PROPOSED REMEDIAL ACTION PLAN

K - Fulton Works
Operable Unit Number 01: Plant Site and Near Off-site
State Superfund Project
Brooklyn, Kings County
Site No. 224051
April 2015

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

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SECTION 1: SUMMARY AND PURPOSE OF THE PROPOSED PLAN

The New York State Department of Environmental Conservation (the Department), in consultation with the New York State Department of Health (NYSDOH), is proposing a remedy for the above referenced site. The disposal of hazardous wastes at the site has resulted in threats to public health and the environment that would be addressed by the remedy proposed by this Proposed Remedial Action Plan (PRAP). The disposal of hazardous wastes at this site, as more fully described in Section 6 of this document, has contaminated various environmental media. The proposed remedy is intended to attain the remedial action objectives identified for this site for the protection of public health and the environment. This PRAP identifies the preferred remedy, summarizes the other alternatives considered, and discusses the reasons for the preferred remedy.

The New York State Inactive Hazardous Waste Disposal Site Remedial Program (also known as the State Superfund Program) is an enforcement program, the mission of which is to identify and characterize suspected inactive hazardous waste disposal sites and to investigate and remediate those sites found to pose a significant threat to public health and environment.

The Department has issued this document in accordance with the requirements of New York State Environmental Conservation Law and Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York; (6 NYCRR) Part 375. This document is a summary of the information that can be found in the site-related reports and documents in the document repository identified below.

SECTION 2: CITIZEN PARTICIPATION

The Department seeks input from the community on all PRAPs. This is an opportunity for public participation in the remedy selection process. The public is encouraged to review the reports and documents, which are available at the following repository:

Brooklyn Community Board
Attn: Craig Hammerman
250 Baltic St.
Brooklyn, NY 12201
Phone: (718) 643 3027

A public comment period has been set from:

4/3/2015 to 5/3/2015

A public meeting is scheduled for the following date:

4/16/2015 at 7:00 PM

Public meeting location:

Wyckoff Gardens Community Center Meeting Room

At the meeting, the findings of the remedial investigation (RI) and the feasibility study (FS) will be presented along with a summary of the proposed remedy. After the presentation, a question-and-answer period will be held, during which verbal or written comments may be submitted on the PRAP.

Written comments may also be sent through 5/3/2015 to:

Henry Willems
NYS Department of Environmental Conservation
Division of Environmental Remediation
625 Broadway
Albany, NY 12233
henry.willems@dec.ny.gov

The Department may modify the proposed remedy or select another of the alternatives presented in this PRAP based on new information or public comments. Therefore, the public is encouraged to review and comment on the proposed remedy identified herein. Comments will be summarized and addressed in the responsiveness summary section of the Record of Decision (ROD). The ROD is the Department's final selection of the remedy for this site.

Receive Site Citizen Participation Information By Email

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

SECTION 3: SITE DESCRIPTION AND HISTORY

Location:
The Fulton Municipal Works MGP is located in the Gowanus neighborhood in South Brooklyn to the east of the Gowanus Canal. The site occupies five properties (designated Parcels I through V) located between Douglass and Sackett Streets and between the Gowanus Canal and Fourth Ave. These five properties comprise approximately 6.5 acres. The remedial investigation identified three additional parcels (designated Parcels VI through VIII) affected by contamination from the Fulton MGP. Parcels VI and VII abut the eastern bank of the Gowanus Canal and Parcel VIII lies on the canal's west bank.

Current Zoning and Land Use:
The area is zoned for industrial use, specifically light manufacturing (M2-1 and M1-2). Parcel I is currently in use as a film studio. Parcel II is occupied by the Thomas Greene Park. Parcel III is currently used as a text book warehouse with offices on the upper of two stories, Parcel IV is occupied as a roll-off container and truck repair facility, and Parcel V, which formerly housed the NY Daily News automotive garage, is currently used as a rock climbing gym. The site is surrounded by mixed use parcels, including commercial, industrial, and multi-family residential properties.

Site Features:
The site is comprised of commercial and industrial properties, as well as a city park containing a playground, basketball and handball courts and a swimming pool, in an urban area. Site topography is nearly flat, with a gradual downslope westward toward the Gowanus Canal.

Past Use of the Site:
The site was operated as a manufactured gas plant (MGP) by Brooklyn Union Gas Co. from approximately 1879 to 1929. The operation of the MGP led to contamination of subsurface soil and groundwater by coal tar, a byproduct of the gas manufacturing process. The specific MGP operations and structures located on the individual parcels are as follows:

Parcel I: production facilities including an oil/naptha collection tank, generator/retort house, condenser/blower house, coal shed, engine house, gasoline house and generators.

Parcel II: the southern portion of the parcel contained production facilities including 3 oil tanks, 1 relief holder/hydrogen tank and 6 gas oil naptha tanks. During World War I a US government toluol plant was located on the northern part of the parcel.

Parcel III: production facilities including a gas holder, purifying house, oxidizing sheds, coal bin, shaving scrubbers, tower scrubbers for the toluol plant, meter house, governor's house and offices.

Parcel IV: production facilities including a gas holder and coal shed.

Parcel V: facilities included a gas holder (storage only), water tank, engines/blowers and coal shed.

The site has been divided into two operable units.

An operable unit represents a portion of a remedial program for a site that for technical or administrative reasons can be addressed separately to investigate, eliminate or mitigate a release, threat of release or exposure pathway resulting from the site contamination.

Operable Unit 1 includes the footprint of the former MGP operation, and the neighboring off-site properties east of the Gowanus Canal, where coal tar has spread in the subsurface. This includes Parcels I through VII. MGP source areas have been identified on Parcels I through IV; tar from these source areas has migrated westward beneath Parcels VI and VII. Parcel V, although included in the definition of Operable Unit 1, appears to be uncontaminated.

Operable Unit 2 includes the more distant off-site areas to the west, where coal tar has spread beneath the Gowanus Canal and a short distance beyond.

Site Geology/Hydrogeology:
The site is underlain by urban fill ranging from 10 to 20 feet in thickness, which overlies a discontinuous peat and silt layer approximately 4 feet thick. Beneath the peat are glacial outwash deposits consisting predominantly of sand, with lesser amounts of silt and clay. Bedrock is approximately 150 feet below the ground surface. Groundwater is encountered at depths of 8 to 14 feet across the site, and flows westward toward the Gowanus Canal.

Operable Unit (OU) Number 01 is the subject of this document.

A Record of Decision will be issued for OU 02 in the future.

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 Parcels I, III, IV, VI and VII to commercial use (which allows for industrial use) and Parcel II (Thomas Greene Park) to restricted residential use (which allows for active recreational use) as described in Part 375-1.8(g) are/is being evaluated in addition to an alternative which would allow for unrestricted use of the site.

A comparison of the results of the investigation to the appropriate standards, criteria and guidance values (SCGs) for the identified land use and the unrestricted use SCGs for the site contaminants is included in the Tables for the media being evaluated in Exhibit A.

SECTION 5: ENFORCEMENT STATUS

Potentially Responsible Parties (PRPs) are those who may be legally liable for contamination at a site. This may include past or present owners and operators, waste generators, and haulers.

The PRPs for the site, documented to date, include:

Keyspan dba National Grid

National Grid

The Department and Keyspan Energy Delivery, New York and Keyspan Energy Delivery, Long Island, corporate predecessors to National Grid, entered into a Consent Order on August 10, 2007 (Index No. A2-0552-0606). The Order obligates the responsible parties to implement a full remedial program for this and 11 other former MGP sites. On-site and off-site contamination unrelated to the former MGP activities identified during the environmental investigations are being addressed separately by the NYSDEC.

SECTION 6: SITE CONTAMINATION

6.1: Summary of the Remedial Investigation

A Remedial Investigation (RI) has been conducted. The purpose of the RI was to define the nature and extent of any contamination resulting from previous activities at the site. The field activities and findings of the investigation are described in the RI Report.

The following general activities are conducted during an RI:

- Research of historical information,
- Geophysical survey to determine the lateral extent of wastes,
- Test pits, soil borings, and monitoring well installations,
- Sampling of waste, surface and subsurface soils, groundwater, and soil vapor,
- Sampling of surface water and sediment,
- Ecological and Human Health Exposure Assessments.

The analytical data collected on this site includes data for:

- air
- 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. The tables found in Exhibit A list the applicable SCGs in the footnotes. For a full listing of all SCGs see: http://www.dec.ny.gov/regulations/61794.html

6.1.2: RI Results

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

COAL TAR
benzene, toluene, ethylbenzene and xylenes (BTEX)
Polycyclic Aromatic Hydrocarbons (PAHs), Total

As illustrated in Exhibit A, 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 Record of Decision.

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.

Based upon the resources and pathways identified and the toxicity of the contaminants of ecological concern at this site, a Fish and Wildlife Resources Impact Analysis (FWRIA) was deemed not necessary for OU 01.

The Remedial Investigation identified the presence of coal tar in subsurface soils beneath four of the five Parcels comprising the original MGP site (I, II, III and IV) and three off-site Parcels (VI, VII and VIII). Contamination beneath these parcels is generally inaccessible due to the distance below ground surface and presence of buildings, pavement and other infrastructure. To date, contamination has not been found at shallow depths, where human exposures would be likely. Future subsurface excavation work, however, could bring workers into direct contact with the contamination in the area adjacent to the intersection of Nevins and DeGraw Streets, where the Remedial Investigation identified coal tar at depths as shallow as 10 feet.

When the MGP was operating, coal tar was released directly into the Gowanus Canal by discharge pipes, and into the subsurface by leaking plant structures (primarily subsurface gas holders and storage tanks). The tar then spread through the subsurface soil. Beneath portions of the site, a discontinuous clay and peat layer commonly referred to as the meadow mat, which was deposited on the tidal flat adjacent to the Gowanus Creek, lies approximately 20 feet below the ground surface. The relatively low permeability of the meadow mat caused the coal tar that leaked from the plant structures to pool and spread laterally on top of it. Much of the coal tar on the site is found in the soil on top of the mat. In areas where the meadow mat is absent, coal tar has migrated deeper, moving both laterally and vertically for considerable distances. Close to the former plant structures coal tar is found at depths ranging from 8 feet to more than 100 feet below ground surface, and is generally found at greater depths with increasing distance from the structures.

Contaminants of concern in the tar include polycyclic aromatic hydrocarbons (PAHs) and the volatile organic compounds benzene, toluene, ethylbenzene and xylene (BTEX). In addition to the high levels of soil contamination, BTEX and PAH compounds have been found in groundwater at levels which greatly exceed SCGs. Benzene was found at levels as high as 5,200 parts per billion (ppb), compared to the groundwater quality standard of 1 ppm. Ethyl benzene was found as high as 6,300 ppb, toluene as high as 2,200 ppb and total xylenes as high as 5,700 ppb; all compared to their individual groundwater quality standard of 5 ppb. Approximately one-quarter of groundwater samples also contained methyl tert-butyl ether (MTBE), a former gasoline additive, indicating that petroleum releases unrelated to the MGP have contributed to groundwater contamination.

Contamination in the form of separate phase tar and associated dissolved groundwater contaminants has migrated off-site. In off-site areas where tar is present, groundwater exceeds standards for VOCs and PAHs. Coal tar has migrated through the subsurface into and beneath the canal. Sediment contamination in the canal and in the canal banks beyond the source sites is being addressed by the United States Environmental Protection Agency (USEPA) under the Federal Superfund Program.

Soil vapor samples were collected from five parcels, along with indoor air samples from the three site parcels with occupied structures. Soil vapor beneath all five parcels contained MGP-related BTEX compounds, as well as non-MGP related compounds such as tetrachloroethene, trichloroethene, dichlorobenzene, and ethanol. Samples of indoor air collected from Parcel 3 contained levels of non-MGP chlorinated solvents exceeding NYSDOH guidelines for mitigation. Levels of BTEX and non-MGP contaminants (e.g., ethanol and n-decane) in the indoor air of Parcel 5 exceeded the concentrations normally seen in indoor air. However, these levels were significantly higher than corresponding sub-slab vapor samples, indicating that an indoor source may be responsible.

The Responsible Party, in accordance with the Order on Consent, is not responsible for remediation of non-MGP related contamination. The owners of affected properties have been notified where mitigation or monitoring of impacts to indoor air is required.

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 site is covered with pavement, concrete or structures. However, people who dig below the surface may come into contact with contaminated subsurface soil or groundwater. People are not drinking contaminated groundwater because the area is served by public water. Volatile organic compounds may move into the soil vapor (air spaces within the soil) which in turn may move into overlying buildings and affect 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. The potential for soil vapor intrusion to occur should be evaluated should the site be redeveloped or new construction occurs. Additionally, people using the canal for recreational purposes such as swimming or boating may come into direct contact with harmful biological organisms or site related contaminants in the surface water or sediments. Fish and shellfish in the canal are likely to contain the same contaminants that are present in the surface water and shallow sediments; therefore people should follow the New York State consumption guidelines for the Upper Bay of New York harbor and the canal.

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.
- Prevent the discharge of contaminants to surface water.
- 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.

SECTION 7: SUMMARY OF THE PROPOSED REMEDY

To be selected, the remedy must be protective of human health and the environment, be cost-effective, comply with other statutory requirements, and utilize permanent solutions, alternative technologies or resource recovery technologies to the maximum extent practicable. The remedy must also attain the remedial action objectives identified for the site, which are presented in Section 6.5. Potential remedial alternatives for the Site were identified, screened and evaluated in the FS report.

A summary of the remedial alternatives that were considered for this site is presented in Exhibit B. Cost information is presented in the form of present worth, which represents the amount of money invested in the current year that would be sufficient to cover all present and future costs associated with the alternative. This enables the costs of remedial alternatives to be compared on a common basis. As a convention, a time frame of 30 years is used to evaluate present worth costs for alternatives with an indefinite duration. This does not imply that operation, maintenance, or monitoring would cease after 30 years if remediation goals are not achieved. A summary of the Remedial Alternatives Costs is included as Exhibit C.

The basis for the Department's proposed remedy is set forth at Exhibit D.

The proposed remedy is referred to as the Containment, Coal Tar Recovery, and Excavation/Solidification remedy.

The estimated present worth cost to implement the remedy is $54,525,000. The cost to construct the remedy is estimated to be $48,825,000 and the estimated average annual cost is $331,000.

The elements of the proposed remedy are as follows:

Due to the presence of active commercial buildings and the Thomas Greene Park on the site, the planned remediation of the Gowanus Canal by the USEPA, and with only limited potential for public health exposures on the parcels to be addressed, the proposed remedy identifies both near term and future actions. Both near term and future actions will require voluntary agreements between the Volunteer and respective property owners for site access and any other pertinent provisions to enable the installation and maintenance of cover systems, management of residual contamination, excavation, inspections, sampling, and/or any other requisite activities.

