (PGWSCO of 0.68 ppm), and vinyl chloride up to 0.037 ppm (PGWSCO of 0.02 ppm).

The SVOC indeno(1,2,3-cd)pyrene was detected up to 0.55 ppm (RRSCO of 0.5 ppm). The following metals were detected above the applicable RRSCOs: arsenic up to 45.4 ppm (RRSCO 16 ppm), lead up to 476 ppm (RRSCO 400 ppm), and mercury up to 0.187 ppm (RRSCO 0.81 ppm). No pesticides or PCBs were detected above applicable SCOs.

The PFAS perfluorooctanoic acid (PFOA) was detected in soil at concentrations up to 1.85 ppb, above its protection of groundwater guidance value of 1.1 ppb. The PFAS perfluorooctanesulfonic acid (PFOS) was detected at concentrations below it's protection of groundwater guidance values of 3.7 ppb.

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

Groundwater:
Groundwater was analyzed via 14 overburden groundwater monitoring wells. Chlorinated VOCs detected above Class GA Ambient Water Quality Standards (AWQS) include: PCE up to 210,000 parts per billion (ppb), TCE up to 1,700 ppb, cis-1,2-DCE up to 57,000 ppb, 1,1-dichloroethene up to 120 ppb, 1,2,4-trimethylbenzene up to 1,500 ppb, 1,3,5-trimethylbenzene up to 1,500 ppb, and xylene up to 420 ppb, all with an AWQS of 5 ppb. Other VOCs detected above their respective AWQS includes: chloroform up to 7.4 ppb (AWQS of 7 ppb) and vinyl chloride up to 1,000 ppb (AWQS of 2 ppb). No other VOCs were detected above AWQS. Several SVOCs were detected above AWQS and include: benzo(a)anthracene up to 0.09 ppb, benzo(b)fluoranthene up to 0.13 ppb, benzo(k)fluoranthene up to 0.04 ppb, chrysene up to 0.09 ppb, and indeno(1,2,3-cd)pyrene up to 0.07 ppb, all with an AWQS of 0.002 ppb. The SVOC benzo(a)pyrene was detected up to 0.06 ppb, above its AWQS of ND. The PCB arochlor 1254 was detected up to 0.39 ppb, above its AWQS of 0.09 ppb. Metals detected above AWQS were selenium, detected up to 11.1 ppb above its AWQS of 10 ppb, and chromium detected up to 378.5 ppb, above its AWQS of 50 ppb. No pesticides were detected above AWQS.

For PFAS, PFOA and PFOS were reported at concentrations up to 651 parts per trillion (ppt) and 472 ppt, respectively, exceeding the Maximum Contaminant Levels (MCLs) (drinking water standard) of 10 ppt each in groundwater. The compound 1,4-dioxane was detected up to 304 ppb, above the MCL of 1 ppb. There are no public water supply wells within a half a mile and there is a municipal prohibition for use of groundwater at the site.

Groundwater flows in a westerly direction, towards the East River. Migration of contaminants of concern have been observed in groundwater and the contaminant plume extends off-site with a maximum detected concentration of up to 1,600 ppb for PCE, 560 ppb for TCE, and 280 ppb for cis-1,2-DCE indicating off-site impacts

Soil Vapor::
Chlorinated VOCs were detected in soil vapor throughout the site with the highest concentrations located within and near the soil source area where the former dipping tanks were located. PCE concentrations range from 163,000 micrograms per cubic meter (ug/m^3) near the southern corner of the site up to 12,300,000 ug/m^3 located within the source area. TCE was detected site-wide with a maximum concentration of 14,000 ug/m^3. The contaminated soil and groundwater are the source of the VOC contaminants in soil vapor. Contaminants of concern in soil vapor were identified off-site during the investigation and are being addressed separately.

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.*

Since the site is covered by asphalt or concrete, people will not come into contact with site-related soil and groundwater contamination unless they dig below the surface. Contaminated groundwater at the site is not used for drinking or other purposes and the site and surrounding area is served by a public water supply that obtains water from a different source not affected by this contamination. Volatile organic compounds in soil vapor (air spaces within the soil) may move into buildings and affect the indoor air quality. This process, which is similar to the movement of radon gas from the subsurface into the indoor air of buildings, is referred to as soil vapor intrusion. Because there is no on-site building, inhalation of site contaminants in indoor air due to soil vapor intrusion does not represent a concern for the site in its current condition. However, the potential exists for the inhalation of site contaminants due to soil vapor intrusion for any future on-site development and occupancy. In addition, efforts are underway to address off-site soil vapor intrusion concerns.

