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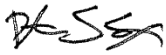
Interim Remedial Measure Work Plan

222 Maspeth Avenue Parcel
Equity Works Former Manufactured Gas Plant (MGP) Site
222-254 Maspeth Avenue, Brooklyn, Kings County, New York

NYSDEC Site No.: 224050

June 2020

Quality information

Prepared by	Checked by	Reviewed by
		
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Acronyms & Abreviations

BTEX	Benzene, toluene, ethylbenzene and xylenes
BUG	The Brooklyn Union Gas Company
Caltrans	California Dept. of Transportation
CAMP	Community Air Monitoring Program
C&D	Construction and Demolition
CY	Cubic Yard
DER-10	NYSDEC Technical Guidance for Site Investigation and Remediation
FS	Feasibility Study
FSAP	Field Sampling and Analytical Plan
ft bgs	feet below ground surface
FWIR	Fish and Wildlife Resources Impact Analysis
HAZWOPER	Hazardous Waste Operationsand Emergency Response
GBFS	Granulated Blast Furnace Slag
IRM	Interim Remedial Measures
ISMP	Interim Site Management Plan
ISS	In-situ Solidification
HASP	Health and Safety Plan
MGP	manufactured gas plant
NAPL	non-aqueous phase liquid
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
OSHA	Occupational Health and Safety Administration
PAHs	Polycyclic Aromatic Hydrocarbons
PID	photoionization detector
PDI	Pre-Design Investigation
PPE	personal protective equipment
PPV	Peak Particle Velocity
PSI	Pounds per square inch
QAPP	Quality Assurance Project Plan
QHHEA	Qualitative Human Health Exposure Assessment
RI	Remedial Investigation
RIR	Remedial Investigation Report
SCO	Soil Cleanup Objectives
SI	Supplemental Site Investigation
SVOCs	semivolatile organic compounds
UCS	Unconfined Compressive Strength

USBM	U.S. Bureau of Mines
USCS	Unified Soil Classification System
VOC	Volatile Organic Compound

Certification Statement

I Michael J. Gardner certify that I am currently a NYS registered professional engineer or Qualified Environmental Professional as in defined in 6 NYCRR Part 375 and that this Interim Remedial Measure Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

Michael Gardner P.E.

June 10, 2020 DATE

It is a violation of Article 145 of New York State Education Law for any person to alter this document in any way without the express written verification of adoption by any New York State licensed engineer in accordance with Section 7209(2), Article 145, New York State Education Law.

Executive Summary

This work plan outlines an Interim Remedial Measure (IRM) to be conducted to address subsurface NAPL impacts on the 222 Maspeth Avenue parcel of the Site (The “IRM Work Plan”). The IRM is being conducted in response to a letter from the New York State Department of Environmental Conservation (NYSDEC) dated February 1, 2019 stating that a recent change in commercial operations on the property provides an opportunity for completion of additional remedial work as an IRM to “remediate a significant quantity of MGP contaminants, thereby reducing the overall remedial timeframe for completion”. The IRM work proposed in this work plan will permanently remove/remediate subsurface impacts to the intermediate clay layer beneath the 222 Maspeth Avenue parcel.

Historical and current land use in the area surrounding the Former Equity Works MGP site consists of industrial and manufacturing facilities. The non-MGP operations, and coal yards in the area of the Site include companies that processed/stored oil, chemicals, and coal, manufactured rope/twine and sheet metal, and performed silk and fur dyeing operations. Many of these non-MGP industrial operations used petroleum feedstocks or managed products that are similar to those generally associated with MGP processes. These non-MGP operations have resulted in a complex nature of environmental impacts to soil and groundwater that include petroleum/tar, solvents and dyes. Two nearby properties, including the former BCF Oil property located at 360 Maspeth Avenue and the Malu Property (formerly operated by Gulf Refining Company, which itself was owned by Chevron for a period of the time it operated the site) located at 364 Maspeth Avenue, have been the location of governmental enforcement actions. Because these non-MGP operations and others outlined in Section 1.1 are associated with environmental residuals similar in nature and composition to by-products from MGP processes, they can complicate identification of specific impact sources.

This IRM Work Plan describes an approach based on current information related to the location of suspected or known subsurface structures at the 222 Maspeth Avenue parcel identified during a Pre-Design Investigation (PDI) completed on the parcel in June of 2019. As suggested in the NYSDEC letter, the remedial approach focuses on the use of excavation and in-situ solidification to address non-aqueous phase liquid (NAPL) within the parcel combined with the addition of deeper NAPL recovery wells beneath the Former No. 1 Relief Holder. The approach will be refined to address NAPL impacts to the extent practicable, based on the information developed during the remedial design process.

The Part 360 Construction and Demolition Debris (C&D) permit for the solid waste recycling operations (DEC ID 2-6101-00061/00003) (the “C&D Permit”) at the 222 Maspeth Avenue parcel is still being maintained by Cooper Tank and will require renewal in 2020 and 2025. The current solid waste recycling structures, equipment and operation are grandfathered pursuant to 6 NYCRR Part 360.4(b)(4)) enabling activities to be conducted outside, rather than within an enclosed building. This IRM is not intended to jeopardize that status and as stipulated by the NYSDEC will not prevent the renewal of the existing permit. This will also be confirmed in the 2020 C&D Permit renewal.

1. Introduction

This work plan has been prepared for the Brooklyn Union Gas Company (BUG) (now d/b/a National Grid NY) by AECOM USA, Inc. (AECOM) for a site located at 222 – 254 Maspeth Avenue in Brooklyn, New York (Figure 1-1). This site, known as the Equity Works Former MGP site, was operated by BUG. The location of the Equity Works Former MGP site is now owned by third parties, is zoned for heavy manufacturing use, and is bounded by industrial or commercial facilities. The 222 Maspeth Avenue parcel (the "Site") is owned by 222 Maspeth Avenue, Inc. Cooper Tank Recycling Company ("Cooper Tank"), operates on the Site. The site is currently leased to Cooper Tank & Welding Corp. The Equity Works Former MGP site is uplands of the Newtown Creek Superfund site.

