DECISION DOCUMENT

34 Berry Street
Brownfield Cleanup Program
Brooklyn, Kings County
Site No. C224268
February 2021

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

DECLARATION STATEMENT - DECISION DOCUMENT

34 Berry Street
Brownfield Cleanup Program
Brooklyn, Kings County
Site No. C224268
February 2021

Statement of Purpose and Basis

This document presents the remedy for the 34 Berry Street 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 34 Berry Street 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. Cover System

A site cover currently exists in areas not occupied by buildings and will be maintained to allow for restricted residential use of the site. Any site redevelopment will maintain the existing site cover. The site cover may include paved surface parking areas, sidewalks or soil where the upper two feet of exposed surface soil meets the applicable soil cleanup objectives (SCOs) for restricted residential use. Any fill material brought to the site will meet the requirements for the identified site use as set forth in 6NYCRR part 375-6.7(d).

3. Groundwater Treatment: Surfactant-Enhanced LNAPL Recovery with Groundwater Recirculation

The existing Light Non-Aqueous Phase Liquid (LNAPL) extraction system will be upgraded to include the injection of surfactant and groundwater recirculation to enhance the treatment and recovery of petroleum LNAPL. The existing recovery well network at the site will be used to recirculate groundwater to induce pressure head changes and increase water flow through low permeability sediments and maximize the contact area of the injected compounds with the contaminants. Injection points will be strategically placed to allow for surfactant to be introduced into the zone of contamination, and then recaptured at recovery wells. It is estimated that two new extraction wells will be installed and used along with the existing recovery wells to pump LNAPL and groundwater to an upgraded aboveground treatment system consisting of an oil/water separator or organoclay filter that will remove emulsified LNAPL from the water, and a granular activated carbon (GAC) filter to further treat the water. A portion of the treated water will then be dosed with surfactants and reinjected into the shallow groundwater via injection wells. The existing network of recovery and monitoring wells can be used for the injection and circulation program, with the installation of additional wells, where needed, to optimize performance. A detailed design document will be prepared for Department review prior to implementation of the in-situ treatment program.

4. Groundwater Treatment: In-Situ Enhanced Biodegradation and Natural Attenuation

In-situ enhanced biodegradation will be employed to treat 1,2-DCA in shallow groundwater and soil below the water table. The biological breakdown of contaminants through aerobic degradation will be enhanced by injection of oxygen into the subsurface via injection wells. The method and depth of injection will be determined during the remedial design. Contact of the injected compounds with the contamination zone will be enhanced by recirculation with fluid injection at one point, and targeted fluid removal at another point. The recirculation increases flow velocity through the treatment zone by increasing the hydraulic gradient.

If the bioremediation results in increased soil vapor generation, the existing passive SSDS may be converted to an active system that depressurizes the entire building slab. The SSDS and vapor barrier below the foundation slab of the parking garage area will be incorporated with the parking area ventilation systems as an engineering control to mitigate the potential migration of vapors into the building from soil and/or groundwater.

A detailed design document will be prepared for Department review prior to implementation of the in-situ treatment program.

After treatment of the source area and dissolved shallow plume, residual dissolved contamination within the deeper saturated zone will be addressed with natural attenuation, where conditions have shown to be conducive for natural degradation of VOCs.

5. 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 NYCDOHMH; and
- require compliance with the Department approved Site Management Plan.

6. 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 5 above.
    - Engineering Controls: The cover system discussed in Paragraph 2, and the groundwater treatment systems discussed in Paragraphs 3 and 4.

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 water use restrictions;
- a provision for evaluation of the potential for soil vapor intrusion for any occupied buildings on the site, including provision for implementing actions recommended to address exposures related to soil vapor intrusion;
- a provision that should a building foundation or building slab be removed in the future, a cover system consistent with that described in Paragraph 2 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, 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.