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 generic soil cleanup objectives remedy.

The selected remedy is referred to as the Excavation, Groundwater Treatment, Soil Vapor Extraction/Vapor Mitigation, and Cover System remedy.

The elements of the selected remedy, as shown in Figure 3A through 3J, are as follows:

1. Remedial Design

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

- Considering the environmental impacts of treatment technologies and remedy stewardship over the long term;
- Reducing direct and indirect greenhouse gases and other emissions;
- Increasing energy efficiency and minimizing use of non-renewable energy;
- Conserving and efficiently managing resources and materials;
- Reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste;
- Maximizing habitat value and creating habitat when possible;
- Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals;
- Integrating the remedy with the end use where possible and encouraging green and sustainable re-development; and
- Additionally, to incorporate green remediation principles and techniques to the extent feasible in the future development at this site, any future on-site buildings will include, at a minimum, a 20-mil vapor barrier/waterproofing membrane on the foundation to improve energy efficiency as an element of construction.

2. Excavation

The existing on-site building foundation elements 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);
- non-aqueous phase liquids;
- soil with visual waste material or non-aqueous phase liquid;
- 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.

All soils in the upper two feet which exceed the restricted residential and/or protection of groundwater soil cleanup objectives (SCOs) will be excavated and transported off-site for disposal. All on-site source material soils below two feet which exceed the protection of groundwater SCO for tetrachlorethylene (PCE) will be excavated. Approximately 13,010 cubic yards of contaminated soil will be removed from the site. Excavation and removal of any underground storage tanks (USTs), fuel dispensers, underground piping or other structures associated with a source of contamination will be performed.

3. Backfill

On-site soil which does not exceed the above excavation criteria or the protection of groundwater SCOs for any constituent may be used below the cover system described in remedial element 4 to backfill the excavation to the extent that a sufficient volume of on-site soil is available and establish the designed grades at the site. Clean fill meeting the requirements of 6 NYCRR Part 375-6.7(d) will be brought in to complete the backfilling of the excavation and establish the designed grades at the site.

4. 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.

5. In-Situ Chemical Oxidation

In-situ chemical oxidation (ISCO) will be implemented to treat tetrachloroethylene (PCE), trichloroethylene (TCE), cis-1,2-dichloroethylene (cis-1,2-DCE), and associated contaminants of concern in groundwater. A chemical oxidant, sodium persulfate, will be injected into the subsurface to destroy the contaminants in an approximately 1,000 square foot area located along the eastern and southern halves of the site where chlorinated volatile organic compounds were elevated in the groundwater and saturated soils. The method and depth of injection will be determined during the remedial design.

Prior to the full implementation of this technology, laboratory and on-site pilot scale studies will be conducted to define design parameters more clearly. It is estimated that the chemical oxidant sodium persulfate will be injected at 14 to 15 locations during approximately three separate events. Monitoring will be conducted for contaminants of concern upgradient, downgradient and within the treatment zone.

6. In-Situ Treatment using Activated Carbon

Activated carbon will be added to the subsurface to capture and prevent the migration of the contaminants of concern, tetrachloroethylene (PCE), trichloroethylene (TCE), and cis-1,2-dichloroethylene (cis-1,2-DCE). The biological breakdown of contaminants through anaerobic reductive dechlorination will be enhanced by the inclusion of zero valent iron (ZVI). In the area of the captured contamination, conditions will be maintained that will allow anaerobic degradation of the contaminants of concern to occur. Activated carbon, including the amendment noted above, will be added to the subsurface along the west and southwest site boundaries where contaminants of concern were elevated in the groundwater via approximately 18 temporary injection wells screened from 10 to 25 feet. The method and depth of injection will be finalized during the remedial design.