This work plan has been prepared in response to a letter from the New York State Department of Environmental Conservation (NYSDEC) dated February 1, 2019. The letter stated that the NYSDEC considered the recent change in commercial site operations provides an opportunity to address subsurface impacts on the Site. The NYSDEC required that the design for an Interim Remedial Measure (IRM) that focused on the use of excavation and solidification be completed as soon as practical, and that a Work Plan for the remedy be submitted within 60 days. The original draft of this IRM Work Plan for the Site (the IRM Work Plan) was submitted to the NYSDEC on April 1, 2019 within the requested 60-day timeframe.

The IRM Work Plan follows the guidelines presented in NYSDEC Technical Guidance for Investigation and Remediation (DER-10) for the development of a Remedial Design Work Plan. It provides a summary of site conditions, outlines a remedial approach based on the current understanding of the Site, and identifies the additional data required to develop a comprehensive design for the IRM.

1.1 Background, History, and Site Setting

The Equity Works, a manufactured gas plant (MGP), were constructed in 1892 by the Equity Gas Works Construction Company and were acquired by Equity Gas Works in 1896. The MGP was acquired by BUG in 1903 and was developed to its maximum extent in 1921. The relief holder, which is located on the 222 Maspeth Avenue parcel, was partially decommissioned by 1931. The remaining gas manufacturing equipment was removed by 1933. The 1951 Sanborn shows the lot being owned by BUG and is vacant with the exception of two small buildings near the southern edge of the former MGP. According to internal notes written on historical BUG facility plan 1-G-119 and corresponding title search of 222 Maspeth Ave, BUG sold the property to Anthony Moreno and Jack Stearns on September 17, 1951. Based on Sanborn maps, subsequent to its sale by BUG, the Site was used by unknown parties for storage (pipe and valves) for the period of 1965 to 1981 and appears to have been vacant during the period of 1986 to 1988. The Site has been used as a solid waste transfer facility from 1989 to the present.

The title search contains further details on post-BUG ownership. After Anthony Moreno passed away, his estate successfully won a court order in 1984 to divide the property into Lots 44 and 54. Mr. Jack Stearns retained ownership of Lot 44 (222 Maspeth Ave.). After Jack Stearns death on February 14, 1984, Cooper Tank obtained ownership of the Site in a deed dated November 16, 1984. In a deed dated December 30, 1987, 222 Maspeth Ave, Inc. obtained ownership of the Site from Cooper Tank.

Historical and current land use in the area surrounding the Site consists of industrial and manufacturing facilities. The manufacturing, industrial, sheet metal and chemical works operations, and coal yards in the area of the former MGP facility included companies that processed/stored oil, chemicals, and coal, manufactured rope/twine, and performed silk and fur dyeing operations. These operations are believed to have resulted in a complex nature of environmental impacts to soil and groundwater that included petroleum/tar, solvents and dyes. Many of the industrial operations that operated in the area of the Site used petroleum feedstocks or managed products that are similar to those generally associated with the MGP process. As a result, these non-MGP operations are associated with environmental residuals that are similar in nature and composition to by-products from the MGP process and can complicate the process of identifying specific sources of impact.

The following properties are identified sources of NAPL in the area of the Site:

- *BCF Oil Refining, Inc. (formerly the Lubraa Oil Corp./Malmstrom & Co./Atlantic Basin Oil Co./Concord Oil Co./Morania Oil Co./Chevron Oil Co./Calleia Brothers. Inc./Gaseteria Oil Corp./Valvoline Oil Co./Gulf Oil Refining Co./Ditmas Terminal)*– The former BCF Oil Refining property is located at 360 Maspeth Ave. The site, 1.9 acres in size, is located adjacent to English Kills and operated as an oil terminal for approximately 40 years and then as a waste oil processing facility for approximately 14 years (Anchor, 2012). Historic and current areas of concern at the site include petroleum conveyance pipelines and storage areas, above ground and underground storage tanks (ASTs and USTs), and truck and vehicle loading and storage areas (Anchor, 2012). The USEPA conducted an emergency removal action in 2000, removing approximately 800,000 gallons of PCB-impacted oil, wastewater, and sludge from the Site and included the cleaning or closure of ASTs and USTs (Anchor, 2012).
- *Bayside Terminal* – This site, approximately 1.5 acres in size and adjacent to English Kills south of the Site, was used to store and distribute petroleum (No. 1, 2, 4, and 6 oils) and coal since the early 1900s (Anchor, 2012). These products were historically transferred from barges to the site using pipelines, and in 1990 a 5,000-gallon spill of No. 2 fuel oil occurred during offloading and identified as NYSDEC Spill No. 9007551 (Anchor, 2012).
- *Empire Transit Mix* – This site, approximately 1.8 acres in size and near the confluence of English Kills and Newtown Creek, historically housed lumber, coal, and several trucking companies and currently houses concrete manufacturing operations (Anchor, 2012). These operations lead to USTs being present on-site, as well as reported discharges to surface water (Anchor, 2012).
- *Morgan Oil Terminal* – This property, approximately 3.5 acres in size and adjacent to English Kills south of the Site, was historically used to store bricks and lime, manufacture asphalt, store coal and lumber, incinerate metals, and manufacture wire and sheet metal and more recently used to store and distribute oil (Anchor, 2012). The NYSDEC issued violation notices in the early 1990s related to petroleum storage handling and operational deficiencies (Anchor, 2012). The site contains ASTs and USTs, piping and loading areas in addition to the historical operations areas (Anchor, 2012).
- *Malu Properties* – This site, approximately 7 acres in size, is located at 364 Maspeth Avenue east of the former Equity Site and was operated as early as the 1920s by Chapman Dock Company. From 1945 to 1989, the site was operated by the Gulf Refining Company, which was acquired by Chevron in 1984, as a bulk oil terminal and petroleum storage facility. In the 1989 the facility was acquired by Termynx/Ditmas Oil and continued to operate as a bulk oil terminal and petroleum products storage facility until approximately 2004. Petroleum was supplied to the property by barge using Newtown Creek and via the Buckeye Pipeline which crosses the site (Anchor, 2012 and 2015). Oil storage was in ASTs and USTs with associated underground piping for distribution. Total storage capacity was reportedly over 1,800,000 gallons and increased to over 3,700,000 gallons by the mid-1980's (Anchor, 2012 and 2015). Gasoline was the primary petroleum product stored at the facility, but it also housed smaller amounts of diesel, No. 2 fuel oil, and kerosene. The NYSDEC issued two Consent Orders to the property requiring the facility to complete major oil storage facility (MOSF) inspection and testing requirements in 2000 and 2008. There were also several documented petroleum spills to the subsurface dating back to 1975 at the property. The NYSDEC issued two spills numbers for the site in 1990 (spill # 9006603) and 1999 (spill # 9812647) to address gasoline and diesel impacts to groundwater. In response to the spills, remedial actions including petroleum recovery and the installation of a bioremediation infiltration system were performed. The spills were closed by NYSDEC in 2003 (spill # 9812647) and 2017 (spill # 9006603). The site is currently owned by Malu Properties, Inc., a commercial real estate company.
- *Greenpoint Energy Center Former MGP Site* – The Greenpoint Energy Center (GPEC) property is located at 287 Maspeth Ave. The site, 117 acres in size, is located to the north of the Equity site and is owned and operated by National Grid. Portions of the site were developed for industrial purposes dating back to at least 1880 as a glue factory, a glass manufacturing facility, and a varnish company. The site was developed as an energy producing facility beginning with a manufactured gas plant (MGP) in the late 1920s that operated for approximately 40 years. A light oil recovery plant also operated during a portion of the MGP period. Other energy producing facilities that have been present at the site have included a liquified petroleum gas plant that began operation during the MGP period and a substitute gas plant that post-dated the operation of the MGP. Currently, the northern portion of the Site is occupied by a Liquified Natural Gas Plant (LNG) that began operations in the 1960s and the southern portion is occupied by gas transmission and operations support facilities. A remedial investigation (RI) was recently completed at the site pursuant to a Multi-Site Order on Consent and Administrative Settlement, Index #A2-0552-0606, between National Grid and the New York State