February 9, 2021

Date

Gerard Burke, Director
Remedial Bureau B

DECISION DOCUMENT

34 Berry Street
Brooklyn, Kings County
Site No. C224268
February 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, 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:

DECInfo Locator - Web Application
https://gisservices.dec.ny.gov/gis/dil/index.html?rs=C224268

Brooklyn Public Library
Leonard Branch
81 Devoe street
Brooklyn, NY 11211
Phone: 718-486-6006

Brooklyn Community Board District 1

435 Graham Avenue
Brooklyn, NY 11211
Phone: 718-389-0009

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 site is located in an urban area in the Williamsburg neighborhood of Brooklyn, NY. The approximately 36,472 square-foot (0.83-acre), irregularly shaped site is bounded to the north by North 12th Street, to the east by Berry Avenue, to the west by a warehouse building used by the Brooklyn Brewery, and to the south by North 11th Street and two buildings containing residential apartments.

Site Features:
The site is developed with an L-shaped, seven-story residential building that fronts Berry and North 12th Streets, with an open courtyard area located behind the building in the central portion of the site. A basement level parking garage is located under the building and courtyard, with an entrance ramp located on North 11th Street. A small, street-level valet parking lot is also located on North 11th Street, immediately east of the garage entrance ramp.

Current Zoning and Land Use:
The site is zoned as M1-2/R6A (light manufacturing and residential uses). The surrounding area is developed primarily with residential and commercial properties.

Past Use of the Site:
Historic records indicated that the site was developed with industrial and manufacturing uses, including the New York Quinine and Chemical Works between 1887 and 1951. After 1951, the site was used for freight loading and parking of vehicles. Sanborn maps from 1965 to 2006 (after decommissioning of the quinine factory) depict a large 2-story freight loading facility and warehouse in the western portion of the site, a 2-story truck repair facility/warehouse and a 4-story unspecified manufacturing facility in the southwestern portion of the site, and a parking lot in the eastern portion of the site containing two gasoline tanks of unspecified capacity. All on-site buildings were demolished starting in April 2008, and construction of the existing residential structure started in June 2008. Building construction was completed in early 2009.

Site Geology and Hydrogeology:
The surface topography in the surrounding area is flat, gradually sloping northwest towards the East River, which is located approximately 1,100 feet from the site. The site lies at an elevation of approximately 20 feet above sea level. Shallow subsurface soils included urban fill material containing brick, asphalt, and concrete fragments to approximately 6 to 10 feet below ground surface (bgs), underlain by apparent native silty sand and silt. Depth to bedrock at the site is expected to be approximately 100 feet bgs. The dominant groundwater flow direction at the site is to the north and northeast, with some variations to the northwest. Groundwater is present at depths ranging from approximately 5 to 8 feet below the basement garage floor, which corresponds to approximate depths of approximately 11 to 14 feet bgs. There are no surface water bodies or streams on or immediately adjacent to the site.

A site location 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(s) under the Brownfield Cleanup Agreement is a/are Volunteer(s). The Applicant(s) does/do not have an obligation to address off-site contamination. However, the Department has determined that this site does not pose a significant threat to public health or the environment; 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
- 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:

1,2-dichloroethane	chlorobenzene
dichloropropane	ethylbenzene
benzene	trichloroethene (TCE)
toluene	vinyl chloride
chloroform	xylene (mixed)
tetrachloroethene (PCE)	chromium

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.

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

Rehabilitation of LNAPL Recovery System

A light non-aqueous phase liquid (LNAPL) recovery system was installed at the site to remove fuel oil from the subsurface under the Spill Response program prior to the site's entry into the BCP. After the Brownfield Cleanup Agreement (BCA) was executed, the LNAPL system was rehabilitated under an approved IRM Work Plan. The work included installation of new pumps in each of five active recovery wells, replacement of the entire length of piping or installation of new piping from the well to the remediation room and updating the equipment within the treatment system room. The IRM included replacing the interior honeycomb structure of the oil water separator along with the transfer pump and piping that routes discharge water through the particulate filter and carbon treatment unit. A new particulate filter installation and a carbon change-out were completed. This work was documented in monthly reports and will be addressed in the Final Engineering Report.

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, pesticides, polychlorinated biphenyls (PCBs), pesticides, and emerging contaminants (ECs). Sub-slab soil vapor and indoor air were analyzed for VOCs. Based upon investigations conducted to date, the primary contaminants of concern include petroleum and chlorinated VOCs.