7. Low Permeability Wall

A low permeability wall will serve as a permanent engineering control to limit off-site migration of residual contamination in groundwater and/or soil vapor. The low permeability wall will be constructed along the north and a portion of the west site boundary, will be downgradient with respect to groundwater flow, and extend to the bedrock surface. The construction methods and design details will be determined during remedial design. Monitoring will be conducted for tetrachloroethylene (PCE), trichloroethylene (TCE), cis-1,2-dichloroethylene (cis-1,2-DCE), and other contaminants of concern downgradient from the low permeability wall to assess its effectiveness.

8. Dewatering & Treatment

Dewatering and treatment will be implemented to treat contaminants in groundwater during the excavation phase of remediation. The dewatering system will be designed and installed so that the capture zone is sufficient to cover the areal and vertical extent of the source area excavation. The extracted groundwater will be treated and discharged per applicable permitting and local

rules and regulations. The method of the groundwater treatment will be determined during the remedial design and reviewed by the Department and the New York State Department of Health (NYSDOH).

9. 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.

10. Vapor Mitigation

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

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

12. 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 site cover system discussed in Paragraph 4, the low permeability wall as discussed in Paragraph 7, the soil vapor extraction system discussed in paragraph 9, and the sub-slab depressurization system(s) discussed in Paragraph 10.

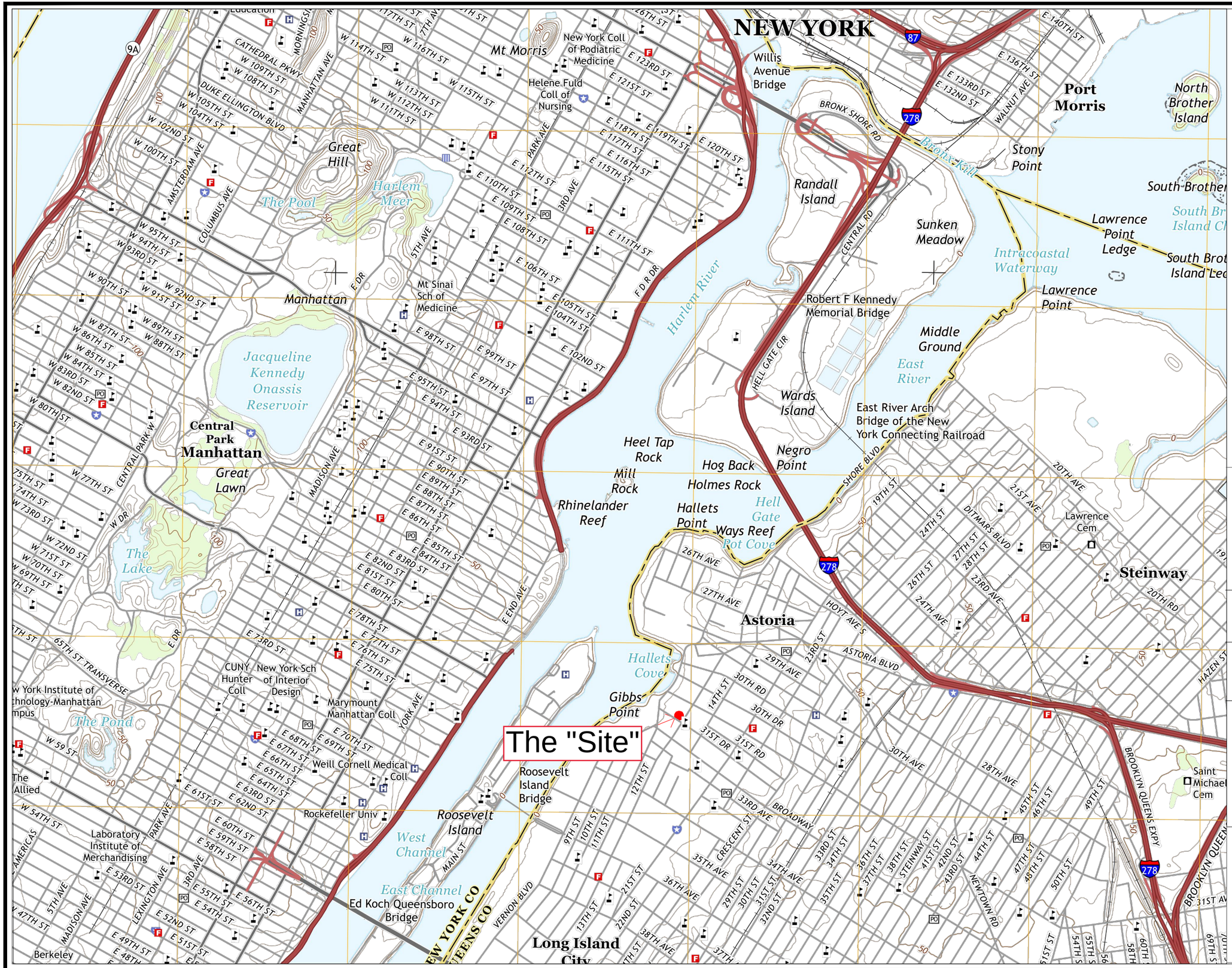
This plan includes, but may not be limited to:

- 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 use restrictions;
- a provision for evaluation of the potential for soil vapor intrusion for any new buildings developed on the site, 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 4 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;
- maintaining site access controls and Department notification; and
- the steps necessary for the periodic reviews and certification of the institutional and/or engineering controls.

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

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

c. an Operation and Maintenance (O&M) Plan to ensure continued operation, maintenance, inspection, and reporting of any mechanical or physical components of the active vapor mitigation system(s), SVE system, and low permeability wall. The plan includes, but is not limited to:
   - procedures for operating and maintaining the system(s);
   - compliance monitoring of treatment systems, soil vapor extraction, and/or sub-slab depressurization 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.



Base Map Source: USGS Topographic Map
Central Park Quadrangle

NOTES:

Figure 1

SITE LOCATION MAP

11-35 31st Drive
Astoria, New York

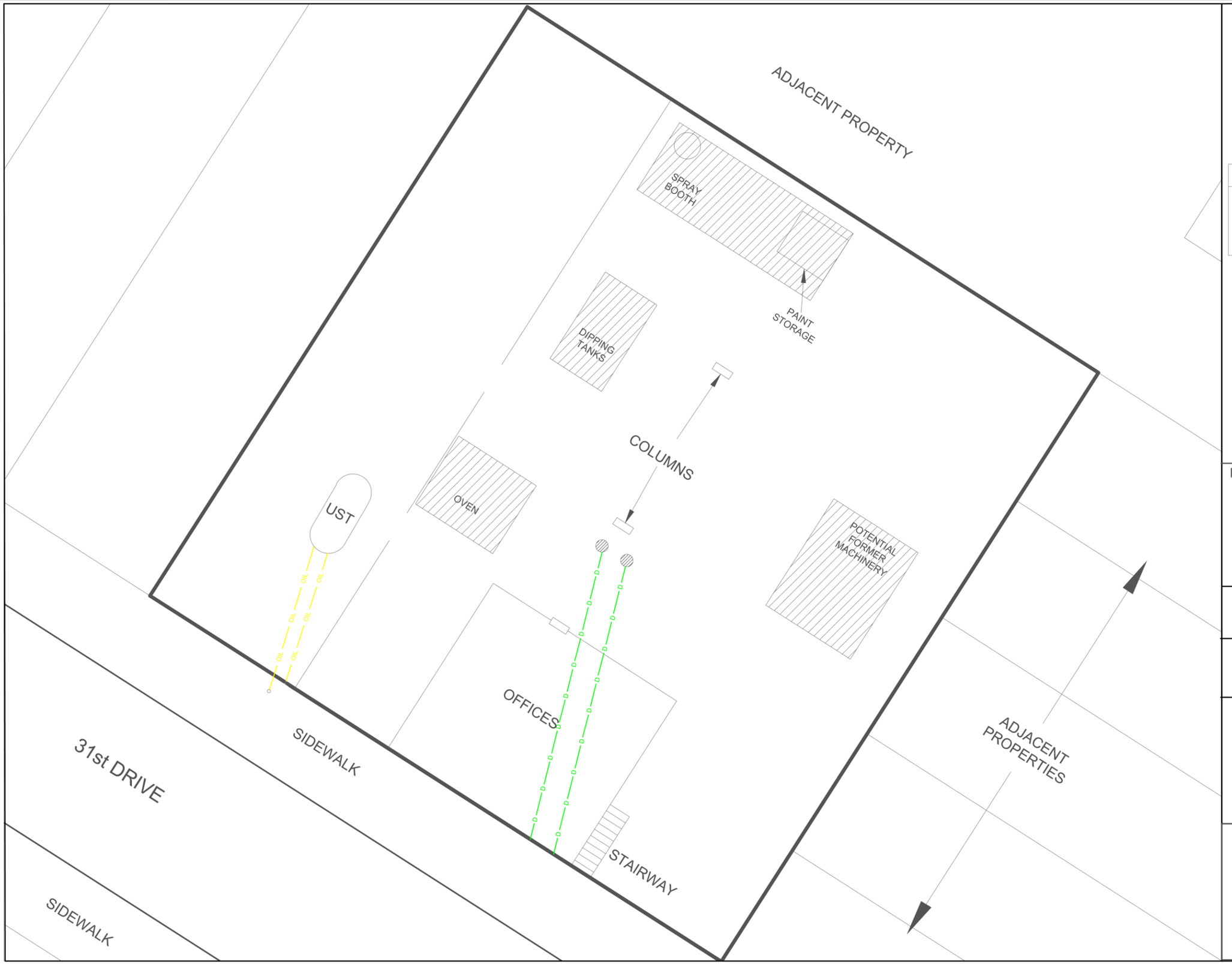
Plate No: 01

PROJECT NO.	11845-01
DESIGNED BY:	LR
DRAWN BY:	LR
CHECKED BY:	JDF
DATE:	10/24/2019
SCALE:	N.T.S
REVISIONS	

PROJECT
NORTH