Department of Environmental Conservation (NYSDEC). The draft RI report was submitted to the NYSDEC in early 2020. The findings of the RI determined that non-aqueous phase liquid (NAPL) is generally isolated to two areas of the site. No subsurface migration pathways for NAPL from the GPEC Site to the Equity site were identified. Remedial actions at the site have included an Interim Remedial Measure (IRM) conducted in the northeast corner of the Site prior to the construction of support facilities for the LNG plant.

A full history of the Site, its setting, and the former MGP site operations is included in the Remedial Investigation Report (AECOM, 2016).

1.2 Previous Investigations and Remedial Activities

Pursuant to a Multi-Site Order on Consent and Administrative Settlement with NYSDEC, Index #A2-0552-0606, executed on February 22, 2007 and modified on August 10, 2007, National Grid has conducted a series of site investigations to characterize the nature and extent of impacts resulting from the operation of the former MGP, and implemented several IRMs pending the development and implementation of a final remedy to address subsurface impacts.

1.2.1 Previous Investigations

1.2.1.1 Remedial Investigation

The remedial investigation (RI) was performed during six separate mobilizations during the period from September 2009 to May 2015 to identify sources of environmental impacts, delineate the associated extent of impacts, determine the surface and subsurface conditions in the area of the Site, and evaluate potential off-site migration pathways and their potential contributions to media and receptors. RI sampling locations are illustrated in Figure 1-2. In summary, the RI demonstrated that the extent of NAPL is defined vertically and horizontally and there is no migration of NAPL beyond the RI Study Area, which included the former MGP Site and the immediately adjacent properties surrounding the former MGP Site boundary. No pathways for NAPL migration to the nearest surface water body, English Kills, were identified during the RI or subsequent investigations. Specifically, the horizontal extent of NAPL beneath the Site is controlled by a depression in the primary confining unit, identified in the RI as the intermediate clay layer, which effectively contains NAPL to the former Site boundary and immediately adjacent properties.

The RI (AECOM, 2016) was conducted under NYSDEC oversight using procedures described in the associated NYSDEC-approved documents, including: Remedial Investigation Work Plan and four addenda, Field Sampling and Analytical Plan (FSAP), Quality Assurance Project Plan (QAPP), Community Air Monitoring Plan (CAMP), and Site-Specific Health and Safety Plan (HASP).

Summary of RI Findings

Geology and Hydrogeology

The stratigraphy in the site area includes urban fill to a depth of 15 to 25 feet below ground surface (ft bgs) that is generally underlain by the following low permeability units:

- a meadow mat (the former ground surface prior to development), encountered from 8 to 26 ft bgs, that was laterally continuous beneath the site.
- an intermediate clay unit, encountered from 36 to 52 ft bgs, that was laterally continuous under the majority of the site with the exception of the western portion of the 222 Maspeth Avenue parcel.
- a lower clay unit, encountered from 78 to 86 ft bgs, comprised of a discontinuous clay unit observed in a subset of borings beneath the 222, 252, and western portion of the 254 Maspeth Avenue parcels, and extending to the north onto National Grid's Greenpoint Energy Center property and to the south beneath 1 Rewe Street and the western portion of 7-9 Rewe Street.
- the regional Gardiners Clay unit, that was laterally continuous beneath the site and located from 80 to 100 ft bgs.

Interbedded sands and silts are present beneath the meadow mat and between the various low permeability units. As noted above, the intermediate clay and lower clay units were observed to pinch out towards the western edge of the 222 Maspeth Avenue parcel near the former relief holder.

The water table was observed at 6 to 10 ft below ground surface. Groundwater flow in the shallow, intermediate and deep overburden aquifer zones is generally to the east and southeast.

Non-Aqueous Phase Liquid (NAPL) and Soil Impacts

Based on site history and RI findings, material handling structures on the 222 Maspeth Avenue parcel and the western edge of the 254 Maspeth Avenue parcel were identified as the likely sources of both NAPL and dissolved phase chemicals in the groundwater at the site.

NAPL is believed to have migrated vertically downward through the fill under density driven flow until it reached the former natural ground surface (meadow mat), where a portion of the NAPL spread laterally to the north and east within, or on top of, the meadow mat surface (Figure 1-3). A series of closely spaced soil boring transects were advanced during the RI perpendicular to all of the former stream traces at the 7-9 Rewe Street property south of the Site and the 300 Maspeth Avenue property east of the Site. The identified NAPL impacts in the transects were limited in extent to a few soil boring locations, and they were in a residual state and therefore not mobile. Combined, subsurface data from these transects demonstrated no evidence of NAPL migration to the nearest surface water body, English Kills. NAPL also migrated vertically through the underlying more permeable glacial outwash sands, where it collected on the intermediate clay layer at typical depths of 45 to 50 ft bgs. NAPL presence above the intermediate clay layer aligned with the topography of the top of the intermediate clay surface, where NAPL collected in a topographic depression beneath the former MGP site as outlined on Figure 1-4. The majority of NAPL identified in the subsurface was noted above the intermediate clay layer.