The near-term actions are intended to address the environmental impact of the discharge of contaminants to the Gowanus Canal to allow the ongoing USEPA project to proceed and avoid re-contamination of remediated sediments, and to address a current potential exposure to utility workers, in addition to collecting mobile tar in the subsurface and overall management of the site. It should be noted that the coal tar present at depths greater than 25 feet under Parcel VIII is not directly addressed by this remedy, but will be addressed as OU2 of the Fulton site. Shallow tar impacts near the walls of the canal will be dealt with by the USEPA remedy pursuant to their September 2013 ROD. The basis for this approach is discussed in more detail in Exhibit D. Accordingly, the remedial elements are described below as near-term and long-term actions, to be implemented in distinct stages as access becomes available.

Near-Term Actions

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. Containment:

A subsurface barrier wall will be installed along the east bank of the Gowanus Canal to prevent the migration of coal tar to the canal from Parcels I, II, III, IV, VI and VII. The wall will be constructed from the north end of the canal to approximately Sackett Street, and will extend to a sufficient depth, currently estimated to be 50 feet, to prevent further movement of coal tar into the canal. Short sections of wing walls leading inland from the canal bank may be necessary to prevent contaminant migration from moving around the ends of the wall. In addition to providing a barrier to contaminant migration, the barrier wall will be designed with sufficient strength to ensure bank stability during the upcoming dredging of the canal. The barrier wall will also include measures such as the sealing of utility penetrations of the wall to prevent tar migration along utilities, such as storm sewers or other piping which cannot be abandoned, to eliminate provide these penetrations as a pathway for tar migration into the canal. The final wall depth and configuration, including the need for hydraulic relief and associated treatment, will be determined during the design of this project. This portion of the remedial work will be designed and constructed as a first priority to minimize any delay in the implementation of the USEPA dredging project.

3. Coal Tar Recovery:

A series of coal tar recovery wells, or other system of collection, will be constructed behind the barrier wall to collect coal tar that accumulates behind the wall. These wells will be designed with sumps to accumulate coal tar passively, without continuous pumping. Coal tar will be collected periodically from each well; however, if wells are determined by the Department to accumulate large quantities of coal tar over extended time periods, they can be converted to automated collection.

Coal tar collection wells will also be constructed in upland areas where mobile coal tar is identified by the Department in the subsurface. Initially, the construction of these collection wells will be focused on the area near the intersection of Nevins and DeGraw Streets. These wells will be installed in public rights of way to the extent possible and will be constructed with sumps to allow passive accumulation of coal tar for periodic collection. All collected tar will be sent off-site for treatment and/or disposal.

4. Utility Corridors:

The potential for coal tar migration into utility corridors within the area at the intersection of Nevins and DeGraw Streets will be assessed during the remedial design. Based on the results of this evaluation, a remedial action plan will be developed to address identified impacts to shallow utility corridors (i.e., water and gas mains or other subsurface infrastructure). Coal tar impacts to the deeper sewer lines in this area will be addressed during any future major sewer modification work.

5. Cover System:

A site cover currently exists and will be maintained to allow for restricted residential use (which includes active recreational use) of Parcel II (Thomas Greene Park), and commercial/industrial use of the remainder of the site and Parcel VI. Any site redevelopment will maintain or re-establish a site cover, which may consist either of the structures such as the buildings, pavement, and sidewalks comprising the site development.

Where a soil cover is required on Parcel II it will include a minimum of two feet of soil meeting the SCOs for cover material as set forth in 6 NYCRR Part 375-6.7(d) for restricted residential use. Where a soil cover is required on the rest of the site (Parcels I, III and IV) and Parcel VI, it will be a minimum of one foot of soil, meeting the SCOs for cover material as set forth in 6 NYCRR Part 375-6.7(d) for commercial use. The soil cover will be placed over a demarcation layer, with the upper six inches of the soil of sufficient quality to maintain a vegetation layer. Any fill material brought to the site will meet the requirements for the identified site use as set forth in 6 NYCRR Part 375-6.7(d).

6. Institutional Controls:

Imposition of institutional controls in the form of environmental easements, subject to agreements with property owners, for the controlled properties, consisting of Parcels I, II, III, and IV, that:

- 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 Parcel II for restricted residential, commercial and industrial uses as defined by Part 375-1.8(g), and the remaining parcels that comprise the site for commercial and industrial uses 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 NYC DOH;
- require compliance with the Department-approved Site Management Plan.

7. Site Management Plan

A Site Management Plan, subject to agreements with property owners of Parcels I, II, III, IV, VI, and VII, 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 are effective:

Institutional Controls:
- The environmental easements discussed in Paragraph 6 above;

Engineering Controls:
- The barrier wall discussed in paragraph 2 above;
- The coal tar recovery system discussed in paragraph 3 above;
- The cover system discussed in paragraph 5 above; and
- The solidified soils discussed in paragraph 8 below.

An Interim Site Management Plan (ISMP) will be required to manage site activities until the final SMP is approved. The ISMP and SMP include, but may not be limited to:

- an Excavation Plan which details the provisions for management of limited excavations in areas of remaining contamination;
- a provision for further investigation and remediation should large scale redevelopment occur, if any of the existing structures are demolished, or if the subsurface is otherwise made accessible. The nature and extent of contamination in areas where access was previously limited or unavailable will be immediately and thoroughly investigated. Based on the investigation results and the Department's determination of the scope of the remedy, a Remedial Action Work Plan (RAWP) will be developed for the final remedy for each parcel, including removal and/or

treatment of any source areas to the extent feasible. Citizen Participation Plan (CPP) activities will continue through this process. Any necessary remediation will be completed prior to, or in association with, redevelopment. This includes Parcels I, II, III, IV and VI;

- a provision for evaluation of the potential for soil vapor intrusion for any buildings developed on the site or for any buildings where the current use changes, including provisions for implementing actions recommended to address exposures related to soil vapor intrusion;
- 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 for site-related contamination and also for natural attenuation indicators to provide an understanding of the biological activity breaking down the contamination and 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 developed on the site or for any buildings where the current use changes, 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 the coal tar recovery system;

- 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.

Future Actions:

8A. Excavation/Stabilization of MGP Structures and Source Material

Excavation of MGP structures, including gas holder foundations and tanks, and immediately adjacent source areas and grossly contaminated soil, as defined in 6NYCRR Part 375-1.2(u), from Parcels I, II, III and IV will be required when each parcel becomes accessible. The excavated material will be transported off-site for treatment and/or disposal. It is estimated that approximately 30,000 cubic yards (cy) of contaminated soil/debris would be removed from the site once all areas are addressed. The excavation areas on these parcels, based on currently available information, are estimated to be:
Parcel I - 50 ft. x 50 ft. x 10 ft. deep – approximately 925 cy;
Parcel II - 250 ft. x 100 ft. x 20 ft. deep – approximately 18,500 cy;
Parcels III and IV are expected to be a contiguous excavation measuring approximately 200 ft. x 75 ft. x 20 ft. deep – approximately 11,000 cy.

Excavation support, such as driven steel sheets or solidified soil walls, will be required in most cases to allow the above excavation (or any additional excavation identified in 8B) to proceed. In cases where mobile NAPL is known or suspected to exist immediately outside the areas to be excavated, the excavation support will be designed to be left in place as a coal tar migration barrier to prevent mobile NAPL from re-contaminating the remediated areas.

8B. Additional Source Removal Evaluation Areas:

The need for additional soil removal will be evaluated beyond the immediate limits of the MGP structure areas identified above. Pre-design investigations (PDIs) will be conducted on Parcels I, II, III, IV and VI to determine the extent of contamination outside the limits of the MGP structure excavations for those areas that exhibited source material at elevations above the meadow mat soil layer that is present approximately 20 feet below ground surface (bgs). This soil will either be excavated and transported off-site for treatment and/or disposal, or may alternatively be treated by in-situ solidification/solidification (ISS). The estimated volume of these areas will be determined by the PDIs.

8C. Utility corridors: In other areas where subsurface disturbances for repairs or redevelopment may occur where levels contaminants in soil exceed CP-51 criteria (total PAHs greater than 500 ppm) due to MGP-related impacts, the soil will be excavated to the depth required for the subsurface repair, maintenance or redevelopment. This soil will be excavated and transported off site for treatment and/or disposal. On-site soils which do not exceed SCOs for restricted residential use of Parcel II and commercial use of the remaining parcels comprising the site may be used to backfill the excavation to the extent that it can be reused on site, below the cover system described in paragraph 5.

Clean fill meeting the requirements of 6 NYCRR Part 375-6.7(d) will be brought in as needed to complete the backfilling of the excavation and establish the designed grades at the site. The site will be re-graded to accommodate installation of a cover system as described in paragraph 5.

8D. In-situ solidification (ISS): As an alternative to excavation, in those areas where potentially mobile coal tar is present in the subsurface above the elevation of the meadow mat (approximately 20 ft. below ground surface), ISS may be implemented in lieu of excavation to immobilize contamination that remains below excavated areas. ISS may also be used to provide containment surrounding excavation areas as discussed above.

ISS is a process that binds soil particles in place, creating a low permeability mass. The contaminated soil will be mixed in place together with solidifying agents (typically Portland cement) or other binding agents using an excavator or augers. The soil and binding agents are mixed to produce a solidified mass resulting in a low permeability monolith. The resulting solid matrix reduces or eliminates mobility of contamination and reduces or eliminates the matrix as a source of groundwater contamination.

In any areas subject to ISS, a four-foot soil cover will be established between the solidified waste and the finished ground surface. The function of this cover will also be to provide sufficient thermal protection of the solidified mass from seasonal freeze/thaw cycles, and to protect the ISS mass from deep root penetration.

Exhibit A

Nature and Extent of Contamination

This section describes the findings of the Remedial Investigation for all environmental media that were evaluated. As described in Section 6.1, samples were collected from various environmental media to characterize the nature and extent of contamination.

For each medium for which contamination was identified, a table summarizes the findings of the investigation. The tables present the range of contamination found at the site in the media and compares the data with the applicable SCGs for the site. The contaminants are arranged into three categories; volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs) and inorganics (metals and cyanide). For comparison purposes, the SCGs are provided for each medium that allows for unrestricted use.

Waste/Source Areas

As described in the RI report, waste/source materials were identified at the site and are impacting soil, and groundwater.

Wastes are defined in 6 NYCRR Part 375-1.2(aw) and include solid, industrial and/or hazardous wastes. Source Areas are defined in 6 NYCRR Part 375(au). Source areas are areas of concern at a site were substantial quantities of contaminants are found which can migrate and release significant levels of contaminants to another environmental medium. Wastes and source areas were identified at the site include, coal tar.

Coal tar waste in the form of dense non-aqueous phase liquid (DNAPL) was identified within and adjacent to subsurface structures related to the operation of the MGP, such as gas holders and tar wells, on Parcels I, II, III and IV. These structures appear to be the principal sources of contamination on the site. The distribution of tar throughout the site is the result of releases from these subsurface structures and associated piping, followed by lateral and vertical migration through the subsurface soil. This release and migration has occurred over a period of many decades, and has resulted in a complex distribution of contamination throughout the area.

DNAPL coal tar has migrated away from these structures in the subsurface predominantly westward, toward the Gowanus Canal, where coal tar impacts were identified beneath off-site Parcels VI and VII. Shallow tar impacts extend to the bank of the Gowanus Canal, and a greater proportion of deeper tar impacts have migrated beneath it. In addition, coal tar contamination is expected to be present in the subsurface under the public streets near the intersection of DeGraw and Nevins Streets. Coal tar contaminated soil was identified at depths ranging from approximately eight feet to 128 feet below the ground surface, within an area bounded by Union Street to the south, the Bond Street to the west, Butler Street to the north and Third Avenue to the east.

Visible coal tar contamination was observed as follows, on a parcel by parcel basis:

Parcel I: Intervals of coal tar coating were observed between depths of 15 to 45 feet below ground surface (bgs). Coal tar saturation was observed between 42 and 46 feet bgs and lenses of tar were observed at 65 feet bgs. Lesser impacts consisting of disconnected coal tar blebs were observed between 5 and 10 feet bgs.

Parcel II: Intervals of coal tar coating were observed between 10 and 65 feet bgs. Coal tar saturated intervals were observed between depths of 10 to 100 feet bgs. Lesser impacts consisting of coal tar blebs and sheens were observed between depths ranging from 15 to 105 feet bgs.

Parcel III: Within the gas holder on the parcel, intervals of tar saturation were observed between depths of 5 feet and the bottom of the holder at a depth of 18 feet. Outside the holder, intervals of visible coal tar contamination consisting of tar globs and coatings were observed between depths of 10 to 48 feet bgs. Lesser impacts consisting of coal tar blebs and sheens were observed between 7 and 27 feet bgs.

Parcel IV: Inside the gas holder on the parcel, coal tar coating was observed between 13 and 15 feet bgs. Coal tar saturated lenses were observed between 14 and 19 feet bgs. Outside of the holder, lesser impacts consisting of coal tar blebs and sheens were observed between 15 and 19 feet bgs.

Parcel V: No MGP-related impacts other than mild odors were observed in subsurface soils.

Parcel VI: Intervals of coal tar coating were observed between depths of 10 to 128 feet bgs. Intervals of coal tar saturation were observed at depths between 13 and 112 feet bgs. Lesser impacts consisting of coal tar blebs and sheens were observed between 6 and 112 feet bgs.

Parcel VII: Intervals of coal tar coating were observed at depths of 20 to 30 feet bgs. Intervals of coal tar saturation were observed between 25 to 30 feet bgs. Lesser impacts consisting of coal tar sheens were observed between 63 and 67 feet bgs.

The principal contaminants present in the tar are the VOCs benzene, toluene, ethylbenzene and xylene (BTEX) and polycyclic aromatic hydrocarbons (PAHs).

The waste/source areas identified will be addressed in the remedy selection process.

Groundwater

In groundwater, VOCs, PAHs, pesticides and metals were detected above applicable standards throughout all of the parcels where coal tar waste was found. This contaminated groundwater migrates slowly toward the Gowanus Canal and discharges into the canal.

Coal tar and associated BTEX and PAHs are considered to be the primary contaminants of concern which will drive the remediation of groundwater to be addressed by the remedy selection process. The extent of groundwater impacts are shown in Figure 4.