Soil - The investigation documented that VOC contamination in soil is present in two distinct contaminant zones; 1,2-dichloroethane (DCA) on the eastern side of the site, and petroleum light non-aqueous phase liquid (LNAPL) on the western side of the site. Fingerprint analysis completed during a previous investigation identified the LNAPL as fuel oil. Since 2009 the NAPL has been managed by a collection system, which was upgraded as an IRM during the Spring of 2019. Quarterly gauging of monitoring wells indicates the extent and thickness of the plume has been reduced by the LNAPL collection system.

One VOC, 1,2-DCA, was detected at a concentration in excess of its restricted residential soil cleanup objective (RRSCO) at a depth of 14 to 15 feet below garage basement grade (bbg) (the water table is at 6ft-bbg), at a concentration of 7.9 parts per million (ppm) compared to a RRSCO of 3.1 ppm and the applicable protection of groundwater SCO (PGWSCO) of 0.02 ppm. 1,2-DCA was not detected in any other soil sample collected during the RI, or any previous investigations at the site, that would indicate any additional source areas.

Trivalent chromium was found at a concentration of 251 ppm, which exceeds the applicable RRUSCO of 180 ppm. This metal appears to be attributable to historic fill.

Fourteen per- and polyfluoroalkyl substances (PFAS) were detected in one or more soil samples at concentrations ranging from an estimated 0.017 parts per billion (ppb) to 0.12 ppb. None of the detected PFAS compounds had concentrations above the screening level of 1 ppb. Perfluorooctanesulfonic acid (PFOS) was detected at a maximum concentration of 0.12 ppb and perfluorooctanoic acid (PFOA) was detected at a maximum of 0.039 ppb. 1,4-dioxane was not detected in soil samples.

No SVOCS, PCBs or pesticides were detected at concentrations exceeding the unrestricted use SCOs. Data does not indicate any off-site impacts in soil related to this site.

Groundwater - Eight VOCs were detected at concentrations above their respective Ambient Water Quality Standards (AWQS) in one or more samples. These included the petroleum VOCs related to the LNAPL zone, and chlorinated solvents. The petroleum VOCs include benzene at a maximum concentration of 430 ppb compared to the AWQS of 1 ppb and toluene at a maximum concentration of 17 ppb (AWQS is 5 ppb). Chlorinated VOCs include 1,2-DCA at a maximum concentration of 660 ppb (AWQS is 0.6 ppb), 1,2-dichloropropane at a maximum concentration of 160 ppb (AWQS is 1.0 ppb), trichloroethene (TCE) at a maximum concentration of 21 ppb (AWQS is 5.0 ppb), chlorobenzene at a maximum concentration of 5.7 ppb (AWQS is 5.0 ppb), chloroform at a maximum concentration of 34 ppb (AWQS is 7.0 ppb), and tetrachloroethene (PCE) at a maximum concentration of 13 ppb (AWQS is 5.0 ppb).

PFOS and PFOA were detected at concentrations above the NYSDEC screening level of 10 parts per trillion (ppt) each with the maximum PFOA concentration of 130 ppt and the maximum PFOS concentration of 47.7 ppt. 1,4-Dioxane was detected at a maximum concentration of 0.69 ppb, below its screening level of 1 ppb. There is no record of use of PFAS or 1,4-dioxane at this site and the site is not considered a source of emerging contaminants. No SVOCS, PCBs or pesticides were found exceeding AWQS. Data does not indicate any off-site impacts in groundwater related to this site.

Sub-Slab Soil Vapor and Indoor Air - SVI sampling was performed both on-site and in the adjacent commercial/residential building to the southeast of the site. For the on-site building, the following VOCs were detected in sub-slab vapor samples during the October 2018 sampling event: mixed xylenes at a maximum concentration of 1,780 micrograms per cubic meter ($\mu g/m^3$); ethylbenzene at a maximum concentration of 190 $\mu g/m^3$;.PCE at a maximum concentration of 5.3 $\mu g/m^3$; TCE at a maximum concentration of 12 $\mu g/m^3$; and vinyl chloride at a maximum