The absence of the confining intermediate clay at the western edge of the 222 Maspeth Avenue parcel allowed portions of the released NAPL to migrate vertically downward to the next confining or semi-confining layer, which is identified as the lower clay lens. The absence of the lower clay lens beneath a portion of the 222 Maspeth Avenue parcel may have allowed some of the released NAPL to migrate vertically downward to the top of the Gardiners Clay a regional confining unit in the Site area. As the NAPL continued to migrate further from its source, the volume of the NAPL and the driving head of the NAPL decreased. As a result, the least amount of NAPL was observed at the top of the Gardiners Clay surface. Where present, NAPL presence also aligned with the topography of the top of the Gardiners Clay surface.

In summary, NAPL presence in the subsurface was observed to be aligned with the topography of the lower permeability subsurface units as described above, which limited its potential to migrate from the Site to only the adjacent properties within the RI Study Area. Specifically, the horizontal extent of NAPL was delineated beyond the former MGP site boundaries to the north beneath National Grid's Greenpoint Energy Center at 287 Maspeth Avenue, to the south beneath the 1 and 7-9 Rewe Street properties immediately adjacent to the Site, to the east beneath the FedEx property at 300 Maspeth Avenue immediately adjacent to the former MGP site, and to the west beneath the 1 Rewe Street property and sidewalk along Vandervoort Avenue immediately adjacent to the Site (Figure 1-4). NAPL impacts did not extend to or beyond Rewe Street to the south towards the closest surface water body, English Kills. Data from the RI demonstrated that although NAPL impacts were observed in one boring on the eastern edge of the RI Study Area on the FedEx property (Figure 1-3) above the meadow mat, the limited impacts were in a residual state and not mobile.

National Grid is currently conducting an IRM to recover NAPL from recovery wells screened at and above the intermediate clay layer beneath the former MGP site. The NAPL above the intermediate clay layer and other depths was determined to be stable prior to implementation of the IRM as evidenced by the documented decrease in NAPL impacts away from source areas showing a progressive change from NAPL saturation to NAPL coating to staining and odors and at distal areas within the RI Study Area.

The laboratory analysis of soil samples demonstrated that exceedances of the applicable NYSDEC Soil Cleanup Objectives (SCOs) were largely limited to volatile organic compounds such as benzene, toluene, ethylbenzene and xylenes (BTEX) and polycyclic aromatic hydrocarbons (PAHs).

Groundwater

Dissolved phase impacts in shallow zone (water table) wells are largely isolated to the former MGP site boundary, with significantly lower levels (typically low to non-detect) at adjacent locations in off-site areas. In the intermediate portion of the overburden aquifer, dissolved phase impacts are generally the highest observed on-site. Dissolved BTEX and PAHs were highest at on-Site wells and decreasing in the direction of groundwater flow at adjacent

locations in the RI Study Area. Dissolved phase impacts in the deepest portion of the overburden aquifer above the Gardiners Clay are lower in concentration and generally consistent laterally with the overlying intermediate zone.

As indicated previously, source material in the RI Study Area may originate from a number of sources with similar characteristics. As a result, the dissolved phase impacts observed at the Site may be associated with commingled sources. The potential for commingled impacts is supported by the presence of constituents, such as chlorinated solvents, which were not in use during the period of operation of the MGP. Despite these findings, the dissolved phase concentrations in both the intermediate and deep portions of the aquifer will decrease further at locations outside of the RI Study area due to biodegradation, attenuation, and dilution.

Qualitative Human Health Exposure Assessment

Under current conditions, complete exposure pathways for potential receptors do not exist because of the current use and activities of the property. A summary of the finding of the exposure assessment is provided in the Conceptual Site Model (Figure 1-5). Future construction workers who perform excavation work in areas on or adjacent to the site may potentially be exposed to impacts in subsurface soil and groundwater. Note that New York City provides potable water to Brooklyn, and potential exposure related to the consumption of groundwater is not a concern. The potential construction worker pathway on-site is currently addressed by an Interim Site Management Plan (AECOM, 2012) that prohibits subsurface work without the use of OSHA-trained personnel, a site-specific HASP, and coordination with National Grid's Site Investigation and Remediation Department.

Fish and Wildlife Resources Impact Analysis

An assessment of site conditions against the Fish and Wildlife Resources Impact Analysis (FWRIA) Decision Key determined that an FWRIA was not required.

1.2.1.2 Supplemental Site Investigation

A Supplemental Site Investigation (SI) was conducted during August of 2018 to better characterize the nature and extent of potential impacts on the 222 Maspeth Avenue Parcel. The SI was conducted to complete the investigation of subsurface soils within the 222 Maspeth Avenue parcel in proximity to the former No. 1 Relief Holder. A total of 11 soil borings were advanced using sonic drilling methods to identify the presence or absence of potential residual impacts from all past industrial processes in the following areas:

- within and proximate to suspected subsurface former MGP structures,
- near impacted subsurface areas above the "intermediate clay" unit described in the RI Report and near the area where the intermediate clay was not observed,
- near impacted subsurface areas above the Gardiners Clay unit as described in the RI Report; and/or
- adjacent to existing buildings and existing above-ground structures at the Site.

Sample locations are illustrated in Figure 1-6. A subset of the soil borings was sampled using continuous split spoon samples with standard penetration testing, including collection of representative soil samples for Unified Soil Classification System (USCS) grain size and Atterberg Limits, and Shelby tube samples for analysis of physical properties, including density and strength of the intermediate clay unit. Two borings within the former No. 1 Relief Holder (SB-101 and SB-102) were converted to recovery wells RW-24 and RW-25, respectively. The results from the SI (AECOM, 2019) were consistent with the RI findings and did not change the RI summary or the conceptual site model for the former MGP site presented above or in the RI (AECOM, 2016). Visible impacts noted during the SI work are included on Figures 1-3 and 1-4. Figure 1-4 also illustrates the maximum extent of NAPL impacts identified in the subsurface during the RI and SI work and confirm that the extent of NAPL is limited to the former MGP site and immediately adjacent properties surrounding the former MGP site.