IMPACT ENVIRONMENTAL CLOSURES, INC.

170 KEYLAND COURT
BOHEMIA, NEW YORK 11716
TEL (631) 269-8800
FAX (631) 269-1599



LEGEND

- Site Boundary

0' 13' 26'

PROJECT NORTH

NOTES:

Site Plan
Figure 2

11-35 31st Drive
Astoria, New York

Plate No: 7

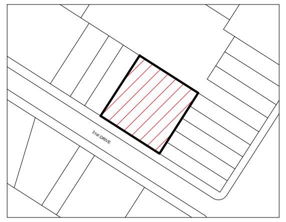
PROJECT NO.	11845-01
DESIGNED BY:	LR
DRAWN BY:	LR
CHECKED BY:	JDF
DATE:	10/24/2019
SCALE:	SEE ABOVE
REVISIONS	

LEGEND

- ▨ 2' BELOW SURFACE GRADE EXCAVATION
- ▨ 4' BELOW SURFACE GRADE EXCAVATION
- ▨ 12' BELOW SURFACE GRADE EXCAVATION
- ▨ SOURCE AREA EXCAVATION
- ▨ HOT SPOT EXCAVATION

PROJECT
NORTH

0' 14' 28'


KEY PLAN

NOTES:

Figure 3A

PLANED EXCAVATION MAP

11-35 31st Drive
Astoria, New York

Plate No: 17

PROJECT NO.	11845-01
DESIGNED BY:	AB
DRAWN BY:	AB
CHECKED BY:	JDF
DATE:	2/24/2021
SCALE:	N.T.S
REVISIONS	

PROJECT
NORTH

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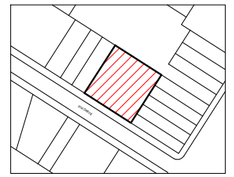
FAX (631) 269-1599

LEGEND

- CONCRETE SECANT PILE WALLS
- PERMANENT INTERLOCKING SHEET PILES
- TEMPORARY INTERLOCKING SHEET PILES

PROJECT NORTH

0' 14' 28'



KEY PLAN

NOTES:

Figure 3B

PROPOSED SOURCE AREA EXCAVATION SOE MAP

11-35 31st Drive
Astoria, New York

Plate No: 17a

PROJECT NO.	11845-01
DESIGNED BY:	AB
DRAWN BY:	AB
CHECKED BY:	JDF
DATE:	7/28/2021
SCALE:	N.T.S
REVISIONS	

PROJECT NORTH

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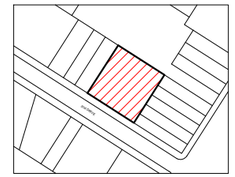
LEGEND