Table 1 - Groundwater

Constituents	Concentration Range (ppb)[a]		SCG[b] (ppb)	Frequency Exceeding SCG
	Minimum	Maximum		
VOCs				
Acetone	21	465	50*	1 of 62
Benzene	0.31	5200	1	28 of 62
Chlorobenzene	5.5	5.5	5	1 of 62
Chloroethane	32	32	5	1 of 62
Chloroform	0.2	44	7	4 of 62
cis-1,2-Dichloroethene	0.36	17	5	4 of 62
Ethylbenzene	0.55	6300	5	21 of 62
Isopropyl benzene	0.13	170	5	6 of 20

Constituents	Concentration Range (ppb)[a]		SCG[b] (ppb)	Frequency Exceeding SCG
	Minimum	Maximum		
Methyl tert-butyl ether (MTBE)	0.25	350	10*	14 of 53
Methylene chloride	0.31	10	5	3 of 62
Styrene	880	880	5	1 of 62
Tetrachloroethene (PCE)	0.24	26	5	3 of 62
Toluene	0.47	2200	5	8 of 62
Trichloroethene (TCE)	0.17	14	5	2 of 62
Trichlorofluoromethane (Freon 11)	3.3	8.7	5	1 of 20
o-Xylene	0.32	2000	5	6 of 20
m/p-Xylene	0.61	3900	5	7 of 20
Total Xylene	5.1	5700	5	13 of 42
Vinyl chloride	1.1	71	2	5 of 62
SVOCs				
Acenaphthene	0.18	550	20*	22 of 62
Benzo(a)anthracene	0.027	0.84	0.002*	6 of 62
Benzo(b)fluoranthene	0.03	0.53	0.002*	6 of 62
Benzo(k)fluoranthene	0.026	0.2	0.002*	4 of 62
Benzo(a)pyrene	0.026	0.5	ND	5 of 62
Biphenyl (1,1-Biphenyl)	0.012	80	5	7 of 20
Bis(2-ethylhexyl)phthalate	0.59	77	5	1 of 62
Chrysene	0.041	0.65	0.002*	7 of 62
Fluorene	0.092	91	50*	4 of 62
Indeno(1,2,3-cd)pyrene	0.022	1.1	0.002*	5 of 62
2-Methylphenol (o-Cresol)	0.35	17	1	2 of 62
4-Methylphenol (p-Cresol)	0.41	30	1	2 of 56
Naphthalene	0.16	14000	10*	19 of 62
Phenanthrene	0.13	120	50*	10 of 62
Phenol	0.24	25	1	5 of 62

a - ppb: parts per billion, which is equivalent to micrograms per liter, ug/L, in water.

b- SCG: Standard Criteria or Guidance - Ambient Water Quality Standards and Guidance Values (TOGs 1.1.1), 6 NYCRR Part 703, Surface water and Groundwater Quality Standards, and Part 5 of the New York State Sanitary Code (10 NYCRR Part 5).

Subsurface Soil

Soil contamination was assessed both by visual observation and chemical analysis. All soil samples recovered were closely inspected for the presence of visible tar, as summarized above. In addition, 98 subsurface soil samples were collected from depths of 1-140 feet for laboratory testing.

The analytical results and sample locations are summarized in Figure 5.The results indicate that soils at the site exceed the unrestricted, restricted residential and commercial SCGs for volatile and semi-volatile organics and metals.

The primary subsurface soil contaminants are polycyclic aromatic hydrocarbons (PAHs) contained in the coal tar which has migrated through the subsurface from the former MGP structures, as noted on Figure 5. These are considered to be the primary contaminants of concern that will drive the remediation of subsurface soil to be addressed in the remedy selection process.

Subsurface soil contamination on Parcels I, II, III, IV, VI and VII will be addressed in the remedy selection process. Parcel V is excluded because no significant MGP contamination was found during the Remedial Investigation

Subsurface soil data is summarized below in separate tables on a parcel by parcel basis.

Table 2A – Parcel I Subsurface Soil

Constituents	Concentration Range (ppm)[a]		Unrestricted SCG[b] (ppm)	Frequency Exceeding Unrestricted SCG	Commercial SCG[c] (ppm)	Frequency Exceeding Commercial SCG
	Minimum	Maximum				
VOCs						
Benzene	0.0015	68	0.06	11 of 32	44	1 of 32
Ethylbenzene	0.00087	370	1	9 of 32	390	0 of 32
m/p-Xylene	0.0026	0.42	0.26	1 of 10	500	0 of 10
Total Xylene	0.0036	82	0.26	8 of 22	500	0 of 22
Acetone	0.046	0.076	0.05	2 of 32	500	0 of 32
cis-1,2-Dichloroethene	0.016	1.9	0.25	2 of 32	500	0 of 32
trans-1,2-Dichloroethene	0.28	0.28	0.19	1 of 32	500	0 of 32
Trichloroethene (TCE)	0.0009	13	0.47	2 of 32	200	0 of 32
SVOCs						
Acenaphthene	0.034	330	20	7 of 32	500	0 of 32
Anthracene	0.044	170	100	1 of 32	500	0 of 32
Benzo(a)anthracene	0.036	150	1	14 of 32	5.6	11 of 32
Benzo(b)fluoranthene	0.034	88	1	15 of 32	5.6	10 of 32
Benzo(k)fluoranthene	0.038	32	0.8	11 of 32	56	0 of 32
Benzo(a)pyrene	0.05	130	1	14 of 32	1	14 of 32
Chrysene	0.038	150	1	15 of 32	56	1 of 32
Dibenz(a,h)anthracene	0.022	6.7	0.33	7 of 32	0.56	5 of 32
Fluoranthene	0.077	270	100	1 of 32	500	0 of 32
Fluorene	0.025	210	30	6 of 32	500	0 of 32
Indeno(1,2,3-cd)pyrene	0.051	48	0.5	14 of 32	5.6	6 of 32
Naphthalene	0.061	1600	12	6 of 32	500	2 of 32
Phenanthrene	0.1	650	100	6 of 32	500	1 of 32
Pyrene	0.11	340	100	1 of 32	500	0 of 32
Dibenzofuran	0.024	7.7	7	1 of 32	350	0 of 32
Pesticides						
4,4'-DDT (p,p'-DDT)	0.018	0.034	0.0033	3 of 18	47	0 of 18
4,4'-DDE (p,p'-DDE)	0.004	0.01	0.0033	3 of 18	62	0 of 18
4,4-DDD (p,p-DDD)	0.012	0.027	0.0033	2 of 18	92	0 of 18
Dieldrin	0.011	0.011	0.005	1 of 18	1.4	0 of 18

Constituents	Concentration Range (ppm)[a]		Unrestricted SCG[b] (ppm)	Frequency Exceeding Unrestricted SCG	Commercial SCG[c] (ppm)	Frequency Exceeding Commercial SCG
	Minimum	Maximum				
Endrin	0.0056	0.045	0.014	2 of 18	89	0 of 18
Inorganics						
Arsenic	1.1	80.8	13	2 of 22	16	2 of 22
Copper	6.6	85.2	50	4 of 22	270	0 of 22
Lead	2.6	613	63	5 of 22	1000	0 of 22
Mercury	0.018	3	0.18	5 of 22	2.8	1 of 22
Nickel	8.2	73.7	30	3 of 22	310	0 of 22
Selenium	1.7	6.8	3.9	1 of 22	1500	0 of 22
Zinc	13.7	327	109	5 of 22	10000	0 of 22

Notes:

a - ppm: parts per million, which is equivalent to milligrams per kilogram, mg/kg, in soil;

b - SCG: Part 375-6.8(a), Unrestricted Soil Cleanup Objectives.

c - SCG: Part 375-6.8(b), Restricted Use Soil Cleanup Objectives for the Protection of Public Health for Restricted Residential Use.

d - SCG: Part 375-6.8(b), Restricted Use Soil Cleanup Objectives for the Protection of Public Health for Commercial Use.

Table 2B – Parcel 2 Subsurface Soil

Constituents	Concentration Range (ppm)[a]		Unrestricted SCG[b] (ppm)	Frequency Exceeding Unrestricted SCG	Restricted Residential SCG[c] (ppm)	Frequency Exceeding Restricted Residential SCG	Commercial SCG[d] (ppm)	Frequency Exceeding Commercial SCG
	Min	Max						
VOCs								
Benzene	0.00082	750	0.06	16 of 56	4.8	11 of 56	44	9 of 56
Toluene	0.00095	1300	0.7	10 of 56	100	7 of 56	500	7 of 56
Ethylbenzene	0.00092	1400	1	16 of 56	41	12 of 56	390	12 of 56
o-Xylene	0.011	260	0.26	1 of 9	100	1 of 9	500	1 of 9
m/p-Xylene	0.016	560	0.26	1 of 9	100	1 of 9	500	1 of 9
Total Xylene	0.0034	1500	0.26	15 of 47	100	9 of 47	500	9 of 47
Acetone	0.006	0.14	0.05	1 of 56	100	0 of 56	500	0 of 56
SVOCs								
Acenaphthene	0.057	1900	20	18 of 56	100	12 of 56	500	12 of 56
Acenaphthylene	0.034	2900	100	8 of 56	100	8 of 56	500	8 of 56
Anthracene	0.067	1000	100	11 of 56	100	11 of 56	500	11 of 56
Benzo(a)anthracene	0.082	690	1	34 of 56	1	34 of 56	5.6	34 of 56
Benzo(b)fluoranthene	0.045	400	1	33 of 56	1	33 of 56	5.6	33 of 56
Benzo(k)fluoranthene	0.045	140	0.8	24 of 56	3.9	13 of 56	56	13 of 56
Benzo(g,h,i)perylene	0.027	380	100	1 of 56	100	1 of 56	500	1 of 56
Benzo(a)pyrene	0.054	620	1	35 of 56	1	35 of 56	1	35 of 56
Chrysene	0.083	610	1	33 of 56	3.9	27 of 56	56	27 of 56
Dibenz(a,h)anthracene	0.04	17	0.33	17 of 56	0.33	17 of 56	0.56	17 of 56
Fluoranthene	0.11	1300	100	11 of 56	100	11 of 56	500	11 of 56
Fluorene	0.04	1400	30	17 of 56	100	11 of 56	500	11 of 56
Indeno(1,2,3-cd)pyrene	0.025	340	0.5	28 of 56	0.5	28 of 56	5.6	28 of 56
Naphthalene	0.08	16000	12	20 of 56	100	16 of 56	500	16 of 56
Phenanthrene	0.081	4100	100	17 of 56	100	17 of 56	500	17 of 56
Pyrene	0.16	2000	100	12 of 56	100	12 of 56	500	12 of 56
Dibenzofuran	0.032	74	7	3 of 56	59	1 of 56	350	1 of 56
Pesticides								
4,4'-DDT (p,p'-DDT)	0.014	0.014	0.0033	1 of 32	7.9	0 of 32	47	0 of 32
4,4'-DDE (p,p'-DDE)	0.006	0.017	0.0033	2 of 32	8.9	0 of 32	62	0 of 32

Constituents	Concentration Range (ppm)[a]		Unrestricted SCG[b] (ppm)	Frequency Exceeding Unrestricted SCG	Restricted Residential SCG[c] (ppm)	Frequency Exceeding Restricted Residential SCG	Commercial SCG[d] (ppm)	Frequency Exceeding Commercial SCG
	Min	Max						
4,4-DDD (p,p-DDD)	0.015	0.015	0.0033	1 of 32	13	0 of 32	92	0 of 32
Dieldrin	0.0066	0.014	0.005	2 of 32	0.2	0 of 32	1.4	0 of 32
Inorganics								
Arsenic	0.56	33	13	6 of 56	16	5 of 56	16	5 of 56
Barium	12.8	1190	350	5 of 56	400	4 of 56	400	4 of 56
Copper	4.7	381	50	13 of 56	270	1 of 56	270	1 of 56
Lead	1.9	4630	63	23 of 56	400	14 of 56	1000	14 of 56
Mercury	0.022	57.6	0.18	23 of 56	0.81	14 of 56	2.8	14 of 56
Nickel	6.7	102	30	5 of 56	310	0 of 56	310	0 of 56
Selenium	0.53	6.5	3.9	1 of 56	180	0 of 56	1500	0 of 56
Zinc	9.8	828	109	21 of 56	10000	0 of 56	10000	0 of 56

Notes:
a - ppm: parts per million, which is equivalent to milligrams per kilogram, mg/kg, in soil;
b - SCG: Part 375-6.8(a), Unrestricted Soil Cleanup Objectives.
c - SCG: Part 375-6.8(b), Restricted Use Soil Cleanup Objectives for the Protection of Public Health for Restricted Residential Use.
d - SCG: Part 375-6.8(b), Restricted Use Soil Cleanup Objectives for the Protection of Public Health for Commercial Use.

Table 2C – Parcel III Subsurface Soil

Constituents	Concentration Range (ppm)[a]		Unrestricted SCG[b] (ppm)	Frequency Exceeding Unrestricted SCG	Commercial SCG[c] (ppm)	Frequency Exceeding Commercial SCG
	Minimum	Maximum				
VOCs						
Benzene	0.0022	1700	0.06	8 of 12	44	2 of 12
Toluene	0.00052	2500	0.7	6 of 12	500	1 of 12
Ethylbenzene	0.0021	310	1	7 of 12	390	0 of 12
Total Xylene	0.0037	2200	0.26	7 of 12	500	1 of 12
Acetone	0.0033	0.52	0.05	1 of 12	500	0 of 12
cis-1,2-Dichloroethene	0.01	1.2	0.25	3 of 12	500	0 of 12
Methylene chloride	0.0017	0.3	0.05	4 of 12	500	0 of 12
Trichloroethene (TCE)	0.0084	9.2	0.47	4 of 12	200	0 of 12
Vinyl chloride	0.1	1	0.02	4 of 12	13	0 of 12
SVOCs						
Acenaphthene	0.026	170	20	4 of 12	500	0 of 12
Acenaphthylene	0.095	1700	100	3 of 12	500	2 of 12
Anthracene	0.022	700	100	3 of 12	500	1 of 12
Benzo(a)anthracene	0.018	360	1	9 of 12	5.6	7 of 12
Benzo(b)fluoranthene	0.53	190	1	9 of 12	5.6	7 of 12
Benzo(k)fluoranthene	0.18	14	0.8	5 of 12	56	0 of 12
Benzo(a)pyrene	0.01	290	1	9 of 12	1	9 of 12

Constituents	Concentration Range (ppm)[a]		Unrestricted SCG[b] (ppm)	Frequency Exceeding Unrestricted SCG	Commercial SCG[c] (ppm)	Frequency Exceeding Commercial SCG
	Minimum	Maximum				
Chrysene	0.34	310	1	9 of 12	56	3 of 12
Dibenz(a,h)anthracene	4	17	0.33	5 of 12	0.56	5 of 12
Fluoranthene	0.032	860	100	3 of 12	500	1 of 12
Fluorene	1.1	920	30	4 of 12	500	1 of 12
Indeno(1,2,3-cd)pyrene	0.68	99	0.5	8 of 12	5.6	6 of 12
Naphthalene	0.039	9000	12	7 of 12	500	4 of 12
Phenanthrene	0.08	2600	100	5 of 12	500	2 of 12
Pyrene	0.058	1400	100	3 of 12	500	2 of 12
Dibenzofuran	1.8	98	7	4 of 12	350	0 of 12
Pesticides						
4,4'-DDT (p,p'-DDT)	0.0035	0.079	0.0033	4 of 4	47	0 of 4
Dieldrin	0.0056	0.0056	0.005	1 of 4	1.4	0 of 4
Inorganics						
Arsenic	2.1	20.8	13	1 of 12	16	1 of 12
Cadmium	0.65	20.4	2.5	2 of 12	9.3	1 of 12
Copper	6.7	415	50	7 of 12	270	2 of 12
Lead	1.9	980	63	7 of 12	1000	0 of 12
Mercury	0.08	0.5	0.18	5 of 12	2.8	0 of 12
Nickel	13	98.5	30	4 of 12	310	0 of 12
Silver	0.13	10.1	2	2 of 12	1500	0 of 12
Zinc	10.9	504	109	5 of 12	10000	0 of 12

Notes:
a - ppm: parts per million, which is equivalent to milligrams per kilogram, mg/kg, in soil;
b - SCG: Part 375-6.8(a), Unrestricted Soil Cleanup Objectives.
c - SCG: Part 375-6.8(b), Restricted Use Soil Cleanup Objectives for the Protection of Public Health for Restricted Residential Use.
d - SCG: Part 375-6.8(b), Restricted Use Soil Cleanup Objectives for the Protection of Public Health for Commercial Use.