1.2.2 Interim Remedial Measures

National Grid has conducted two Interim Remedial Measures to address potentially complete exposure pathways for site workers and is currently conducting a program to recover NAPL from the former MGP site. A summary of the recovery activities is provided below.

In 2013, National Grid installed a system to collect recoverable NAPL while site-wide investigation and remedial alternative/design activities were completed at the former MGP site.

The design of the NAPL recovery system included the installation of 23 recovery wells located in areas of topographic depressions of the intermediate clay surface beneath the former MGP site that were determined to have the potential to collect NAPL and be compatible with Cooper Tank's construction and long-term operational activities. As discussed in Section 1.2.1, the presence of NAPL in these depressions has limited its potential to migrate from the former MGP site.

The NAPL recovery system is operated in a manner that maintains the NAPL levels within the well sumps. Data collected to date indicate that NAPL collection rates at 12 (2 on-site and 10 perimeter locations) of the 23 recovery well locations warrant the continued operation of pumps to support automated recovery. The remaining 11 wells are managed using manual recovery techniques on a quarterly basis.

1.2.3 Pre-Design Investigation

A pre-design investigation (PDI) was conducted to collect the information required to design the IRM. It included the completion of test pits to provide structural information and soil borings to evaluate deep impacts and collect samples for subsequent treatability testing to support the design of the stabilization remedy. Additional data has been collected to pre-characterize soil for off-site disposal approval. Figure 1-7 illustrates the sample locations that were required to develop the design for the removal of the contents of the former No. 1 Relief Holder/other MGP structures and solidification of NAPL in adjacent areas. The locations were the following:

- 7 test pits to locate the relief holder tank walls and provide information for the evaluation of structural integrity of site structures and refine the exact location and condition of the former No. 1 Relief Holder tank.
- 5 deep borings to evaluate the nature and extent of impacts within/below the former No. 1 Relief Holder tank, collect samples from within the former No. 1 Relief Holder tank for the pre-characterization of soil for acceptance at an off-site disposal facility, and collect samples for subsequent treatability testing; and
- 15 shallow borings to collect samples for acceptance at an off-site disposal facility.

The results from the program achieved the following objectives:

- Confirmed the location of the former No. 1 Relief Holder tank.
- Delineated potential NAPL impacts beneath the former No. 1 Relief Holder tank.
- Pre-characterized soil to facilitate direct-loading for disposal during the remediation.
- Identified potential structural issues associated with the walls of Relief Holder 1 tank, an adjacent elevated structure and the perimeter walls of the Site.
- Collected representative samples of impacted media for subsequent treatability testing to determine an appropriate ad mix for *in-situ* solidification.

Details of the investigation were provided to NYSDEC in a separate PDI letter Work Plan (June 10, 2019) and PDI Report (October 24, 2019).

2. Design Scope

National Grid is developing a scope of work to conduct an IRM to address source material on the 222 Maspeth Avenue parcel to the extent practicable. As required by NYSDEC, the approach will focus on the use of excavation and solidification to address subsurface impacts on the parcel The following discussion provides an overview of the potential physical limitations of the Site, identifies data gaps to be addressed in a Pre-Design Investigation (PDI), and provides a preliminary design of a remedy based on the current understanding of site conditions.

2.1 Protection of Existing Cooper Tank C&D Permit During the IRM

Recently, the on-going business on the 222 Maspeth Avenue parcel temporarily changed from a “continuous” solid waste recycling operation to one focused on the storage and distribution of recycling containers. The temporary change in business practice provides an opportunity to implement an IRM. The C&D Permit at the 222 Maspeth Avenue parcel is still being maintained by Cooper Tank and will require renewal in 2020 and 2025. The current solid waste recycling structures, equipment and operation are grandfathered pursuant to 6 NYCRR Part 360.4(b)(4)) enabling activities to be conducted outside, rather than within an enclosed building. This IRM will not include any work that would change this grandfathered status and as stipulated by the NYSDEC, will not prevent the renewal of the existing permit. This workplan does not include plans to modify the existing C&D recycling structures. The IRM Final Construction Completion Report will account for all work undertaken pursuant to this IRM.

2.2 Remedial Goals and Remedial Action Objectives

The goal for remedial activities will be to eliminate or mitigate the potential risk posed by impacts and to remove source material to the extent practicable. Achieving the remedial goals for the Site will require that the remediation activities result in the management of the potential exposure pathways identified in the RIR (AECOM, 2016), and the removal of sources of impacts to the extent practicable, given the limitations of the Site. Therefore, the following RAOs that have been developed by NYSDEC will be used in the development and evaluation of remedial alternatives for the Site:

- Prevent ingestion/direct contact with impacted soil.
- Prevent ingestion of groundwater impacted at levels above drinking water standards.
- Prevent migration of impacts that would result in groundwater contamination, to the extent practicable.
- Remove the source of impacted groundwater, to the extent practicable.

The RAOs will be used to facilitate the design of the IRM with consideration of the limitations imposed by the site setting and existing site infrastructure.

2.3 Description of the Interim Remedial Measure

The following discussion outlines the conceptual scope and the current understanding of the Site on which the IRM will be based. The approach for the IRM anticipates the removal of accessible “shallow” subsurface structures, (e.g. tar tank and settling tank), the in-situ solidification (ISS) of accessible, observed NAPL impacts to the depth of the intermediate clay (approximately 45 to 50 ft bgs), excavation of the Former No. 1 Relief Holder tank contents to the extent practicable, and installation of several NAPL recovery wells designed to collect recoverable NAPL (if present) at depths below the intermediate clay and above the regional Gardiners Clay confining unit (Figure 2-2).

2.3.1 Site Preparation

Prior to the start of the excavation work, Dig Safely New York will be contacted and companies with subsurface utilities present will be requested to mark-out their utilities in the remediation area. Site preparation activities will include the relocation of utilities, installation of erosion controls and odor controls, delineation of soil stockpile/loading areas, and construction of decontamination pads/facilities.