- 2' BELOW SURFACE GRADE EXCAVATION
- 4' BELOW SURFACE GRADE EXCAVATION
- 12' BELOW SURFACE GRADE EXCAVATION
- SOURCE AREA EXCAVATION
- HOT SPOT EXCAVATION
- PROPOSED SOIL CONFIRMATION SAMPLE LOCATIONS

PROJECT NORTH

0' 14' 28'



NOTES:

Figure 3C

CONFIRMATION SOIL SAMPLE LOCATIONS

11-35 31st Drive
Astoria, New York

Plate No: 17b

PROJECT NO.	11845-01
DESIGNED BY:	AB
DRAWN BY:	AB
CHECKED BY:	JDF
DATE:	5/18/2021
SCALE:	N.T.S

REVISIONS

PROJECT NORTH

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LEGEND

ESTIMATED LOCATION OF BACKFILL

0' 18' 36'

PROJECT NORTH

NOTES:

Figure 3D

IMPORTED BACKFILL LOCATION MAP

11-35 31st Drive
Astoria, New York

Plate No: 18

PROJECT NO.	11845-01
DESIGNED BY:	AB
DRAWN BY:	AB
CHECKED BY:	JDF
DATE:	7/23/2021
SCALE:	N.T.S

REVISIONS

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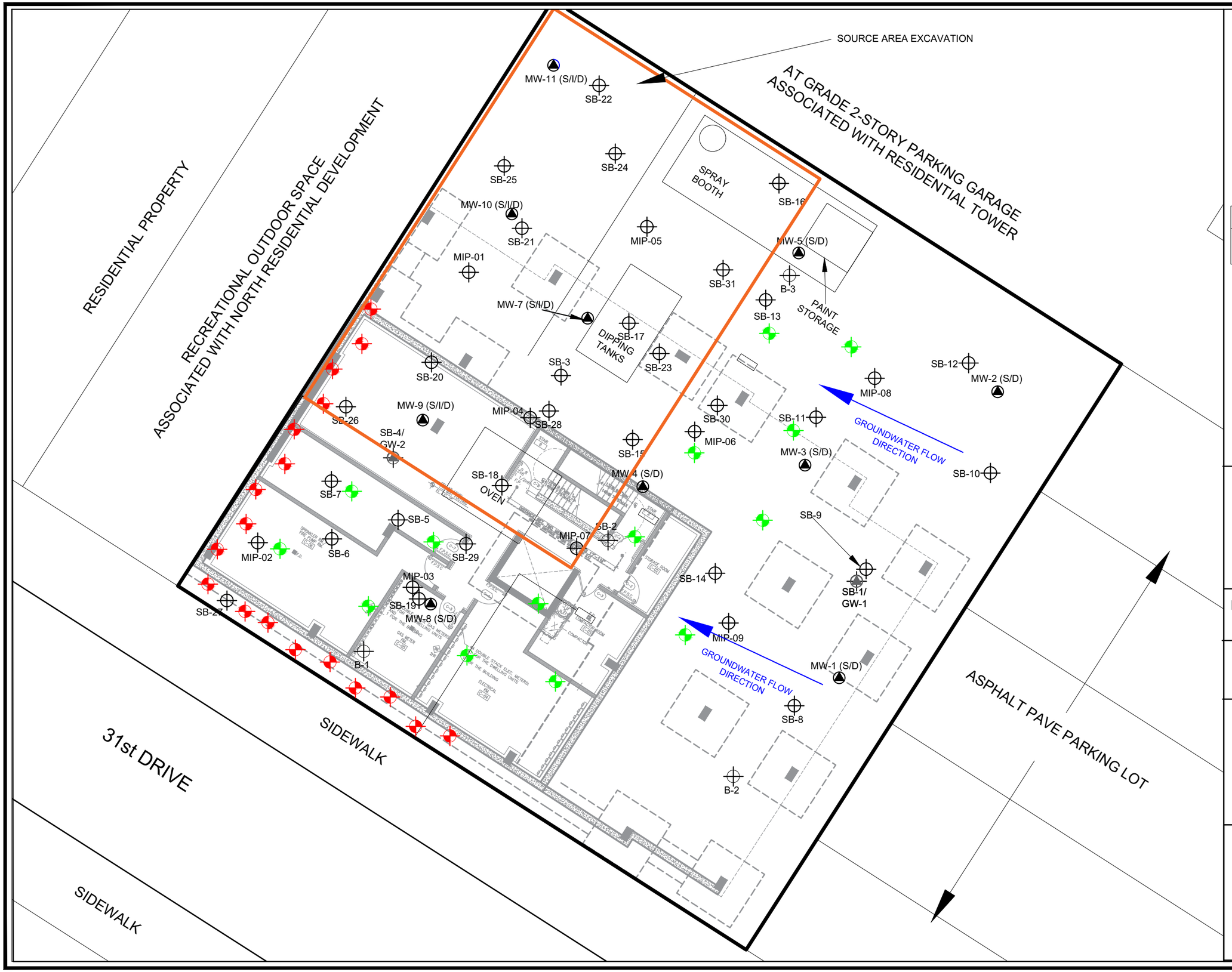