Table 2D – Parcel IV Subsurface Soil

Constituents	Concentration Range (ppm)[a]		Unrestricted SCG[b] (ppm)	Frequency Exceeding Unrestricted SCG	Commercial SCG[c] (ppm)	Frequency Exceeding Commercial SCG
	Minimum	Maximum				
SVOCs						
Benzo(a)anthracene	3.1	19	1	2 of 3	5.6	1 of 3
Benzo(b)fluoranthene	3.3	18	1	2 of 3	5.6	1 of 3
Benzo(k)fluoranthene	1.4	8.3	0.8	2 of 3	56	0 of 3
Benzo(a)pyrene	3.5	17	1	2 of 3	1	2 of 3
Chrysene	3.6	21	1	2 of 3	56	0 of 3
Dibenz(a,h)anthracene	1.1	5	0.33	2 of 3	0.56	2 of 3
Indeno(1,2,3-cd)pyrene	3.6	14	0.5	2 of 3	5.6	1 of 3
Pesticides						
4,4'-DDE (p,p'-DDE)	0.0056	0.0056	0.0033	1 of 1	62	0 of 1
Dieldrin	0.017	0.017	0.005	1 of 1	1.4	0 of 1
Inorganics						

Constituents	Concentration Range (ppm)[a]		Unrestricted SCG[b] (ppm)	Frequency Exceeding Unrestricted SCG	Commercial SCG[c] (ppm)	Frequency Exceeding Commercial SCG
	Minimum	Maximum				
Barium	17.6	763	350	1 of 3	400	1 of 3
Cadmium	10.1	10.1	2.5	1 of 3	9.3	1 of 3
Copper	8.4	16400	50	1 of 3	270	1 of 3
Lead	1.2	1500	63	2 of 3	1000	1 of 3
Mercury	0.38	1.2	0.18	2 of 3	2.8	0 of 3
Nickel	10.7	54.5	30	2 of 3	310	0 of 3
Silver	2.8	2.8	2	1 of 3	1500	0 of 3
Zinc	12.5	9660	109	1 of 3	10000	0 of 3

Notes:

Notes:

a - ppm: parts per million, which is equivalent to milligrams per kilogram, mg/kg, in soil;

b - SCG: Part 375-6.8(a), Unrestricted Soil Cleanup Objectives.

c - SCG: Part 375-6.8(b), Restricted Use Soil Cleanup Objectives for the Protection of Public Health for Restricted Residential Use.

d - SCG: Part 375-6.8(b), Restricted Use Soil Cleanup Objectives for the Protection of Public Health for Commercial Use.

Table 2E – Parcel V Subsurface Soil

Constituents	Concentration Range (ppm)a		Unrestricted SCGb (ppm)	Frequency Exceeding Unrestricted SCG	Commercial SCGc (ppm)	Frequency Exceeding Commercial SCG
	Min	Max				
VOCs						
Benzene	0.0015	1.1	0.06	1 of 12	44	0 of 12
Toluene	1.4	1.4	0.7	1 of 12	500	0 of 12
Ethylbenzene	0.0013	1.3	1	1 of 12	390	0 of 12
Total Xylene	0.0007	1.4	0.26	1 of 12	500	0 of 12
Acetone	0.053	0.079	0.05	3 of 12	500	0 of 12
SVOCs						
Benzo(a)anthracene	0.05	17	1	1 of 12	5.6	1 of 12
Benzo(b)fluoranthene	0.079	21	1	1 of 12	5.6	1 of 12
Benzo(k)fluoranthene	0.083	9.7	0.8	1 of 12	56	0 of 12
Benzo(a)pyrene	0.055	18	1	1 of 12	1	1 of 12
Chrysene	0.052	21	1	1 of 12	56	0 of 12
Dibenz(a,h)anthracene	0.027	2.4	0.33	1 of 12	0.56	1 of 12
Indeno(1,2,3-cd)pyrene	0.1	11	0.5	2 of 12	5.6	1 of 12
Inorganics						
Arsenic	1.8	25.3	13	1 of 12	16	1 of 12
Copper	12	131	50	1 of 12	270	0 of 12
Lead	3.8	1790	63	8 of 12	1000	1 of 12
Mercury	0.013	7	0.18	4 of 12	2.8	1 of 12
Zinc	27.2	345	109	3 of 12	10000	0 of 12

Notes:
a - ppm: parts per million, which is equivalent to milligrams per kilogram, mg/kg, in soil;
b - SCG: Part 375-6.8(a), Unrestricted Soil Cleanup Objectives.
c - SCG: Part 375-6.8(b), Restricted Use Soil Cleanup Objectives for the Protection of Public Health for Restricted Residential Use.
d - SCG: Part 375-6.8(b), Restricted Use Soil Cleanup Objectives for the Protection of Public Health for Commercial Use.

Table 2F – Parcel VI Subsurface Soil

Constituents	Concentration Range (ppm)[a]		Unrestricted SCG[b] (ppm)	Frequency Exceeding Unrestricted SCG	Commercial SCG[c] (ppm)	Frequency Exceeding Commercial SCG
	Min	Max				
VOCs						
Benzene	0.0014	230	0.06	3 of 10	44	1 of 10
Toluene	0.00055	72	0.7	1 of 10	500	0 of 10
Ethylbenzene	0.055	790	1	2 of 10	390	1 of 10
o-Xylene	0.0044	21	0.26	1 of 7	500	0 of 7
m/p-Xylene	0.006	3.2	0.26	1 of 7	500	0 of 7

Constituents	Concentration Range (ppm)[a]		Unrestricted SCG[b] (ppm)	Frequency Exceeding Unrestricted SCG	Commercial SCG[c] (ppm)	Frequency Exceeding Commercial SCG
	Min	Max				
Total Xylene	840	840	0.26	1 of 3	500	1 of 3
Acetone	0.0082	0.08	0.05	1 of 10	500	0 of 10
cis-1,2-Dichloroethene	0.26	0.26	0.25	1 of 10	500	0 of 10
trans-1,2-Dichloroethene	1.3	1.3	0.19	1 of 10	500	0 of 10
Trichloroethene (TCE)	0.67	0.67	0.47	1 of 10	200	0 of 10
SVOCs						
Acenaphthene	0.057	290	20	2 of 10	500	0 of 10
Acenaphthylene	0.26	1900	100	1 of 10	500	1 of 10
Anthracene	0.092	980	100	1 of 10	500	1 of 10
Benzo(a)anthracene	0.19	570	1	4 of 10	5.6	2 of 10
Benzo(b)fluoranthene	0.17	250	1	4 of 10	5.6	2 of 10
Benzo(k)fluoranthene	0.13	110	0.8	4 of 10	56	1 of 10
Benzo(g,h,i)perylene	0.093	550	100	1 of 10	500	1 of 10
Benzo(a)pyrene	0.17	430	1	4 of 10	1	4 of 10
Chrysene	0.19	560	1	4 of 10	56	1 of 10
Dibenz(a,h)anthracene	0.029	1.1	0.33	1 of 10	0.56	1 of 10
Fluoranthene	0.32	1000	100	1 of 10	500	1 of 10
Fluorene	0.057	1100	30	2 of 10	500	1 of 10
Indeno(1,2,3-cd)pyrene	0.085	480	0.5	3 of 10	5.6	1 of 10
Naphthalene	0.074	8400	12	2 of 10	500	1 of 10
Phenanthrene	0.069	3600	100	2 of 10	500	1 of 10
Pyrene	0.37	1500	100	1 of 10	500	1 of 10
Dibenzofuran	0.042	110	7	1 of 10	350	0 of 10
Pesticides						
4,4'-DDT (p,p'-DDT)	0.0042	0.011	0.0033	2 of 8	47	0 of 8
4,4'-DDE (p,p'-DDE)	0.0098	0.0098	0.0033	1 of 8	62	0 of 8
4,4-DDD (p,p-DDD)	0.017	0.017	0.0033	1 of 8	92	0 of 8
Dieldrin	0.0084	0.0084	0.005	1 of 8	1.4	0 of 8
Inorganics						
Arsenic	61	61	13	1 of 3	16	1 of 3
Lead	184	184	63	1 of 3	1000	0 of 3
Mercury	0.0049	0.31	0.18	1 of 3	2.8	0 of 3

Notes:
a - ppm: parts per million, which is equivalent to milligrams per kilogram, mg/kg, in soil;
b - SCG: Part 375-6.8(a), Unrestricted Soil Cleanup Objectives.
c - SCG: Part 375-6.8(b), Restricted Use Soil Cleanup Objectives for the Protection of Public Health for Restricted Residential Use.
d - SCG: Part 375-6.8(b), Restricted Use Soil Cleanup Objectives for the Protection of Public Health for Commercial Use.

Table 2G – Parcel VII Subsurface Soil

Constituents	Concentration Range (ppm)[a]		Unrestricted SCG[b] (ppm)	Frequency Exceeding Unrestricted SCG	Commercial SCG[c] (ppm)	Frequency Exceeding Commercial SCG
	Minimum	Maximum				
VOCs						
Ethylbenzene	0.0014	21	1	1 of 6	390	0 of 6
Total Xylene	18	18	0.26	1 of 6	500	0 of 6
SVOCs						
Benzo(a)anthracene	0.49	27	1	1 of 6	5.6	1 of 6
Benzo(b)fluoranthene	0.47	11	1	1 of 6	5.6	1 of 6
Benzo(k)fluoranthene	0.19	5	0.8	1 of 6	56	0 of 6
Benzo(a)pyrene	0.38	19	1	1 of 6	1	1 of 6
Chrysene	0.56	27	1	1 of 6	56	0 of 6
Fluorene	0.41	50	30	1 of 6	500	0 of 6
Indeno(1,2,3-cd)pyrene	1.5	14	0.5	2 of 6	5.6	1 of 6
Naphthalene	0.42	230	12	1 of 6	500	0 of 6
Phenanthrene	0.94	170	100	1 of 6	500	0 of 6
Inorganics						
Arsenic	2.9	41.7	13	1 of 6	16	1 of 6
Copper	5.8	101	50	1 of 6	270	0 of 6
Lead	4.7	403	63	1 of 6	1000	0 of 6
Mercury	0.0067	0.24	0.18	1 of 6	2.8	0 of 6
Nickel	7.1	41.7	30	1 of 6	310	0 of 6

Notes:
a - ppm: parts per million, which is equivalent to milligrams per kilogram, mg/kg, in soil;
b - SCG: Part 375-6.8(a), Unrestricted Soil Cleanup Objectives.
c - SCG: Part 375-6.8(b), Restricted Use Soil Cleanup Objectives for the Protection of Public Health for Restricted Residential Use.
d - SCG: Part 375-6.8(b), Restricted Use Soil Cleanup Objectives for the Protection of Public Health for Commercial Use.

Table 2H – Parcel VIII Subsurface Soil

Constituents	Concentration Range (ppm)[a]		Unrestricted SCG[b] (ppm)	Frequency Exceeding Unrestricted SCG	Commercial SCG[c] (ppm)	Frequency Exceeding Commercial SCG
	Minimum	Maximum				
VOCs						
Benzene	0.0012	880	0.06	16 of 84	44	5 of 84
Toluene	0.00096	1600	0.7	16 of 84	500	6 of 84
Ethylbenzene	0.00011	1300	1	6 of 84	390	2 of 84
Total Xylene	0.00084	1500	0.26	16 of 84	500	4 of 84
Acetone	0.0034	0.24	0.05	9 of 84	500	0 of 84

Constituents	Concentration Range (ppm)[a]		Unrestricted SCG[b] (ppm)	Frequency Exceeding Unrestricted SCG	Commercial SCG[c] (ppm)	Frequency Exceeding Commercial SCG
	Minimum	Maximum				
Methyl ethyl ketone (2-Butanone)	0.024	7.4	0.12	1 of 84	500	0 of 84
Methylene chloride	0.011	11	0.05	2 of 84	500	0 of 84
SVOCs						
Acenaphthene	0.024	2000	20	13 of 84	500	4 of 84
Acenaphthylene	0.021	2000	100	6 of 84	500	3 of 84
Anthracene	0.016	1200	100	7 of 84	500	4 of 84
Benzo(a)anthracene	0.012	840	1	26 of 84	5.6	17 of 84
Benzo(b)fluoranthene	0.038	500	1	27 of 84	5.6	14 of 84
Benzo(k)fluoranthene	0.036	150	0.8	15 of 84	56	3 of 84
Benzo(g,h,i)perylene	0.13	370	100	3 of 84	500	0 of 84
Benzo(a)pyrene	0.04	750	1	29 of 84	1	29 of 84
Chrysene	0.022	730	1	27 of 84	56	9 of 84
Dibenz(a,h)anthracene	0.065	270	0.33	14 of 84	0.56	12 of 84
Fluoranthene	0.039	1400	100	8 of 84	500	5 of 84
Fluorene	0.019	1500	30	9 of 84	500	5 of 84
Indeno(1,2,3-cd)pyrene	0.11	330	0.5	25 of 84	5.6	9 of 84
Naphthalene	0.024	17000	12	15 of 84	500	8 of 84
Phenanthrene	0.051	4700	100	11 of 84	500	6 of 84
Pyrene	0.022	2300	100	10 of 84	500	5 of 84
Dibenzofuran	0.044	120	7	3 of 84	350	0 of 84
Pesticides						
4,4'-DDT (p,p'-DDT)	0.003	0.0083	0.0033	3 of 22	47	0 of 22
4,4'-DDE (p,p'-DDE)	0.017	0.017	0.0033	1 of 22	62	0 of 22
4,4-DDD (p,p-DDD)	0.004	0.049	0.0033	5 of 22	92	0 of 22
Dieldrin	0.012	0.012	0.005	1 of 22	1.4	0 of 22
Inorganics						
Arsenic	0.45	19.9	13	2 of 84	16	2 of 84
Barium	8.4	376	350	1 of 84	400	0 of 84
Copper	5.2	83.7	50	2 of 84	270	0 of 84
Lead	1.1	651	63	16 of 84	1000	0 of 84
Mercury	0.005	2.3	0.18	7 of 57	2.8	0 of 57
Nickel	7.2	68.7	30	12 of 84	310	0 of 84
Zinc	9.8	300	109	6 of 84	10000	0 of 84

Notes:

a - ppm: parts per million, which is equivalent to milligrams per kilogram, mg/kg, in soil;

b - SCG: Part 375-6.8(a), Unrestricted Soil Cleanup Objectives.

c - SCG: Part 375-6.8(b), Restricted Use Soil Cleanup Objectives for the Protection of Public Health for Restricted Residential Use.

d - SCG: Part 375-6.8(b), Restricted Use Soil Cleanup Objectives for the Protection of Public Health for Commercial Use.