Within the proposed ISS area, the site surface (one foot of concrete) will be removed and soil will be excavated to a depth of approximately 6 ft. bgs, i.e. two feet above the typical water table, to provide a platform for the solidification of deeper soil. Data was collected as part of the PDI to facilitate direct loading of these soils (approximately 2,000

cubic yards) for off-site transport and disposal. Note that the structural evaluation conducted during the PDI indicates that all excavations will need to be offset from existing perimeter walls and foundations by at least 10 feet to ensure the stability of the structures (Figure 2-3).

2.3.2 In-Situ Solidification

The approach will treat the area outside of the holder to solidify observed NAPL above the intermediate clay unit to a depth of approximately 45 to 50 ft bgs. Solidification will involve the introduction of cement slurry (grout) into impacted media to reduce the residual saturation point of potentially mobile NAPL, decrease media permeability, and increase strength to meet performance standards. Treatment will create a solidified mass that will “isolate” the areas of contamination from groundwater flow. Solidification will control the ability of on-site source material to adversely affect groundwater.

Prior to solidification, subsurface structures including the settling tank and tar tanks will be removed with limited excavation up to 10 ft bgs. Localized dewatering may be required for this excavation. Collected water will be containerized and managed at a permitted off-site facility or Publicly Owned Treatment Works (POTW).

Soil will then be treated to the depths of the intermediate clay (approximately12,800 cubic yards) using an admix that will be developed during the remedial design process based on the results from the treatability studies detailed in the PDI Work Plan. The mix will likely include Portland 1 Cement, ground granulated blast furnace slag (GGBFS) and possibly bentonite. Treatment will be conducted by installing overlapping columns using a 6-8 ft. diameter auger. Excess ISS material (spoils), typically 15 to 25% of the solidification volume will be managed inside the solidification platform area.

2.3.3 Former No. 1 Relief Holder Tank Excavation

Based on the findings from the PDI, the source material within former No. 1 Relief Holder tank will be removed to the extent practical given the physical limitations of the site.

2.3.3.1 Structural Support

As indicated in Section 2.1, an elevated platform containing sorting equipment for the recycling business is located above a portion of the former No. 1 Relief Holder tank. The excavation of the contents of the holder tank will require the installation of temporary structural support of the platform. The preliminary design of the support provides for the use of steel needle beams supported on piles to transfer the gravity loading from the existing concrete walls to the pile foundation. In lieu of driven piles, these piles will be drilled into the ground to minimize vibrations and prevent damage to the adjacent building. The steel beams will be supported on pile caps. The installation will be completed by packing grout/shim plates in the gap between the steel beam flanges and the bottom of the concrete bin walls to provide proper bearing support. No disturbance or reconstruction of Cooper Tank’s recycling equipment/infrastructure is expected other than replacement of the concrete slab at the ground surface following work completion. The details of the temporary support will be finalized during the remedial design phase of the project.

2.3.3.2 Excavation of Holder Tank Contents

Results from the PDI indicate that the holder tank has an outside diameter of approximately 90 feet and has a depth of 26 feet with an intact bottom (1-foot thickness) and walls. The brick sidewalls are approximately 2.5 feet thick near the ground surface but are believed to thicken with depth. The results from the PDI indicate that the holder contains approximately 6,600 cubic yards of impacted media, consisting of soil with brick, wood fragments and intervals coated or saturated with NAPL. The holder tank was observed to contain water at a depth of 4-6 ft. bgs.

Although a preliminary analysis of the holder tank indicates that it possesses sufficient capacity to resist the soil lateral loads during excavation, the remedial sequencing will prioritize the solidification of soil outside of the structure prior to initiating removal activities. The approach will enhance the load bearing capacity of the soil adjacent to the holder tank.

Dewatering of the holder tank contents is anticipated during excavation. It will be conducted in a controlled manner in accordance with plan developed as part of the IRM design. Impacted media will be removed to the extent practicable from the structure using an excavator. Material may be allowed to free drain within the structure to facilitate direct loading for transport for off-site disposal. Plans for additional amendment to facilitate transport/disposal, if required, will be developed as part of the remedial design. The remedial design will evaluate the need for the use of a

Temporary Fabric Structure (TFS) to control potential emissions/odors during excavation and the management of impacted media.

The holder tank will be backfilled with clean fill and the area restored as detailed in Section 2.3.8.

2.3.4 Management of NAPL Beneath Former No. 1 Relief Holder Tank

The findings of the PDI indicate the presence of NAPL (coating or saturation), beneath the holder tank, in intervals of varying thickness, from immediately below the holder (27 ft. bgs) to the top of the lower clay unit at approximately 83 ft bgs. Based on these findings, four deep NAPL recovery wells are proposed following excavation of the holder tank contents. Locations of these wells are subject to change pending agreement with the property owner to ensure their locations are compatible with the future use of the Site. Figure 2-2 shows the proposed locations of the four recovery wells. The recovery wells will be 6-inch diameter wells with stainless-steel, continuous v-wire wrap screens and stainless-steel sumps. Preliminary information regarding the proposed screen and sump intervals has been provided in the PDI Report. Further details of the proposed recovery wells will be included in the IRM design documents. The proposed recovery wells will be incorporated into the existing NAPL recovery IRM work for manual removal of any accumulated NAPL.

2.3.5 Waste Management

The implementation of the IRM will generate the following wastes for off-site management: soil (*e.g.* urban fill and impacted media, including NAPL impacted media), construction debris (*e.g.*, reinforced surface concrete and structure foundations) and personal protective equipment (PPE), and dewatering effluent. All shipments of waste from the 222 Maspeth Avenue property will be documented using waste tracking forms, bills of lading, and receipts.

2.3.5.1 Soil

To the extent possible, excavated soil will be loaded directly into trucks for off-site transportation. However, because of construction sequencing and off-site disposal facility scheduling issues, and in order to consolidate large amounts of waste material for bulk truck shipments, it will likely be necessary to temporarily store some quantity of waste material onsite prior to loading and shipment. In these instances, excavated soil will be stockpiled within the 222 Maspeth Avenue parcel. Additionally, fill material that is not consistent with the composition of site soil will be segregated and characterized in accordance with the requirements of off-site disposal facilities. Note that all excavated material from previous work at the site during the 2012 Shallow Soil IRM was determined to be appropriate for management using thermal treatment/disposal. The stockpiles will be bermed and liners will be used to contain material. Based on the available data, the composition of the excavated soils will meet the requirements of NYSDEC guidance, Management Of Coal Tar Waste and Coal Tar Contaminated Soils and Sediment [(DER - 4), NYSDEC 2002], and can be managed as solid wastes at approved off-site disposal facilities as non-hazardous industrial waste.