LEGEND

- APPROXIMATE ISCR INJECTION POINT
- APPROXIMATE ISCO INJECTION POINT

0' 13' 26'

PROJECT NORTH

NOTES:

Figure 3E

PROPOSED ISCO AND ISCR INJECTION POINTS

11-35 31st Drive
Astoria, New York

Plate No: 19

PROJECT NO.	11845-01
DESIGNED BY:	LR
DRAWN BY:	AB
CHECKED BY:	JDF
DATE:	2/24/2021
SCALE:	N.T.S

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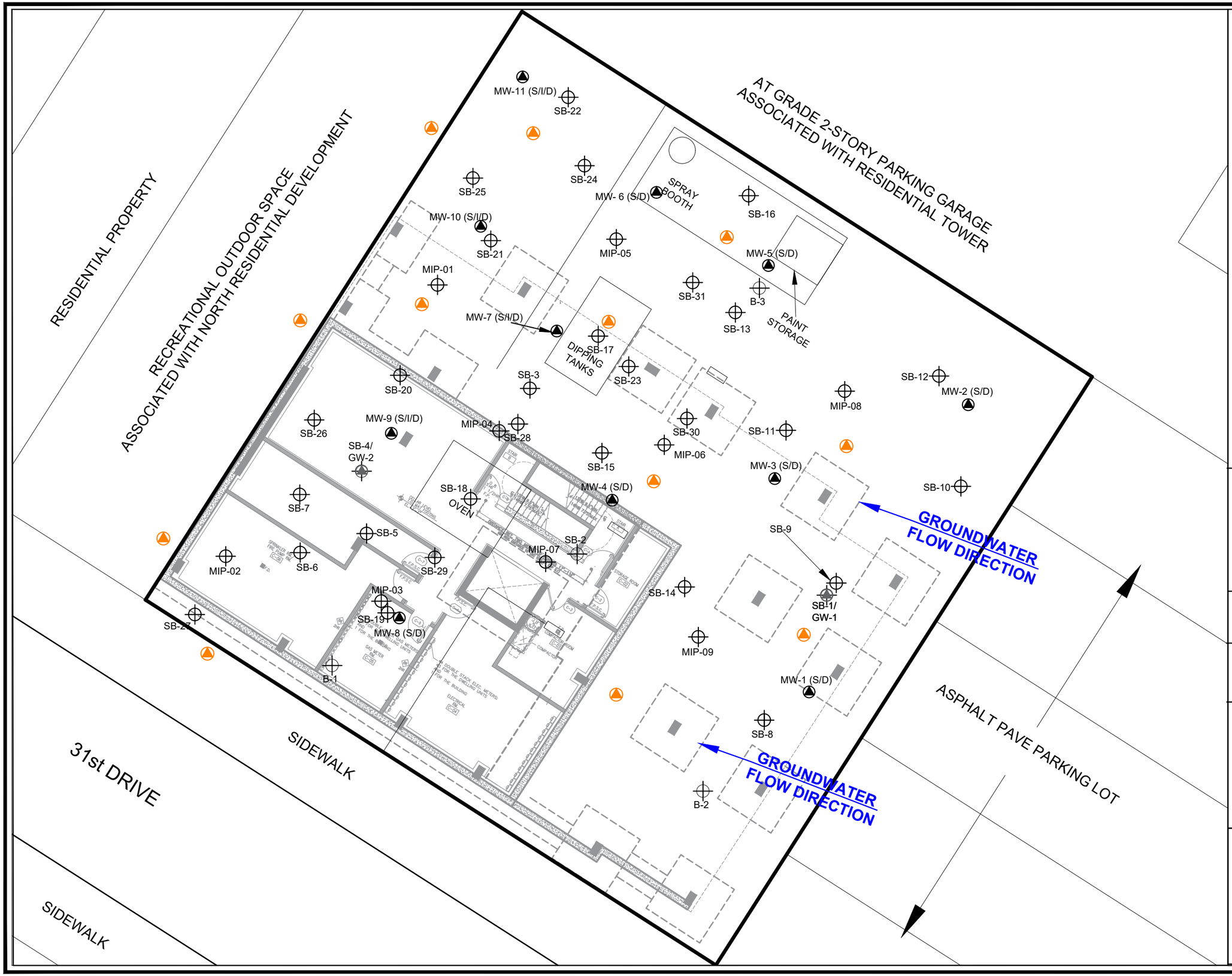