concentration of 9.4 µg/m^3. 1,2-DCA was not detected in any of the sub-slab vapor samples. On-site indoor air samples collected in the basement parking garage during the October 2018 sampling event found the following maximum concentrations of VOCs: xylenes at 8.l4 µg/m^3; ethylbenzene at 1.9 µg/m^3; PCE at 2.8 µg/m^3; and TCE at 0.21 µg/m^3. An additional round of sampling was completed in August 2019 and TCE was not detected in any of the samples (soil vapor or indoor air). The results of the second round of sampling determined that additional monitoring is not necessary provided that the existing parking garage ventilation system and passive SSDS installed as part of the building redevelopment in 2008 are properly maintained as an engineering control for the site. Sampling will occur as part of the remedy for this site to ensure this engineering control continues to be effective at preventing potential indoor air impacts via the soil vapor intrusion pathway. Data does not indicate any off-site impacts in soil vapor related to this site.

6.4: Summary of Human Exposure Pathways

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

Direct contact with contaminants in the soil is unlikely because the majority of the site is covered with buildings and pavement. Contaminated groundwater at the site is not used for drinking or other purposes and the site is served by a public water supply that obtains water from a different source not affected by this contamination. Volatile organic compounds in 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. Environmental sampling indicates that soil vapor intrusion is not currently a concern for onsite or offsite buildings.

6.5: Summary of the Remediation Objectives

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

The remedial action objectives for this site are:

Groundwater

RAOs for Public Health Protection

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

RAOs for Environmental Protection

- Restore ground water aquifer to pre-disposal/pre-release conditions, to the extent

practicable.
- Remove the source of ground or surface water contamination.

Soil

RAOs for Public Health Protection

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

RAOs for Environmental Protection

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

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 Enhanced LNAPL Extraction, Bioremediation, Vapor Mitigation and Cover System remedy.

The elements of the selected remedy, as shown in Figures 2 through 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;
- 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. Cover System

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A detailed design document will be prepared for Department review prior to implementation of the in-situ treatment program.

After treatment of the source area and dissolved shallow plume, residual dissolved contamination within the deeper saturated zone will be addressed with natural attenuation, where conditions have shown to be conducive for natural degradation of VOCs.

5. 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 NYCDOHMH; and
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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 water use restrictions;
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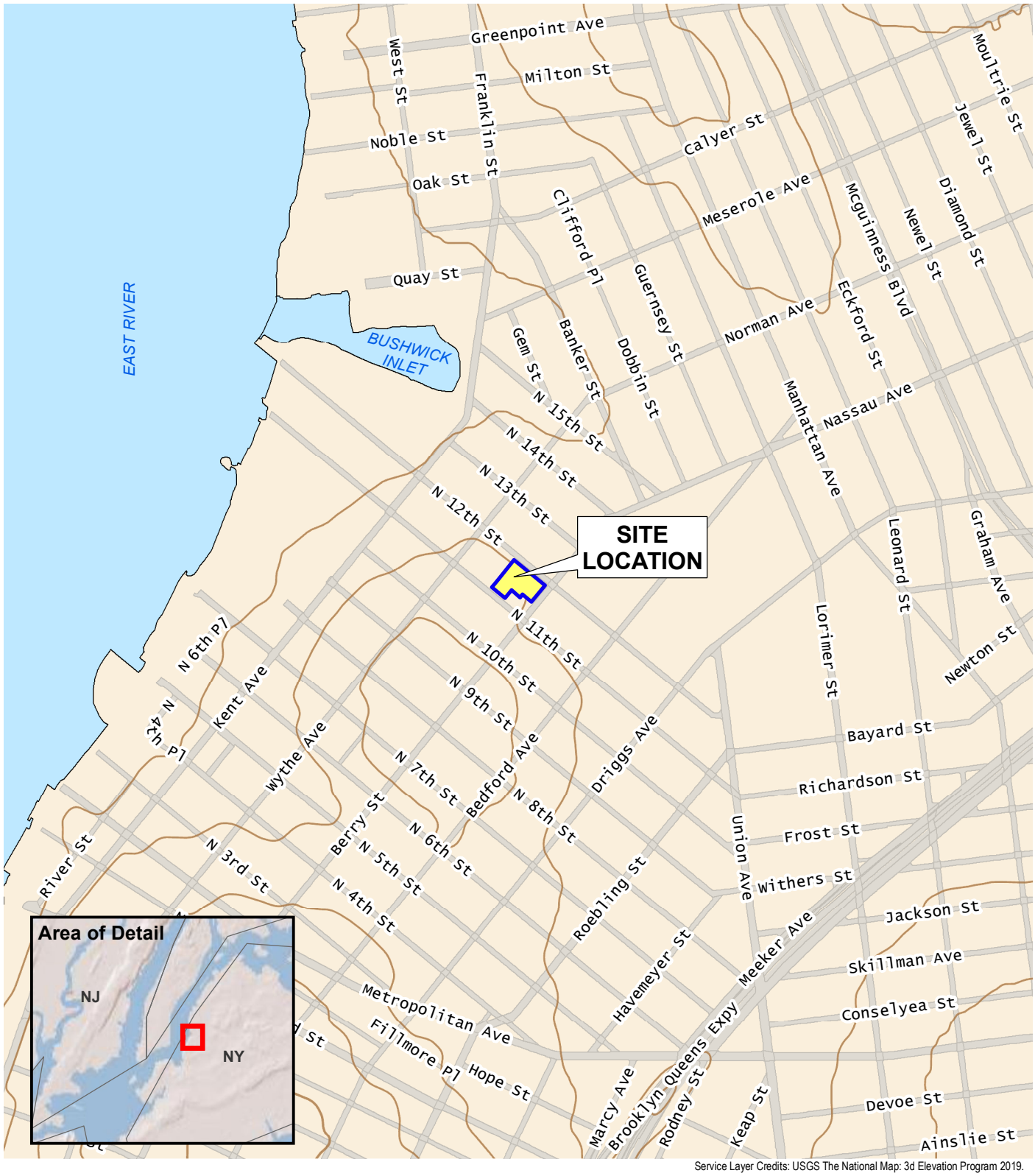
- provisions for the management and inspection of the identified engineering controls;
- maintaining site access controls and Department notification; and
- the steps necessary for the periodic reviews and certification of the institutional and/or engineering controls.