Table 2I – Public Streets Subsurface Soil

Constituents	Concentration Range (ppm)[a]		Unrestricted SCG[b] (ppm)	Frequency Exceeding Unrestricted SCG	Commercial SCG[c] (ppm)	Frequency Exceeding Commercial SCG
	Minimum	Maximum				
VOCs						
Benzene	300	300	0.06	1 of 2	44	1 of 2
Toluene	890	890	0.7	1 of 2	500	1 of 2
Ethylbenzene	1000	1000	1	1 of 2	390	1 of 2
Total Xylene	1100	1100	0.26	1 of 2	500	1 of 2
SVOCs						
Acenaphthene	240	240	20	1 of 2	500	0 of 2
Acenaphthylene	0.13	2200	100	1 of 2	500	1 of 2
Anthracene	0.17	1100	100	1 of 2	500	1 of 2
Benzo(a)anthracene	0.095	570	1	1 of 2	5.6	1 of 2
Benzo(b)fluoranthene	0.055	330	1	1 of 2	5.6	1 of 2
Benzo(k)fluoranthene	150	150	0.8	1 of 2	56	1 of 2
Benzo(g,h,i)perylene	110	110	100	1 of 2	500	0 of 2
Benzo(a)pyrene	0.074	470	1	1 of 2	1	1 of 2
Chrysene	0.093	600	1	1 of 2	56	1 of 2
Fluoranthene	0.19	1200	100	1 of 2	500	1 of 2
Fluorene	0.14	1300	30	1 of 2	500	1 of 2
Indeno(1,2,3-cd)pyrene	780	780	0.5	1 of 2	5.6	1 of 2
Naphthalene	0.081	7900	12	1 of 2	500	1 of 2
Phenanthrene	0.59	3500	100	1 of 2	500	1 of 2
Pyrene	0.31	1500	100	1 of 2	500	1 of 2
Dibenzofuran	140	140	7	1 of 2	350	0 of 2

Notes:
a - ppm: parts per million, which is equivalent to milligrams per kilogram, mg/kg, in soil;
b - SCG: Part 375-6.8(a), Unrestricted Soil Cleanup Objectives.
c - SCG: Part 375-6.8(b), Restricted Use Soil Cleanup Objectives for the Protection of Public Health for Commercial Use.

Surface Soil

Twelve surface soil samples were collected from a depth of 0-2 inches to assess potential for direct human exposure. Since most of the site is paved, sample collection was focused on the few areas where surface soil was exposed. Samples were collected on Parcels I, II, IV and VI and from tree wells on the Sackett and DeGraw Street right of ways.

Analyses of the surface soil samples showed exceedances of unrestricted use SCOs for PAHs, metals and pesticides. One sample exceeded Commercial SCOs for PAHs. Pesticides are unrelated to MGP activities. The observed concentrations of metals and PAHs represent typical urban fill concentrations and are not related to the operation of the MGP.

Table 3 – Surface Soil

Constituents	Concentration Range (ppm)[a]		Unrestricted SCG[b] (ppm)	Frequency Exceeding Unrestricted SCG	Commercial SCG[c] (ppm)	Frequency Exceeding Commercial SCG
	Minimum	Maximum				
SVOCs						
Benz[a]anthracene	0.33	11	1	3 of 12	5.6	1 of 12
Benzo[a]pyrene	0.41	8.8	1	3 of 12	1	3 of 12
Benzo[b]fluoranthene	0.65	12	1	6 of 12	5.6	1 of 12
Benzo[k]fluoranthene	0.23	4.8	0.8	3 of 12	56	0
Chrysene	0.42	11	1	5 of 12	56	0
Dibenz[a,h]anthracene	0.092	1.4	0.33	1 of 12	0.56	1 of 12
Indeno[1,2,3-cd]pyrene	0.34	6.8	0.5	8 of 12	5.6	1 of 12
4-Methylphenol (p-Cresol)	0.06	0.67	0.33	1 of 12	500	0
Pesticides						
Aldrin	0.0079	0.0079	0.005	1 of 12	0.68	0
4,4-DDD	0.0059	0.042	0.0033	6 of 12	92	0
4,4'-DDE	0.0039	0.021	0.0033	5 of 12	62	0
4,4'-DDT	0.013	0.081	0.0033	10 of 12	47	0
Dieldrin	0.0054	0.0082	0.005	1 of 12	1.4	0
Inorganics						
Cadmium	0.62	4.3	2.5	1 of 12	9.3	0
Copper	35	198	50	9 of 12	270	0
Lead	44.1	333	63	11 of 12	1000	0
Mercury	0.066	0.68	0.18	7 of 12	2.8	0
Nickel	12.2	36.5	30	1 of 12	310	0
Zinc	111	567	109	12 of 12	10000	0

Notes:
a - ppm: parts per million, which is equivalent to milligrams per kilogram, mg/kg, in soil;
b - SCG: Part 375-6.8(a), Unrestricted Soil Cleanup Objectives.
c - SCG: Part 375-6.8(b), Restricted Use Soil Cleanup Objectives for the Protection of Public Health for Commercial Use.

Soil Vapor

Soil vapor, indoor air and ambient (outdoor) air were sampled. Soil vapor was sampled on Parcels I through V. Indoor air was sampled in occupied buildings on Parcels I, III and V. Ambient air was sampled on Parcels I, III, IV and V. The sampling showed the presence of MGP- related compounds in soil vapor. Concentrations of MGP-related compounds in indoor air were below the 90th percentile of USEPA BASE Study. The analytical results are presented in Tables 4 A-C.

Table 4A – Soil Vapor

Constituents	Concentration Range (ug/m3)	
	Minimum	Maximum
VOCs		
Benzene	0.38	200
Toluene	0.686	73
Ethylbenzene	0.56	12
m,p-Xylene	0.535	21
o-Xylene	0.49	14
p-Xylene	1.5	33
Acetaldehyde	6.5	40
Acetone	4.09	410
Acrolein (propenal)	0.67	10
Bromodichloromethane	0.27	1.6
Bromoform	0.29	2
Bromomethane	0.057	0.074
1,3-Butadiene	0.42	5.2
Butane	0.7	520
2-Butanone (Methyl ethyl ketone)	1.75	79
t-Butyl alcohol (Tertiary Butyl Alcohol)	0.18	26
Carbon disulfide	1.2	21
Carbon tetrachloride	0.16	22
Chloroethane	0.11	0.65
Chloroform	0.2	130
Chloromethane	0.69	3.7
2-Chlorotoluene	1.3	1.3
Cryofluorane (Freon-114)	0.11	0.12
Cyclohexane	0.54	2000
n-Decane	1.3	410
Dibromochloromethane	0.41	1.3
1,3-Dichlorobenzene	0.19	10
1,4-Dichlorobenzene	0.21	22
Dichlorodifluoromethane	1	36
1,1-Dichloroethane	0.8	1.2
1,2-Dichloroethane	0.13	5.1
cis-1,2-Dichloroethene	0.71	1700
trans-1,2-Dichloroethene	1.2	1.3
1,1-Dichloroethene	0.078	0.078
1,2-Dichloropropane	0.15	0.15
1,4-Dioxane	0.64	0.64
n-Dodecane	3.3	150
Ethanol	2.2	130
p-Ethyltoluene	1.1	11
n-Heptane	0.46	320
n-Hexane	0.59	1300

Constituents	Concentration Range (ug/m3)	
	Minimum	Maximum
2-Hexanone	0.65	10
Indane	1.2	7.1
Indene	2.1	9.8
Methyl tert-butyl ether	0.62	23
4-Methyl-2-pentanone	0.29	30
Methylene chloride	1	3.5
1-Methylnaphthalene	18	19
2-Methylnaphthalene	8.9	71
Naphthalene	1.3	100
Nonane	0.58	43
n-Octane	0.33	54
Pentane	0.731	1200
2-Propanol (Isopropyl Alcohol)	0.8	23
Styrene	0.47	20
1,1,2,2-Tetrachloroethane	1.3	5.8
Tetrachloroethene	0.69	5500
1,2,4,5-Tetramethylbenzene	2.3	25
Thiophene	0.64	2
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	0.32	2
1,1,1-Trichloroethane	0.094	14
Trichloroethene	0.27	180000
Trichlorofluoromethane	0.53	78
1,2,3-Trimethylbenzene	2.2	130
1,2,4-Trimethylbenzene	0.4	26
1,3,5-Trimethylbenzene	0.86	18
2,2,4-Trimethylpentane	0.49	1200
n-Undecane	1	360

Notes:
Minimum is the minimum detected value
VOCs - volatile organic compounds
ug/m3-microgram per cubic meter

Table 4B – Indoor Air

Constituents	Concentration Range (ug/m3)		EPA BASE Indoor Air Concentrations 90th Percentile	Frequency Exceeding EPA BASE Indoor Air Concentrations 90th Percentile
	Minimum	Maximum		
VOCs				
Toluene	3	610	43	4 of 8
Ethylbenzene	0.93	34	5.7	4 of 8
o-Xylene	0.83	12	7.9	1 of 8

Constituents	Concentration Range (ug/m3)		EPA BASE Indoor Air Concentrations 90th Percentile	Frequency Exceeding EPA BASE Indoor Air Concentrations 90th Percentile
	Minimum	Maximum		
Acetone	13	240	98.9	2 of 8
2-Butanone (Methyl ethyl ketone)	2.1	14	12	1 of 8
n-Decane	1.1	39	17.5	3 of 8
1,4-Dichlorobenzene	0.3	30	5.5	3 of 8
1,2-Dichloroethane	0.084	20	0.9	4 of 8
cis-1,2-Dichloroethene	1.9	5.5	1.9	2 of 8
Ethanol	3.2	360	210	3 of 8
p-Ethyltoluene	0.43	4.7	3.6	1 of 8
Methylene chloride	1.4	30	10	2 of 8
Styrene	0.11	4.9	1.9	2 of 8
Trichloroethene (TCE)	0.29	40	4.2	3 of 8
1,3,5-Trimethylbenzene	0.23	5.3	3.7	1 of 8

Notes:
ug/m3 - micrograms per cubic meter
VOCs - volatile organic compounds
NE - not established
U.S. Environmental Protection Agency (EPA) Building Assessment and Survey Evaluation (BASE) Reference1 Source: New York State Department of Health (DOH), October 2006. Summary of Indoor and Outdoor Levels of Volatile Organic Compounds from selected public and commercial office buildings reported in various locations within office settings in New York State, 1994-1996.

Table 4C – Outdoor Air

Constituents	Concentration Range (ug/m3)		USEPA BASE Outdoor Air Concentrations	Frequency Exceeding USEPA BASE Outdoor Air Concentrations
	Minimum	Maximum		
VOCs				
Methylene chloride	2.2	26	6.1	2

Notes:
ug/m3 - micrograms per cubic meter
VOCs - volatile organic compounds
NE - not established

Exhibit B

Description of Remedial Alternatives

The following alternatives were considered based on the remedial action objectives (see Section 6.5) to address the contaminated media identified at the site as described in Exhibit A.

Alternative 1: No Action

The No Action Alternative is evaluated as a procedural requirement and as a basis for comparison. This alternative leaves the site in its present condition and does not provide any additional protection to public health and the environment.

Common Elements

All of the active remedies discussed below include measures to prevent subsurface migration of coal tar from source areas at the Fulton Works site into the Gowanus Canal. Migration of tar toward the canal and the presence of tar-contaminated sediments at the bottom of the canal was documented during the RI. USEPA is currently designing a remedy for dredging contaminated sediments in the canal, and has stated that those dredging efforts will begin at the head of the canal, adjacent to the Fulton site.

A subsurface barrier to tar migration located along the eastern bank of the canal is included as a common element to protect the canal from recontamination once the USEPA dredging project is complete. This barrier will take the form of a subsurface wall of sufficient depth to prevent further migration of tar at depths where it could further contaminate canal sediments.

In addition, many of the existing bulkheads in this area are in poor condition and pose a threat of collapse if the USEPA dredging remedy were to proceed at this time. Consequently, the barrier wall will serve two purposes: to stop further migration of coal tar into the sediments at the bottom of the canal, and also to support the bank of the canal and adjacent buildings from collapse as dredging deepens the canal. A sealed, reinforced steel sheet pile wall is the baseline technology identified which can serve both of these purposes.

The design of the wall includes:

- a cutoff wall approximately 50 feet deep installed on the east bank of the Gowanus Canal to prevent the migration of MGP contamination from the site to the canal. The wall will include a “wing wall” projecting inland along Sackett Street to address the possibility of contaminant migration around the south end of the wall.
- coal tar recovery wells installed (or an alternative means of tar collection) behind the cutoff wall where mobile source material is present to remove coal tar DNAPL and prevent migrating tar from building up behind the wall.
- Measures such as sealing all penetrations of the wall to prevent tar migration along utilities such as storm sewers or other piping which cannot be abandoned, which could provide a pathway for migration into the canal.

Alternatives 2 – 4 outlined below present different degrees of source area remediation. The alternatives vary widely in the length of time required, the degree of short-term impacts, the reliance on institutional controls, and overall cost.

Alternative 2: Restoration to Pre-Disposal or Unrestricted Conditions

Full Excavation

In addition to the Common Elements noted above, the Full Excavation alternative requires removal and off-site disposal of NAPL-impacted soil and all soil that exceeds the SCOs for unrestricted use from all areas of the site, as well as the street rights of way to which coal tar has migrated in the subsurface. Given the presence of coal tar at depths greater than 100 feet, the water table at an approximate depth of 10 feet and the densely populated urban nature of the site, this alternative will be subject to the limitations of excavation technology applicable to this area. Natural attenuation of groundwater would reduce dissolved contaminant concentrations over a period of several years following completion of the excavation.

Capital Cost $609,248,000

Alternative 3: Excavation of Former MGP Subsurface Structures and Immediately Adjacent Coal Tar Contaminated Soils and Containment and Coal Tar Recovery

In addition to the Common Elements noted above, Alternative 3 would call for excavation of MGP source areas currently located beneath parcels I, II, III, IV and VI. Because all of these parcels currently host active land uses, remediation would proceed on a parcel by parcel basis, as each parcel becomes vacant or otherwise becomes available for remediation. Such opportunities for remediation would include redevelopment proposals, extensive reconstruction of city sewer infrastructure, or rehabilitation/reconstruction of the Thomas Greene Park.

Once a parcel becomes available for remediation, the following actions would be implemented:

- Excavation of the MGP structure areas, including gas holder foundations and tanks, and immediately adjacent source areas and grossly contaminated soil, as defined in 6NYCRR Part 375-1.2(u), from Parcels I, II, III and IV. Grossly contaminated soils would be excavated from the portions of off-site Parcel VI, where tar has migrated from the original MGP operations areas.
- Additional excavation work required to facilitate redevelopment would be included in the removal program, with requirements for proper handling and disposal of the excavated material.
- Excavation support systems such as sheet piling, installed to facilitate deep excavations, would be left in place as necessary to minimize recontamination by tar migrating from adjacent unremediated areas. Coal tar impacts to the deeper sewer lines in this area will be addressed during major sewer modification work.
- Natural attenuation of groundwater would reduce dissolved contaminant concentrations over a period of several years following completion of the excavation and solidification. However, due to the extensive presence of tar throughout the area, it is unlikely that groundwater contamination will be eliminated.