LEGEND

PROPOSED MONITORING WELL LOCATION

0' 13' 26'

PROJECT NORTH

NOTES:

Figure 3F

PROPOSED MONITORING WELL LOCATIONS

11-35 31st Drive
Astoria, New York

Plate No: 20

PROJECT NO.	11845-01
DESIGNED BY:	AB
DRAWN BY:	AB
CHECKED BY:	JDF
DATE:	5/19/2021
SCALE:	N.T.S

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OUTLINE OF BUILDING (2nd FLOOR, 3rd / 4th FLOOR)
DN
UP
KITCHEN BOH
STAIR #1
STAIR #2
ELEV. #1
ELEV. #2
ELEV. MACH. RM.
STAIR #3
ELEV. #3
ELEV. MACH. RM.
STAIR #4
ELEV. #4
ELEV. MACH. RM.
STAIR #5
ELEV. #5
ELEV. MACH. RM.
STAIR #6
ELEV. #6
ELEV. MACH. RM.
STAIR #7
ELEV.

LEGEND

🟥 PROPOSED SVE PIPING
🔺 PROPOSED SVE/MONITORING WELL
🔵 PROPOSED MONITORING WELL

PROJECT
NORTH

0' 14' 28'

KEY PLAN

NOTES:

Figure 3H

Conceptual SVE Design Plan With Proposed SVE and Monitoring Well Locations

11-35 31st Drive
Astoria, New York

Plate No: 23

PROJECT NO.	11845-01
DESIGNED BY:	LR
DRAWN BY:	LR
CHECKED BY:	JDF
DATE:	3/2/2020
SCALE:	N.T.S
REVISIONS	

PROJECT
NORTH

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FAX (631) 269-1599

LEGEND

- ESTIMATED LOCATION OF LANDSCAPED COVER
- ESTIMATED LOCATION OF CONCRETE COVER

PROJECT NORTH

0' 14' 28'

KEY PLAN

NOTES:

Figure 3I

LOCATION OF EACH COVER TYPE

11-35 31st Drive
Astoria, New York

Plate: 25

PROJECT NO.	11845-01
DESIGNED BY:	LR
DRAWN BY:	LR
CHECKED BY:	JDF
DATE:	10/24/2019
SCALE:	N.T.S
REVISIONS	

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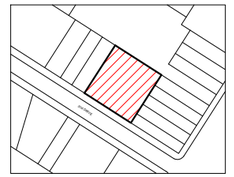
TEL (631) 269-8800
FAX (631) 269-1599

LEGEND

- CONCRETE SECANT PILE WALLS
- PERMANENT INTERLOCKING SHEET PILES
- TEMPORARY INTERLOCKING SHEET PILES

PROJECT NORTH

0' 14' 28'



KEY PLAN

Figure 3J

PROPOSED SOURCE AREA EXCAVATION SOE MAP

11-35 31st Drive
Astoria, New York

Plate No: 17a

PROJECT NO.	11845-01
DESIGNED BY:	AB
DRAWN BY:	AB
CHECKED BY:	JDF
DATE:	7/28/2021
SCALE:	N.T.S
REVISIONS	

PROJECT NORTH

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