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, 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.



Service Layer Credits: USGS The National Map: 3d Elevation Program 2019.

0 800 1,600

SCALE IN FEET

AKRF
440 Park Avenue South, New York, NY 10016

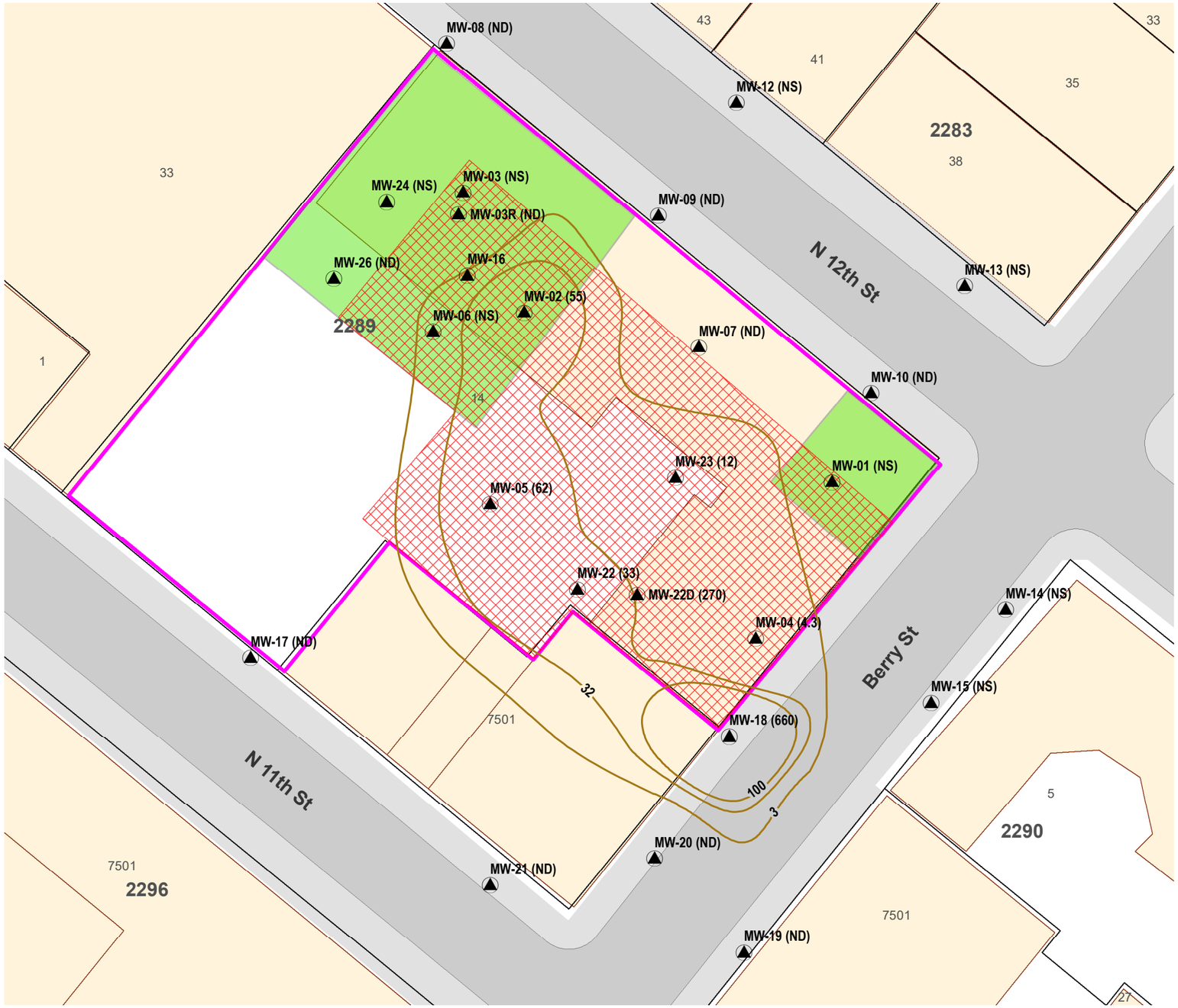
34 Berry Street
Brooklyn, New York

SITE LOCATION

DATE
3/3/2020

PROJECT NO.
11259

FIGURE
1



LEGEND

- PROJECT SITE BOUNDARY
- NOVEMBER 2018 1,2-DCA ISOCONTOUR
- MONITORING WELL LOCATION WITH CONCENTRATION (µg/L)
- 14 LOT BOUNDARY AND TAX LOT NUMBER
- 2289 BLOCK NUMBER
- BUILDING
- AREA OF 1,2-DCA REMEDIATION
- AREA OF PETROLUEM REMEDIATION

ND = NOT DETECTED
NS = NOT SAMPLED

Map Source:
NYCDCP (NYC Dept. of City Planning) GIS database.