Environmental Easements will be required in the near term for Parcels I, II, III and IV, which make up the footprint of the former MGP. Interim Site Management Plans will be required for all on-site and off-site properties except Parcel V, subject to agreements with the property owners.

Present Worth: $35,501,000
Capital Cost:...$29,801,000

Annual Costs:..$331,000

Alternative 4: Excavation of Former MGP Subsurface Structures and Remediation of MGP Source Material to a Minimum Depth of 20 feet and Containment and Coal Tar Recovery

This alternative builds on Alternative 3 by providing for additional remediation of deeper soils. It includes the Common Elements noted above, and provides for a parcel by parcel remedial approach which would be triggered by the same events listed for Alternative 3.

Once a parcel becomes available for remediation, the following actions would be implemented:

- Excavation of MGP structures, including gas holder foundations and tanks, and immediately adjacent source areas and grossly contaminated soil, as defined in 6NYCRR Part 375-1.2(u), from Parcels I, II, III and IV.
- For Parcels I, II, III, IV, VI and VII, a pre-design investigation would be conducted to determine the extent of MGP source material to depths of at least 20 feet. This material will be either excavated and replaced with clean backfill meeting the appropriate Part 375 SCOs, or solidified in place using an in-situ solidification (ISS) process. ISS is a process that binds the soil particles in place creating a low permeability mass. The contaminated soil is mixed in place with solidifying agents (typically Portland cement) or other binding agents using an excavator or augers. The mixture produces a solidified low permeability monolith. The solidified mass will then be covered with a cover system to prevent direct exposure and to protect the solidified material from weathering due to freeze/thaw cycles. The process reduces or eliminates mobility of contamination and reduces or eliminates the matrix as a source of groundwater contamination. The solidified mass, however, can still be removed as necessary to support future site redevelopment.
- Excavation support systems such as sheet piling or soil-concrete walls that are installed to facilitate deep excavations, would be left in place as necessary to minimize recontamination by tar migrating from adjacent unremediated areas.
- Coal tar impacts to the deeper sewer lines in this area would be addressed during major sewer modification work.
- Natural attenuation of groundwater would reduce dissolved contaminant concentrations over a period of several years following completion of the excavation and solidification. However, due to the extensive presence of tar at depth beneath the area, it is unlikely that groundwater contamination will be eliminated.
- Environmental Easements will be required in the near term for Parcels I, II, III and IV, which make up the footprint of the former MGP. Interim Site Management Plans will be required for all on-site and off-site properties except Parcel V, subject to agreements with the property owners.

Present Worth: $54,525,000
Capital Cost:..$48,825,000
Annual Costs:..$331,000

Exhibit C

Remedial Alternative Costs

Remedial Alternative	Capital Cost ($)	Annual Costs ($)	Total Present Worth ($)
1) No Action	0	0	0
2) Restoration to Pre-Disposal or Unrestricted Conditions	609,248,000	0	0
3) Excavation of Former MGP Subsurface Structures and Immediately Adjacent Coal Tar Contaminated Soils and Containment and Coal Tar Recovery	29,801,000	331,000	35,501,000
4) Excavation of Former MGP Subsurface Structures and Remediation of MGP Source Material to a depth of 20 feet and Containment and Coal Tar Recovery	48,825,000	331,000	54,525,000

Exhibit D

SUMMARY OF THE PROPOSED REMEDY

The Department is proposing Alternative 4: Barrier Wall with Coal Tar Extraction, Excavation of Former MGP Subsurface Structures, and Remediation of MGP Source Material to a minimum depth of 20 feet as the remedy for this site. The elements of this remedy are described in Section 7. The proposed remedy is depicted in Figure 5.

Basis for Selection

The proposed remedy is based on the results of the RI and the evaluation of alternatives. The criteria to which potential remedial alternatives are compared are defined in 6 NYCRR Part 375. A detailed discussion of the evaluation criteria and comparative analysis is included in the FS report.

The first two evaluation criteria are termed "threshold criteria" and must be satisfied in order for an alternative to be considered for selection.

1. Protection of Human Health and the Environment. This criterion is an overall evaluation of each alternative's ability to protect public health and the environment.

Alternative 1 (No Action) does not provide any protection to public health and the environment and will not be evaluated further. Alternative 2, by removing soil contaminated above the unrestricted soil cleanup objectives, to the limits of construction technology applicable to this area, meets this threshold criterion. Alternatives 3 and 4 protect the environment in the short term by the construction of the barrier wall to prevent further contamination of the canal, by addressing potential utility worker exposures in the short term, and by maintaining the existing protections for general public exposures through institutional controls. As the parcels become available for remediation in the longer term, Alternative 3 partially addresses contaminated soil and the sources of groundwater contamination. Those soils most likely to be encountered during future excavation work would be removed and replaced with clean backfill. The proposed remedy, Alternative 4, would satisfy this criterion to a greater degree by removing or stabilizing/solidifying more of the contaminated subsurface soils. By removing or stabilizing all MGP contamination to a depth of at least 20 feet, Alternative 4 would achieve an enhanced level of overall protection.

Alternatives 2, 3 and 4 rely on natural attenuation of groundwater contamination over time, in conjunction with eventually reducing the source of contaminants as remedial actions remove and/or treat additional areas of contamination, to protect the groundwater resource. Under favorable conditions, all of the identified MGP contaminants can be digested and destroyed by soil bacteria once they are dissolved in groundwater. However, it is likely that at least some MGP source areas will remain at unreachable subsurface depths for the foreseeable future, and this undissolved material would not be broken down by soil bacteria. Thus, it is likely that significant levels of groundwater contamination will remain beneath the area indefinitely. To achieve human health protection, in addition to the local groundwater use restrictions that are already in place, institutional controls will also be required to prevent human contact with this groundwater. Under Alternatives 2, 3, and 4, tar discharges to the Gowanus Canal will be eliminated, and a substantial reduction in dissolved groundwater contaminant concentrations discharged to the canal will be achieved. Under current conditions, dissolved contaminants are rapidly degraded once they reach the canal, and reach concentration levels below human and ecological screening thresholds. Alternatives 2, 3, and 4, combined with increasing oxygen levels in the canal resulting from operation of the newly rehabilitated flushing tunnel, will reduce contaminant levels even further.

2. Compliance with New York State Standards, Criteria, and Guidance (SCGs). Compliance with SCGs addresses whether a remedy will meet environmental laws, regulations, and other standards and criteria. In addition, this criterion includes the consideration of guidance which the Department has determined to be applicable on a case-specific basis.

Alternatives 2, 3, and 4 would comply with SCGs to the extent practicable. Alternative 2 would meet unrestricted use soil cleanup objectives while Alternatives 3 and 4 would meet commercial use soil cleanup objectives by removing soils which exceed those objectives. Alternative 3 would remove less of this soil, but would isolate it from human and environmental exposure with a surface cover consisting of clean soil, buildings, or pavement. Alternative 4 would remove/solidify more contaminated soil than Alternative 3 and thus provide a deeper layer of clean or solidified soil, but would still rely to some extent on a surface cover to prevent exposure.

Alternatives 3 and 4 would allow source material to remain at depth below the site, and this source material would continue to contaminate groundwater which comes into contact with these source materials. Alternative 4 removes or solidifies a greater volume of source material, more effectively addressing the sources of groundwater contamination. Human exposure to the contaminated groundwater would be prevented through institutional controls.

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

The next six "primary balancing criteria" are used to compare the positive and negative aspects of each of the remedial strategies.

3. Long-term Effectiveness and Permanence. This criterion evaluates the long-term effectiveness of the remedial alternatives after implementation. If wastes or treated residuals remain on-site after the selected remedy has been implemented, the following items are evaluated: 1) the magnitude of the remaining risks, 2) the adequacy of the engineering and/or institutional controls intended to limit the risk, and 3) the reliability of these controls.

Alternatives 2, 3, and 4 all include construction of a subsurface barrier wall along the east bank of the Gowanus Canal to prevent further migration of coal tar from the site into the sediments at the bottom of the canal. This is a well-established technology for controlling contaminant migration, and is considered highly effective and reliable over the long term. A similar barrier wall system was installed along the banks of the Hudson River in Newburgh in 2010. It has proven highly effective: over 5,000 gallons of coal tar DNAPL has been collected behind the wall, and no evidence of discharge to the river or to remediated river sediments has been seen. Along the Gowanus Canal, a similar wall has already been pilot tested at the Citizen's MGP site farther to the south, and is slated for installation in 2016. National Grid's design team conducted the pilot test and is familiar with the challenges posed by design and construction of this structure.

Behind this barrier wall, long-term effectiveness is best accomplished by those alternatives involving excavation and removal of the contaminated soils. Alternative 2 calls for complete excavation of soil contamination. Alternatives 3 and 4 both call for excavation of all MGP structures, but Alternative 4 calls for more extensive excavation of source material outside of those structures.

The greatest degree of long-term effectiveness would be achieved by Alternative 2 since contaminated material would be removed from the site to the limits of excavation technology. However, contaminated material would remain at depths unreachable by existing excavation technology, which would still remain beneath the canal and at depth on the west side of the canal. Alternatives 3 and 4 would remove all MGP structures and associated source material to a depth of 20 feet, but some contaminated material would remain at depths below 20 feet on site, beneath the canal and at depth on the west side of the canal. Alternative 4 would remediate more source material than Alternative 3, either through excavation or stabilization. In-situ stabilization (ISS) is considered highly effective over the long-term, since it binds the contaminants tightly into a solidified cement mass which is highly resistant to dissolution by groundwater. ISS has been successfully applied to MGP-contaminated soils at numerous locations throughout New York State.

Alternatives 3 and 4 would both provide additional containment around areas of the future excavated material, since they call for leaving excavation supports such as sheet piling in place when excavation is complete. This would help prevent recontamination of remediated areas by coal tar, which could otherwise move back into the remediated areas

4. Reduction of Toxicity, Mobility or Volume. Preference is given to alternatives that permanently and significantly reduce the toxicity, mobility or volume of the wastes at the site.

The most important concern with contaminant mobility is the ongoing migration of coal tar from on-site source areas toward the Gowanus Canal, and into the sediments at the bottom of the canal. Alternatives 2, 3, and 4 all call for construction of a barrier wall along the bank of the canal and collection of coal tar behind the wall to eliminate this off-site migration and future impacts to canal sediments. To ensure that the mobility of tar is minimized before USEPA performs the remedial dredging of the canal, it is essential that the design and implementation of this portion of the overall remedy be conducted in a timely manner.

Alternatives 3 and 4 offer an additional degree of mobility reduction within the site itself in the future, by calling for excavation support sheeting to be left in place following remediation. This sheeting would serve as an additional barrier to migration of contaminants within the site. The in-situ solidification of soils allowed under Alternative 4 would further limit the mobility of contaminants in the solidified soil mass.

Reducing the volume of contaminated material is best achieved by excavation and removal, as discussed in item 3 above. Alternatives 2, 3 and 4 offer varying degrees of volume reduction. Alternative 2 offers the greatest degree of volume reduction, Alternative 3 offers the least, and Alternative 4 offers significantly more than Alternative 3.

Toxicity reduction is best achieved by physical removal as well, so Alternative 2 ranks best by removing the maximum amount of material. Alternative 4 allows for a different approach to toxicity reduction, by allowing some of the contaminated soil to be solidified in place. Solidification greatly reduces the toxicity of the treated soil, but actually results in a slight increase in volume. This volume increase would be inconsequential, however, since the solidified mass would be created at depth below the ground surface, and would simply result in a smaller volume of backfill required to restore the remediated areas to existing grades.

Natural attenuation would, in time, reduce the toxicity and mobility of contamination in the groundwater since the dissolved contaminants break down naturally in the environment, but achievement of groundwater quality standards is unlikely.

5. Short-term Impacts and Effectiveness. The potential short-term adverse impacts of the remedial action upon the community, the workers, and the environment during the construction and/or implementation are evaluated. The length of time needed to achieve the remedial objectives is also estimated and compared against the other alternatives.

The barrier wall and tar collection system included in the common remedy elements will involve construction in a relatively narrow space along the eastern bank of the Gowanus Canal. Noise and vibration impacts during this construction work are a significant concern. On Parcel 1 in particular, the presence of an active movie production studio a few feet from the barrier wall alignment will pose significant engineering challenges. Suspension of production activities, or relocation of the studio operation, may be required during the barrier wall installation.

Since Alternatives 2, 3 and 4, include excavation of MGP structures and source material, the short term impacts for all alternatives are similar. However, the severity of these impacts varies significantly. Alternative 2 would require an extremely large scale excavation to extraordinary depths, and would generate a much greater disruption to current property use and a greater amount of truck traffic, construction noise, and other impacts in the surrounding community. The duration of construction would be far longer than for Alternatives 3 and 4. Alternative 2 would require large scale disruption of current businesses and land use, whereas Alternative 3 and 4 are specifically designed to allow implementation on a parcel-by-parcel basis as each property becomes available.

Alternatives 3 and 4 would result in lower levels of truck traffic, since the volume of material excavated and transported off site would be less than the amount required by Alternative 2. Noise impacts would be generated by excavation work and by sheet pile driving for excavation support under all alternatives, but would be considerably less intense and shorter in duration for Alternatives 3 and 4 than for Alternative 2. Truck traffic to transport coal tar collected from recovery wells will occur under Alternatives 3 and 4, but the number of truck trips required to move the recovered tar is very small compared to the number of truck trips required to transport the far larger volumes of excavated soil.

Alternatives 3 and 4 will result in truck traffic as a result of the transportation of contaminated soil off-site and clean fill to the site, but the number of truck trips is less than the number required for the full excavation alternative. Minimizing truck traffic is consistent with the green remediation principles outlined in DER-31. If ISS techniques are employed under Alternative 4, this would require importing loads of cement, but the associated truck traffic would generally be smaller than the amount of truck traffic required for full excavation, off-site disposal, and importation of clean backfill.

6. <u>Implementability.</u> The technical and administrative feasibility of implementing each alternative is evaluated. Technical feasibility includes the difficulties associated with the construction of the remedy and the ability to monitor its effectiveness. For administrative feasibility, the availability of the necessary personnel and materials is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, institutional controls, and so forth.

The barrier wall and tar collection system included in the common remedial elements will require close coordination with the USEPA program to dredge contaminated sediments from the canal. The current presence of occupied buildings on Parcels 1 and 6 requires that the wall be constructed by working from large, heavy barges in the canal. The current accumulation of contaminated sediment in the canal does not provide sufficient water depth to position a work barge in this area. As a result, building the wall from the canal could require preliminary dredging in this area, which would complicate the logistics of the USEPA effort and could delay its full implementation.