The following facilities have been identified for the thermal desorption and disposal of impacted soils from the 222 Maspeth Avenue parcel:

- Bayshore Soil Management of New Jersey, LLC, located at 75 Crows Mill Road, Keasbey, New Jersey 08832.
- Clean Earth of Southeast Pennsylvania, Inc., located at 7 Steel Road East, Morrisville, Pennsylvania 19067.
- Clean Earth of New Castle Delaware, Inc., located at 94 Pyles Lane, New Castle, Delaware 19720.

2.3.5.2 Construction Debris

C&D materials, e.g. concrete, removed during the excavation will be segregated, visually inspected, and as necessary, sized and decontaminated using scrapers, shovels, and a steam cleaner. The material will be characterized as required for acceptance by off-site disposal or recycling and loaded into roll-offs for off-site transportation to the appropriate permitted facility.

2.3.5.3 Dewatering Effluent

Any construction water, including NAPL, generated during the implementation of the IRM will be collected and stored on the 222 Maspeth Avenue parcel for off-site disposal. Construction water will be analyzed and characterized according to receiving disposal facility requirements and, if required, pre-treated on-site prior to transport. Off-site management options will include an approved disposal facility (Clean Water of New York, Inc. or similar), or Publicly

Owned Treatment Works (POTW). Any water discharged to the POTW will be treated to remove contaminants to levels acceptable to the POTW prior to discharge.

2.3.6 Off-site Transportation

Transportation of impacted materials from the 222 Maspeth Avenue property will be performed in accordance with all regulatory requirements. All haul trucks will have gasketed tailgates, as well as impermeable poly bed liners and impermeable poly covers that fully line the bed of the truck and can be overlapped to cover the top of the load to manage odors during transportation. The trucks may be sprayed, as necessary, with odor suppressive foam prior to covering to reduce vapor and odor emissions.

2.3.7 Decontamination

During and upon completion of the excavation/solidification phases of the project, decontamination of equipment will be performed in order to prevent contaminated material from being spread offsite during waste hauling activities and to prevent the spreading of impacted material to un-impacted areas of the Site. Trucks used for transport of excavated material will be decontaminated using dry decontamination methods (i.e., removal of loose material with a broom or brush) to the extent practicable to limit the volume of decontamination water, which will require treatment and disposal. However, a truck wash will be used, if required. These methods, along with parking of trucks on plastic sheeting during loading, will effectively prevent the spread of contaminated materials onto roadways during transport to disposal facilities. Decontamination of the earth-moving equipment will occur at the completion of the excavation phase and prior to the handling of clean backfill or mobilization offsite. The method of equipment decontamination will consist of pressure washing to remove any impacted soil. Decontamination water generated during cleaning of tools and equipment will be temporarily stored on-site for later off-site disposal at an approved facility. Water generated from decontaminating personnel will be minimal due to the availability of disposable personal protective equipment (PPE) such as Tyvek® coveralls, booties, and nitrile gloves.

2.3.8 Site Restoration

Upon completion of excavation activities, the excavated areas will be backfilled using material from an off-site source that meets the requirements of NYSDEC 6 NYCRR 375 Subpart 6.7 (d). Note that the option of reusing treated Site soil will be evaluated. The backfill will be placed in 12-inch lifts and properly compacted to within 95% of the backfill material maximum dry density as established by Standard Proctor (ASTM D698). Details for the compaction procedures and quality control will be included in the design drawings and specifications. The surface of the Site will be restored using concrete and will meet the requirements under the C&D Permit (as renewed), per Part 360 and all other applicable local laws and regulations. Any soil brought on the 222 Maspeth Avenue parcel for use as backfill will be sampled at least once for each borrow source and submitted to NYSDEC for approval. All remnants of the IRM activities will be removed from the 222 Maspeth Avenue parcel after completion of IRM activities and the site will l be restored to its pre-IRM condition.

2.3.9 Environmental Controls

Environmental controls will ensure that the work activities do not spread impacted soil and wastes outside the impacted areas and maintain the protection of human health and the environment throughout the remedial activity.

2.3.9.1 Erosion and Sediment

Sediment will be controlled during all onsite earthwork activities in accordance with the applicable New York State guidance. Stormwater run-off will be controlled to prevent contact with impacted soils. Stormwater that does contact impacted soils will be collected and disposed off-site. Hay bales, silt fence, and/or rip rap will be used as necessary to prevent erosion of exposed soils.

Decontamination pads will be used to remove mud from truck tires and prevent tracking of mud and impacted soil onto the streets.

2.3.9.2 Odor and Dust Control

Odor, vapor, and dust control will be required for this project due to the immediate proximity of commercial buildings. An odor and vapor suppressing foam (Rusmar AC-654 foam or similar) and plastic sheeting (or other approved methods, including BioSolve™ and similar products) will be available at all times during the remedial activity to contain air emission sources. The necessary application equipment and plastic sheeting will be brought on the 222

Maspeth Avenue property during mobilization, along with odor neutralization concentrate. As stated previously, the remedial design will include an evaluation of the use of a TFS to control potential emissions during the excavation of the holder contents.

2.3.10 Remedial Action Monitoring

2.3.10.1 Process Monitoring

The location of the soil columns will be laid out by survey prior to the start of work. During treatment, the contractor will continuously monitor the following parameters:

- Verticality and position of the mixing auger;
- Top of column and bottom of column elevations;
- The quantity/rate of admix for each column;
- Rotation rate of the auger;
- Number of treatment passes; and
- Auger penetration and withdrawal rates.

2.3.10.2 Performance Standards

Wet column samples will be collected at a frequency of 1 sample/ 200 cubic yards of treated material. They will be visually inspected to verify that a homogeneous mixture has been created based on the following criteria:

- No visible NAPL or sheen;
- Grout and soil are thoroughly mixed;
- Consistent color for samples collected from different depth intervals and locations; and
- There are no unmixed soil clumps greater than three inches.

The samples will be recovered into standard soil mold cylinders and allowed to cure for subsequent analysis for unconfined compressive strength, permeability and free liquids. The following performance standards will be used for the project. National Grid will notify the NYSDEC project manager of instances when the performance standards are not met to determine whether corrective actions are necessary.