0 20 40 80
SCALE IN FEET

AKRF
440 Park Avenue South, New York, NY 10016

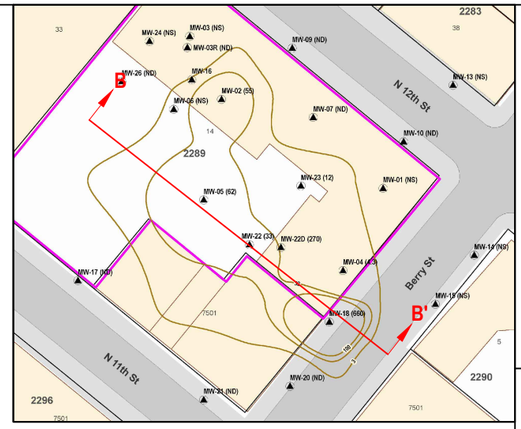
34 Berry Street
Brooklyn, New York

REMEDIATION AREAS

DATE
5/15/2020

PROJECT NO.
11259

FIGURE
2

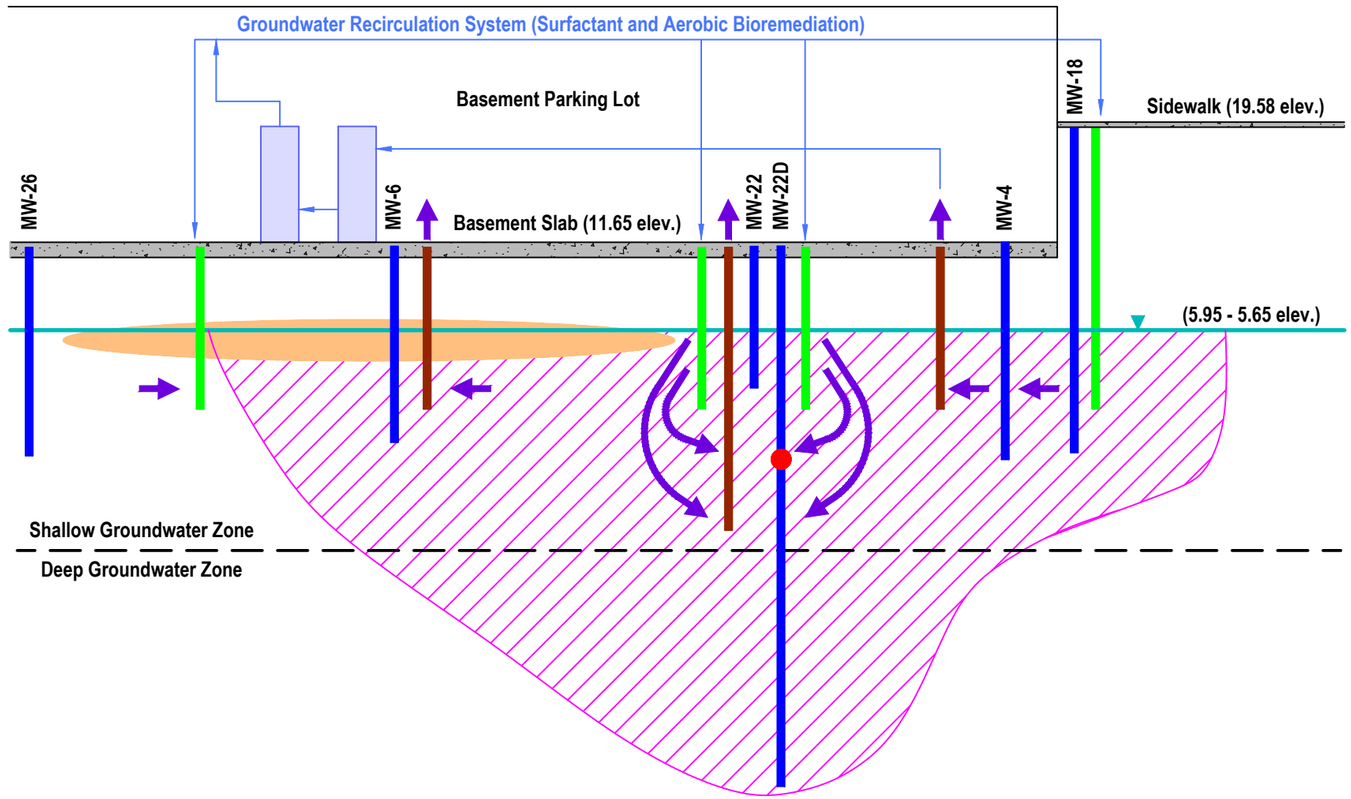


KEY MAP

SCALE: 1" = 100'

B

B'



LEGEND

- WATER TABLE
- SOIL SOURCE AREA
- LNAPL AREA
- 1,2-DCA PLUME
- MONITORING WELL
- EXTRACTION WELL
- INJECTION WELL
- ANTICIPATED GROUNDWATER FLOW DIRECTION
- ABOVEGROUND PIPING AND FLOW

NOTES:
1. ELEVATIONS BASED ON NAVD 88 DATUM.
2. INJECTION AND EXTRACTION WELL LOCATIONS PROJECTED ONTO CROSS SECTION.