The Parcel 1 and 6 buildings also constrain the location of the tar recovery wells to be built behind the wall, since very little room is available between the barrier wall and the wall of the existing buildings. Construction and operation of these wells can be accomplished with the buildings in place, but would be significantly easier if the buildings were to be removed prior to construction.

Alternatives 2 through 4 all include excavation, which is a relatively routine activity that can be accomplished with existing construction techniques. However, Alternative 2 would require an extremely deep excavation, and correspondingly extreme measures for excavation support and dewatering would be required. It is likely that the deepest contamination, far below the ground surface, could not be reached with existing technologies. It would not be feasible to implement Alternative 2 in the manner planned or even to fully excavate to the depths necessary without severely damaging area infrastructure and buildings given the magnitude of such a removal. Alternatives 3 and 4 include coal tar recovery, which is already under way at one other MGP site on the Gowanus Canal and can be readily implemented here. The ISS treatment of soils allowed under Alternative 4 has been successfully implemented at several other MGP sites in New York and elsewhere and is readily implementable.

Administratively, implementation of Alternatives 3 and 4 will be somewhat difficult because they involve excavation or treatment of soil beneath occupied structures, city streets, and a city park. However the administrative feasibility is enhanced by performing this excavation when the parcels become available for redevelopment or other improvements. Alternative 2, which would require those parcels to be immediately excavated, would be extremely difficult to implement administratively due to the need to obtain access or ownership of all of the affected parcels.

Parcel 1 also contains subsurface MGP structures in close proximity to the alignment of the barrier wall, just inside the western wall of the current studio building. Heavily contaminated soil may be present beneath both parcels 1 and 6. The barrier wall can be constructed under current conditions, but it may prove more efficient to remove the buildings prior to construction of the wall. Such a removal would significantly accelerate the construction of the wall and the removal of source areas throughout Parcels 1 and 6.

Alternatives 3 and 4 call for institutional controls to control future excavation work on the site, and would include controls to prevent the use of groundwater without appropriate treatment. Similar controls have been implemented at numerous other sites statewide.

7. <u>Cost-Effectiveness.</u> Capital costs and annual operation, maintenance, and monitoring costs are estimated for each alternative and compared on a present worth basis. Although cost-effectiveness is the last balancing criterion evaluated, where two or more alternatives have met the requirements of the other criteria, it can be used as the basis for the final decision.

The costs of the alternatives vary significantly. Because of the great depths to which tar has migrated in the subsurface, and the need to remove several city blocks full of buildings and infrastructure, the estimated cost for Alternative 2 is extraordinarily high, given the minimal increase in the protection of public health and the environment it represents. Alternative 3 has a moderate to high cost but does not remove the MGP source material outside the immediate vicinity of the MGP structures. Alternative 4 is less costly than Alternative 2 and more costly than Alternatives 3. Alternative 3 best addresses the RAOs of the alternatives and is cost-effective.

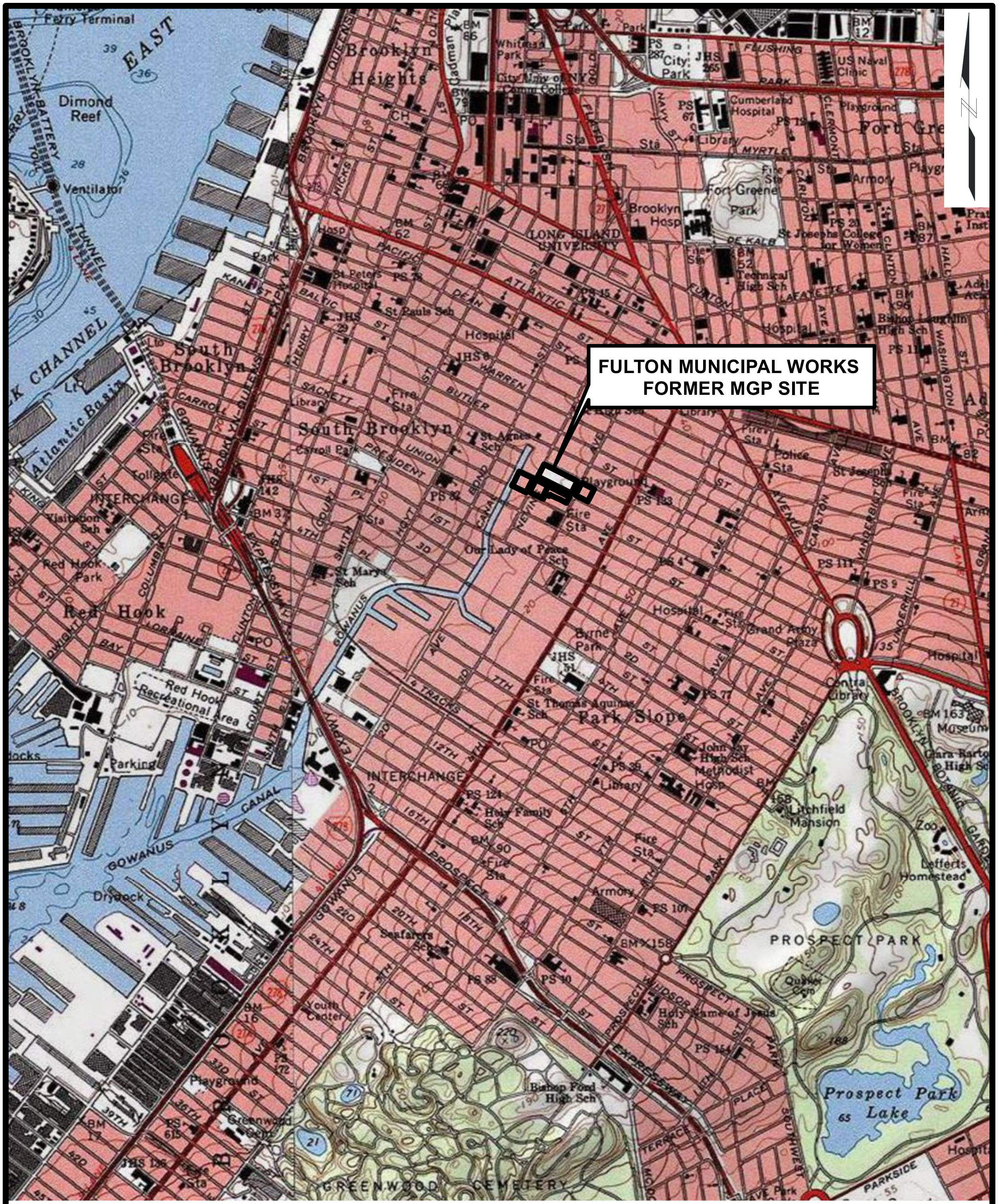
8. <u>Land Use.</u> When cleanup to pre-disposal conditions is determined to be infeasible, the Department may consider the current, intended, and reasonable anticipated future land use of the site and its surroundings in the selection of the soil remedy.

Alternative 2 would require no further restrictions on land use if it could be fully implemented. However, significant restrictions on land use already exist in this highly urbanized area, in the form of zoning restrictions and restrictions on groundwater use. Although Alternatives 3 and 4 would be less desirable because some contaminated soil and NAPL would remain untreated, exposure to the material remaining at depth would be controlled under the provisions of the environmental easement and Site Management Plan, which would be compatible with the current restricted residential, recreational, commercial and industrial land uses.

The final criterion, Community Acceptance, is considered a "modifying criterion" and is taken into account after evaluating those above. It is evaluated after public comments on the Proposed Remedial Action Plan have been received.

9. Community Acceptance. Concerns of the community regarding the investigation, the evaluation of alternatives, and the PRAP are evaluated. A responsiveness summary will be prepared that describes public comments received and the manner in which the Department will address the concerns raised. If the selected remedy differs significantly from the proposed remedy, notices to the public will be issued describing the differences and reasons for the changes.

Alternative 4 is being proposed because, as described above, it satisfies the threshold criteria and provides the best balance of the balancing criterion.



SOURCE:
USGS TOPOGRAPHIC MAP, ACCESSED
VIA WWW.ARCGISONLINE.COM

0 2,000 4,000
SCALE, FEET

Fulton Municipal Works Former MGP Site Brooklyn, New York Site No. 224051	FIGURE 1: SITE LOCATION MAP

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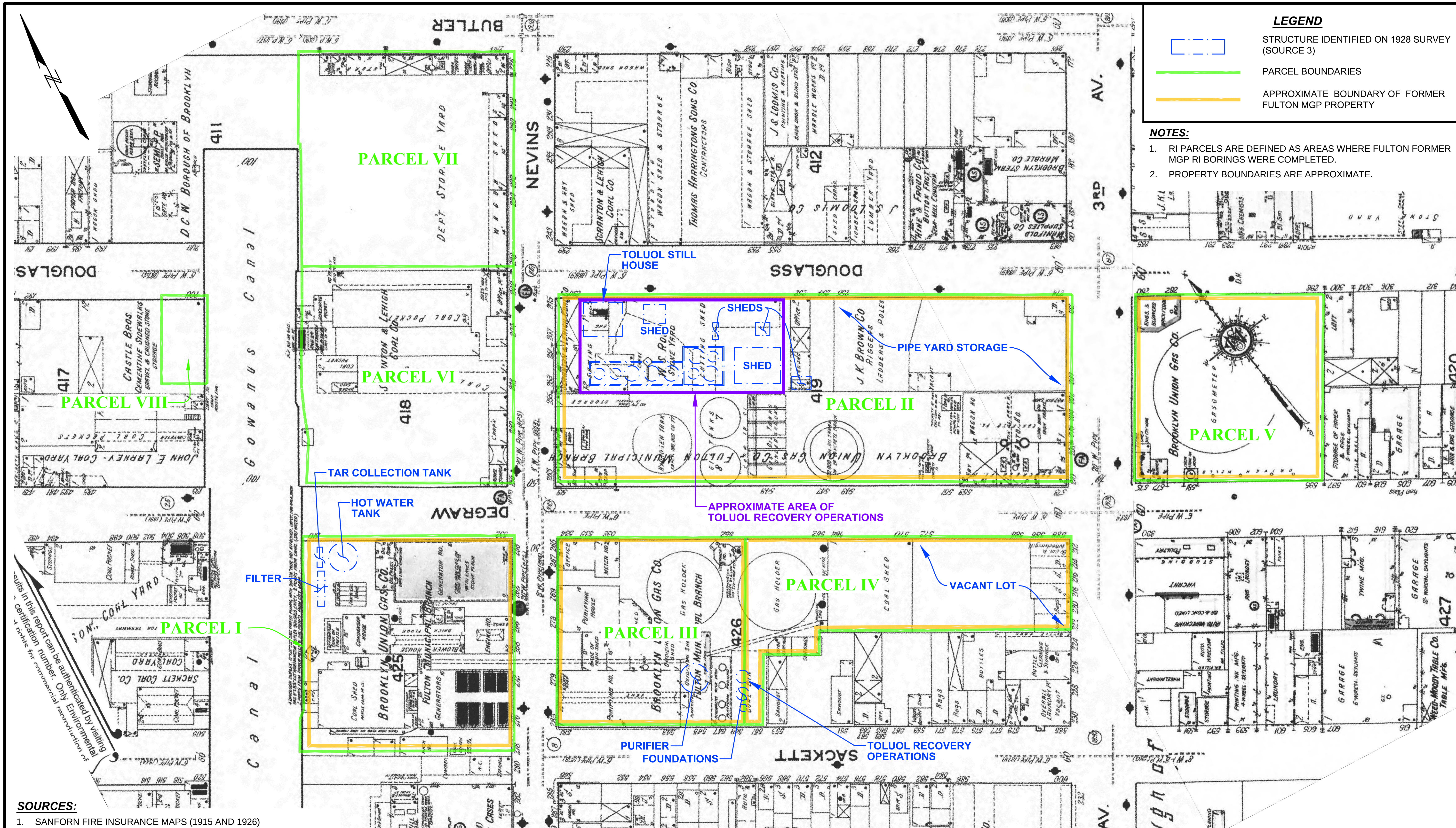


LEGEND

- STRUCTURE IDENTIFIED ON 1928 SURVEY (SOURCE 3)
- PARCEL BOUNDARIES
- APPROXIMATE BOUNDARY OF FORMER FULTON MGP PROPERTY

NOTES:

1. RI PARCELS ARE DEFINED AS AREAS WHERE FULTON FORMER MGP RI BORINGS WERE COMPLETED.
2. PROPERTY BOUNDARIES ARE APPROXIMATE.

SOURCES:

1. SANFORN FIRE INSURANCE MAPS (1915 AND 1926)
2. NEW YORK CITY OPEN ACCESSIBLE SPACE INFORMATION SYSTEM (http://www.oasisnyc.net), ACCESSED JANUARY 2008.
3. SURVEY OF FULTON GAS WORKS, PREPARED BY JOHNSON AND HIGGINS, N.Y., SCALE: 1" = 50', DATE: MARCH 13, 1928.
4. BIRD'S EYE VIEW PHOTOGRAPH DOUGLASS STREET STORE YARD (19806), THE BROOKLYN UNION GAS CO., DATED MARCH 13, 1928.
5. PROPERTY DEED INFORMATION FOR 270 NEVINS STREET, 537 SACKETT STREET, 225 NEVINS STREET, 560 DEGRAW STREET, AND 191 3RD AVENUE.

0 100 200

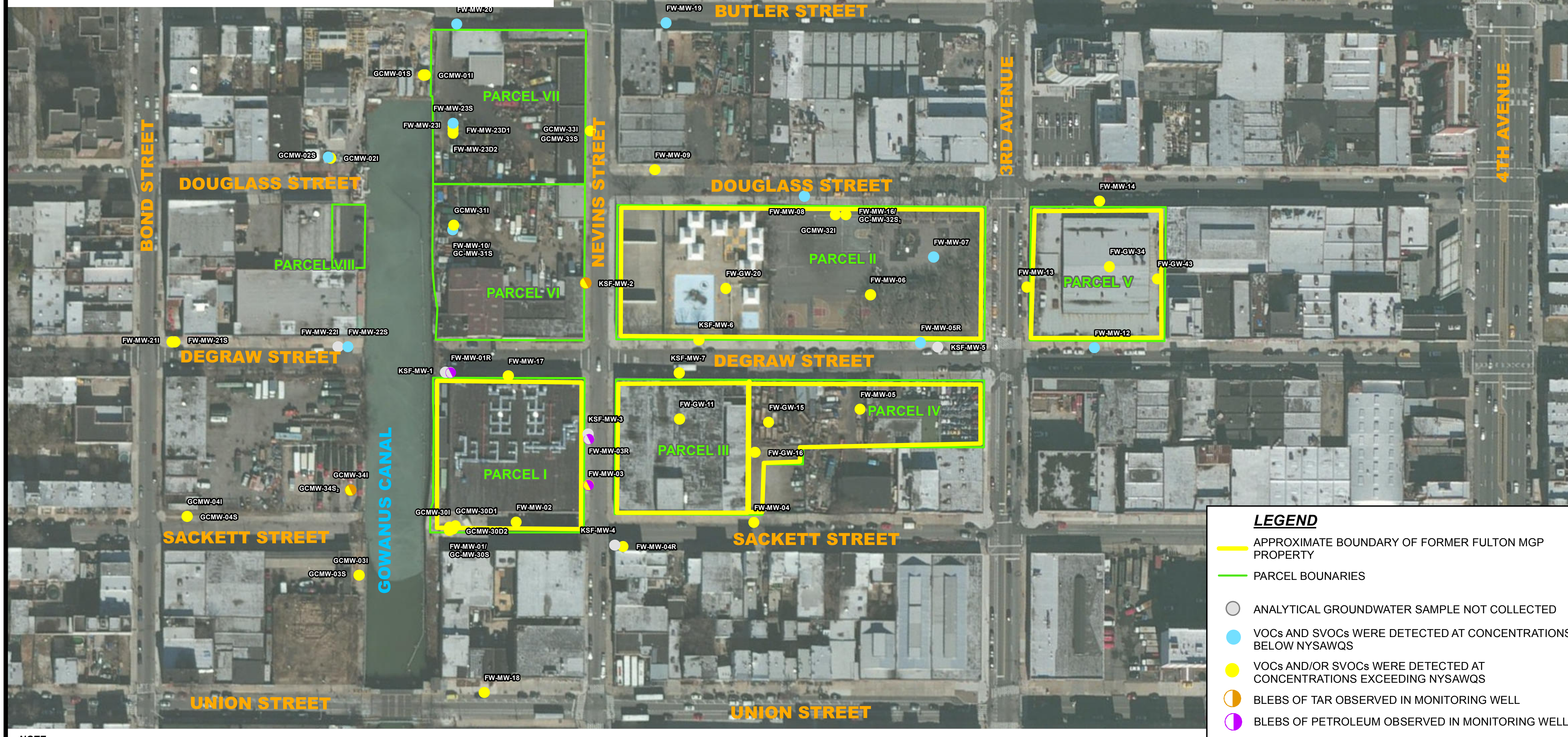
SCALE, FEET

Fulton Municipal Works Former MGP Site
Brooklyn, New York
Site No. 224051

FIGURE 2:
FULTON MUNICIPAL WORKS FORMER MGP SITE FOOTPRINT SUMMARY

I:\Project\National Grid\Fulton\Feasibility Study\2014-12\Fulton-Former MGP Footprint-PRAP.dwg

SOURCES:
1. 2011 ESRI WORLD IMAGERY.
2. NEW YORK CITY DEPARTMENT OF CITY PLANNING MapPLUTO, UPDATED NOVEMBER 2009.
3. SITE CHARACTERIZATION REPORT, FULTON FORMER MANUFACTURED GAS PLANT, BROOKLYN (II), KING'S COUNTY, NEW YORK, SITE NO. 2-24-051, SEPTEMBER 2007, PREPARED BY NYSDEC REMEDIAL BUREAU C., DIVISION OF ENVIRONMENTAL REMEDIATION.
4. SURVEY OF SAMPLE LOCATIONS CONDUCTED BY GEI CONSULTANTS, INC, BY NEW YORK STATE LICENSED SURVEYOR NUMBER 050146. HORIZONTAL DATUM: NEW YORK STATE PLANE COORDINATE SYSTEM (EAST ZONE, NORTH AMERICAN DATUM (NAD) 83). VERTICAL DATUM: NORTH AMERICAN VERTICAL DATUM (NAVD) 88.
5. DRAFT GOWANUS CANAL REMEDIAL INVESTIGATION REPORT. PREPARED FOR U.S. ENVIRONMENTAL PROTECTION AGENCY [CONTRACT NO. EP-W-09-009/WORK ASSIGNMENT NO 013-RICO-02ZP], PREPARED BY HDR, CH2MILL, GRB ENVIRONEMTNAL SERVICES, INC. JANUARY 2011.
6. GEI CONSULTANTS, INC. 2009. REMEDIAL INVESTIGATION TECHNICAL REPORT GOWANUS CANAL, BROOKLYN, NEW YORK AOC INDEX NO. A2-0523-0705. SUBMITTED TO NYSDEC ON BEHALF OF NATIONAL GRID.



NOTE:
1 - FW-MW-16 samples collected on 6/12/2008 and 9/15/2009 do not have VOCs/SVOCs detected at concentrations exceeding NYSAWQS criteria. The GC-MW-32S sample collected on 7/20/2010 has SVOCs detected at concentrations exceeding the NYSAWQS.
2 - Tar blebs were observed in GCMW-34I and not in GCMW-34S.
3 - Tar blebs were observed at KSF-MW-6 and KSF-MW-7 during the 2007 sampling event. However tar blebs were not observed during the 2009 and 2010 events.

0 150 300
SCALE, FEET

Fulton Municipal Works Former MGP Site
Brooklyn, New York
Site No. 224051

FIGURE 3:
SUMMARY OF GROUNDWATER CONDITIONS

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SOURCES:
1. 2011 ESRI WORLD IMAGERY.
2. NEW YORK CITY DEPARTMENT OF CITY PLANNING MapPLUTO, UPDATED NOVEMBER 2009.
3. SITE CHARACTERIZATION REPORT, FULTON FORMER MANUFACTURED GAS PLANT, BROOKLYN (II), KING'S COUNTY, NEW YORK, SITE NO. 2-24-051, SEPTEMBER 2007, PREPARED BY NYSDEC REMEDIAL BUREAU C., DIVISION OF ENVIRONMENTAL REMEDIATION.
4. SURVEY OF SAMPLE LOCATIONS CONDUCTED BY GEI CONSULTANTS, INC, BY NEW YORK STATE LICENSED SURVEYOR NUMBER 050146. HORIZONTAL DATUM: NEW YORK STATE PLANE COORDINATE SYSTEM (EAST ZONE, NORTH AMERICAN DATUM (NAD) 83). VERTICAL DATUM: NORTH AMERICAN VERTICAL DATUM (NAVD) 88.
5. DRAFT GOWANUS CANAL REMEDIAL INVESTIGATION REPORT. PREPARED FOR U.S. ENVIRONMENTAL PROTECTION AGENCY [CONTRACT NO. EP-W-09-009/WORK ASSIGNMENT NO 013-RICO-02ZP], PREPARED BY HDR, CH2MILL, GRB ENVIRONEMTNAL SERVICES, INC. JANUARY 2011.
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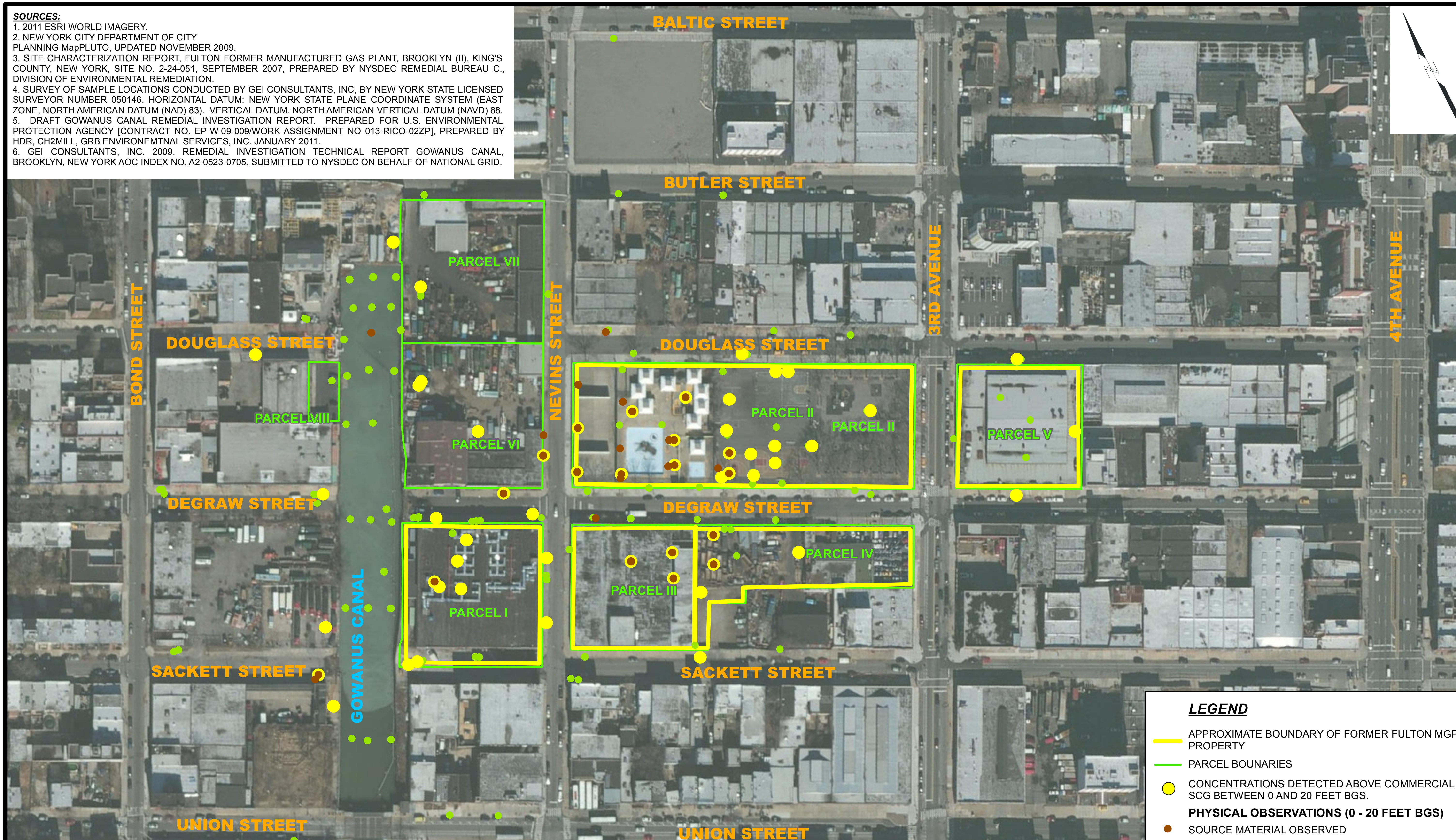

LEGEND

- APPROXIMATE BOUNDARY OF FORMER FULTON MGP PROPERTY
- PARCEL BOUNARIES
- CONCENTRATIONS DETECTED ABOVE COMMERCIAL SCG BETWEEN 0 AND 20 FEET BGS.

PHYSICAL OBSERVATIONS (0 - 20 FEET BGS)

- SOURCE MATERIAL OBSERVED
- NO SOURCE MATERIAL OBSERVED

NOTE:
1. SOURCE MATERIAL IS DEFINED AS SOILS THAT CONTAIN TAR COATINGS, LENSES, AND SATURATION.
2. COMMERCIAL SCG - PART 375-6.8(B), RESTRICTED USE SOIL CLEANUP OBJECTIVES FOR THE PROTECTION OF PUBLIC HEALTH FOR COMMERCIAL USE.

0 150 300
SCALE, FEET

Fulton Municipal Works Former MGP Site
Brooklyn, New York
Site No. 224051

FIGURE 4:
SUMMARY OF SUBSURFACE SOIL
(0 - 20 FEET BGS)

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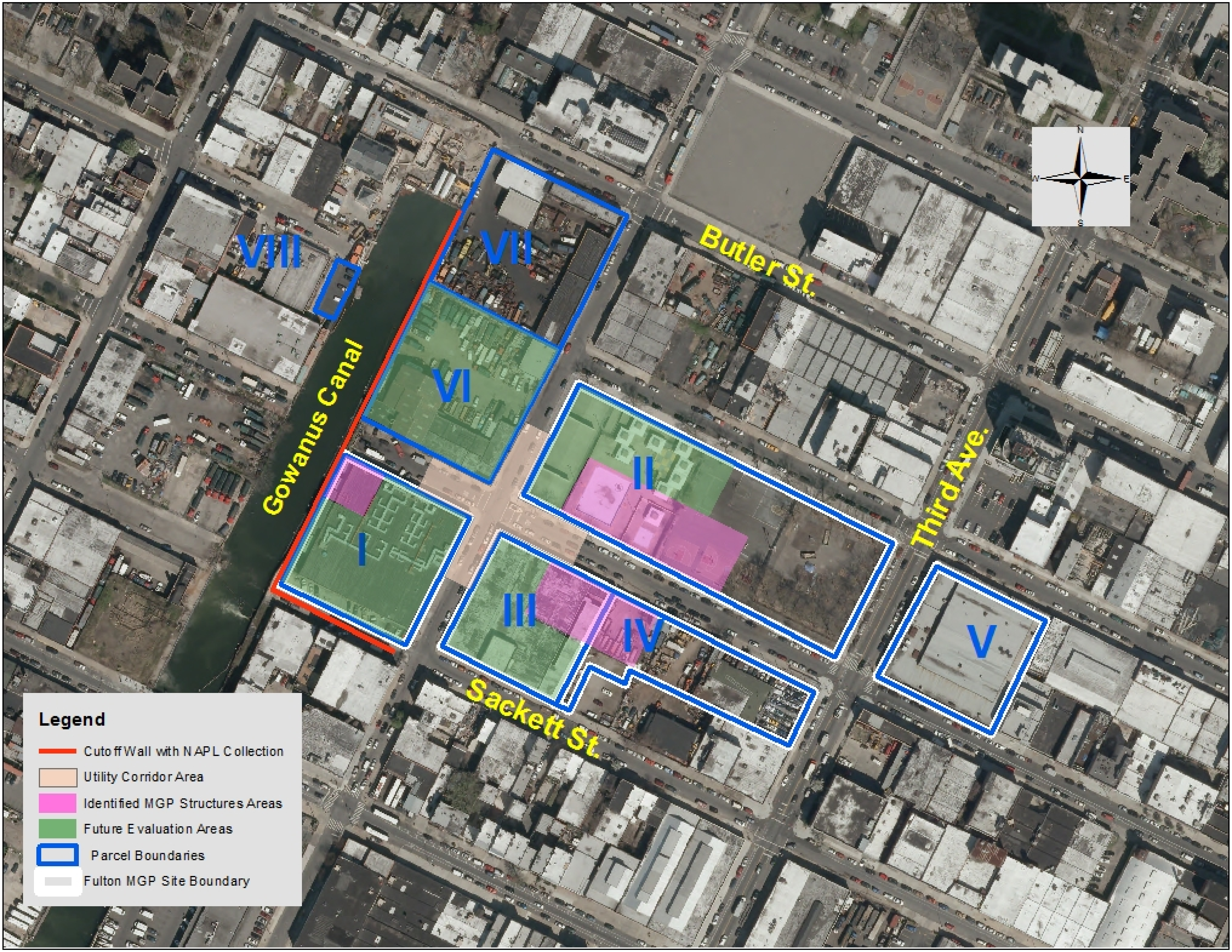

Butler St.
Sackett St.
Third Ave.
Gowanus Canal
I
II
III
IV
V
VI
VII
VIII
N
S
E
W
Legend
Cutoff Wall with NAPL Collection
Utility Corridor Area
Identified MGP Structures Areas
Future Evaluation Areas
Parcel Boundaries
Fulton MGP Site Boundary