NOT TO SCALE

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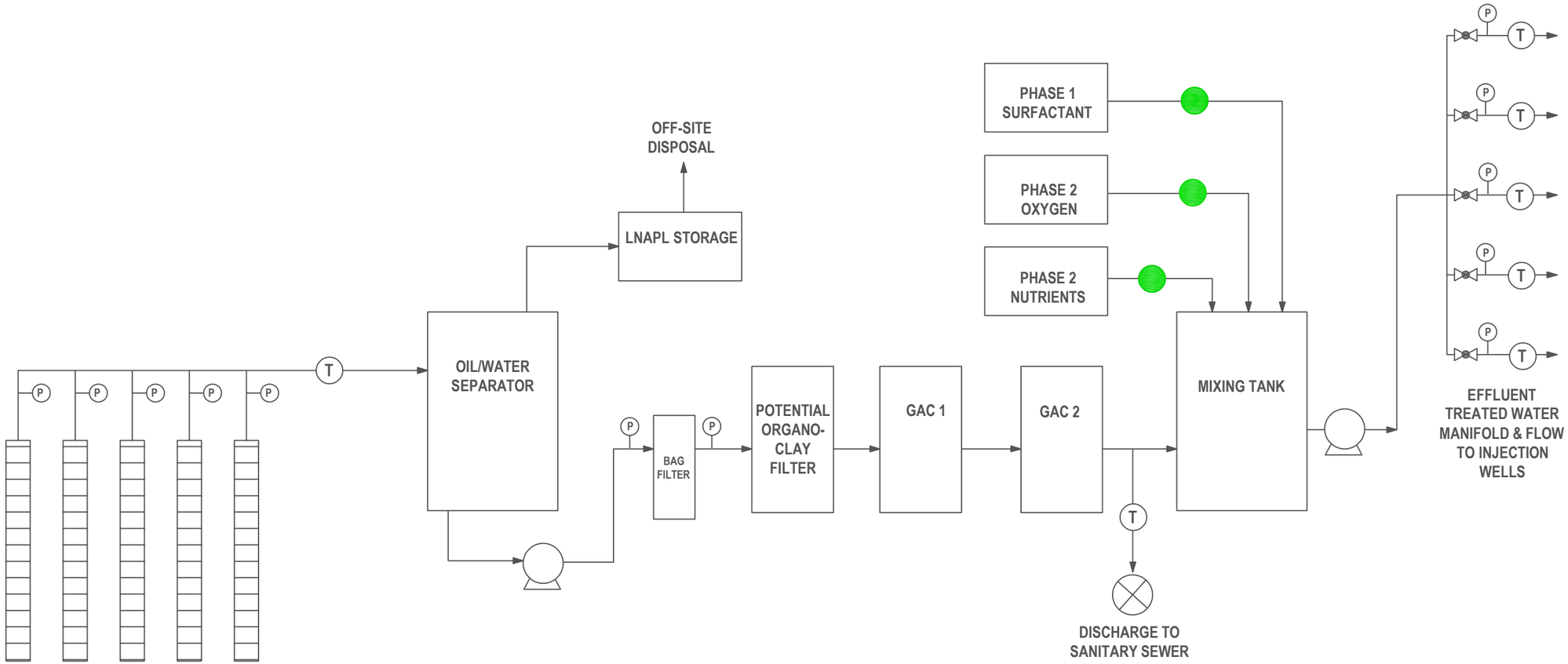
34 Berry Street
Brooklyn, New York

SOURCE TREATMENT CROSS SECTION MODEL

DATE
5/13/2020

PROJECT NO.
11259

FIGURE
3



EXTRACTION WELLS:
MW-1, MW-2, MW-3, MW-6, MW-16
ADDITIONAL WELLS TO BE ADDED BASED ON HYDRAULIC MODELING

NOTES:

1. EXTRACTION FLOW RATE IS ESTIMATED TO BE 4 TO 5 TIMES THE RE-INJECTION FLOW RATE
2. THE QUANTITY AND LOCATION OF INJECTION & EXTRACTION WELLS WILL BE DETERMINED USING HYDRAULIC MODELING, AND WILL BE INCLUDED IN THE IN-SITU DESIGN DOCUMENT.
3. AN ORGANOCLAY FILTER MAY BE ADDED TO TREATMENT TRAIN FOLLOWING THE OIL./WATER SEPARATOR TO FURTHER TREAT EMULSIFIED OIL.

LEGEND

- DOSING PUMP
- PRESSURE GAUGE
- TOTALIZER
- TRANSFER PUMP
- CONTROL VALVE

NOT TO SCALE

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REMEDIATION PROCESS FLOW DAIGRAM

DATE
6/29/2020

PROJECT NO.
11259

FIGURE
4