Unconfined Compressive Strength (UCS)

- Minimum – 28-day UCS of at least 50 pounds per square inch (psi) as determined by ASTM D1633 Standard Test Method for Compressive Strength of Molded Soil-Cement Cylinders. & day test results will be used to provide an early indicator that the 28 –day results will meet the performance standard.
- Maximum – 28-day UCS of less than 500 psi to ensure that the strength of the solidified soil will not interfere with the ability to achieve the required overlap between soil-cement columns, or future re-development of the property.

Permeability

28-day hydraulic conductivity of less than $1X10^{-6}$ centimeters per second (cm/sec) as determined by ASTM D5084 Standard Test Methods for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter.

Free Liquids

The solidified soil shall have no free liquid present observed along the break point of the UCS testing detailed above.

2.3.10.3 Quality Assurance Quality Control (QA/QC)

Coring of the solidified mass will be conducted as a means to ensure the complete mixing of the ISS ad-mix and soil.

Coring Implementation

The advancement of two (2) core boreholes, i.e. one for every 5,000 square feet of ISS treatment area, are anticipated for the project. Each borehole will be advanced to at least one foot below the base of the ISS monolith design. Soil cores will be used to collect core samples of the solidified material. Individual sample cores will be less than five (5) feet in length. The core samples will be collected in accordance with the following guidelines:

- Cores will be installed within 7-10 days of treatment of an area, with the first coring location completed when the ISS area is no more than 25 percent complete.
- Core locations will be biased towards the following: areas with the greatest soil contamination; areas where excessive grout was lost during ISS implementation; and/or locations where other difficulties in the ISS process were encountered. To the extent practicable, cores will be collected in locations where individual treatment columns overlap.
- An adjacent core will be installed in instances when less than 60% of the core material is recovered from any of the core runs. The location will be abandoned if the recovery from the adjacent core hole continues to be less than 60%. An alternate location(s) for coring will be selected to meet the representative number of cores required by NYSDEC.

National Grid will provide NYSDEC with a minimum of 72 hours' or two business days' notice of the sampling to allow for the on-site inspection of the collected cores. Following completion of each coring location, the borings will be filled with grout using tremie methods. The sample cores will be archived on-site and will be discarded upon approval by the NYSDEC project manager.

Visual Inspection and Reporting

Core samples and related equipment will be visually inspected for the following criteria:

- Visible NAPL within the core, on drilling tools or in drill wash tub, the latter if water-based drilling methods are employed
- Non-mechanical induced cracking within the core
- Percent of core sample recovered

National Grid will notify NYSDEC if any of the following conditions are observed, to discuss whether any corrective actions will be necessary:

- A continuous layer or seam of NAPL within the core.
- NAPL coating on drilling tools
- NAPL is noted in the drill wash tub
- Large sections (> 1 cubic foot) of unmixed material.

Field documentation of the QA/QC activities will include the following information: a figure depicting coring locations; photographs of each core boring referenced; type of drilling method and field coring logs. Following on-site inspection of the ISS QA/QC, email correspondence summarizing the observations of the coring results will be sent to the NYSDEC project manager. The NYSDEC project manager will have two business days to confirm that the ISS QA/QC objectives have been met. In the event the NYSDEC determines that the QA/QC objectives have not been met, corrective actions required to meet QA/QC criteria will be provided.

2.3.11 CAMP Monitoring

Air monitoring will be conducted during all ground intrusive activities as well as an initial 2-day background survey. It will include real-time monitoring for volatile organic compounds (VOCs), and particulates (i.e., dust) as described in the Generic Community Air Monitoring Plan (CAMP) included in Appendix 1A to DER-10. Each air monitoring instrument will be continuously downloaded and saved electronically to a dedicated computer located on-site. Summary reports of the monitoring results will be provided to NYSDEC/NYSDOH on a weekly basis. Note that the 222 Maspeth Avenue parcel is completely enclosed by perimeter walls (Figure 2-3). There is the potential that the walls will contain, and routinely concentrate, dust in the work area to levels greater than the DER-10 "stop work" criteria. As a result, National Grid is proposing to place the CAMP locations outside of the perimeter and have the conditions within the parcel managed as part of the Contractor Health and Safety monitoring.

VOC monitoring will be performed using a field PID (RAE Systems MiniRAE™ or equivalent). The monitors will be calibrated daily using certified calibrations gas. If the concentration of total VOCs exceeds 5 parts per million (ppm) above background, then work activities will be temporarily halted. If the total VOC level then decreases below 5 ppm over background, work activities will resume. If the total VOC levels persist at levels greater than 5 ppm, work

activities will be halted, the source of the vapors identified, and corrective actions taken to abate the emissions until the concentrations drop below the action levels.

Particulate monitoring will be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 microns in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. Each particulate monitor will be calibrated daily with a filtered air sample.

2.3.12 Structural Monitoring

Safety and the structural integrity of the facility and existing equipment are a paramount concern for the implementation of the IRM. Perimeter walls of the parcel and the equipment supports, as well as structures at the adjacent 1 Rewe Street property and 7-9 Rewe Street property will be subject to a pre- and post-construction survey, as well as vibration and settlement monitoring to document their condition during the remedial construction activity.

2.3.12.1 Pre-Construction Survey

A pre-construction vibration survey will be undertaken prior to the initiation of any activity at the Site. Vibration monitors will be used to establish baseline ground motions caused by vehicular traffic (buses, cars, trucks, and other vibration sources) that will be used as reference levels in evaluating vibrations induced during construction.

The survey will include the inspection of building foundations and walls to document any pre-existing defects such as cracks, settlement, subsidence, corrosion, or water damage. Defects that should be monitored during construction will be noted and, where appropriate crack monitors installed prior to the start of construction. The surveys will be documented through notes and photography to establish the pre-construction conditions. At the end of construction, a similar set of photos will be taken for comparison. Post-construction photographs will be compared with the initial pre-construction photographs to establish the growth of any pre-existing crack or the onset of any new cracks.

2.3.12.2 Construction Monitoring

The vibration and crack monitoring program will be conducted during each phase of the construction. The implementation of vibration and crack monitoring program will be subject to change depending on the remedial contractor’s construction plan and duration of the construction operations. The potential program change could involve a change in number of monitoring equipment, locations, and extent of the construction activities being monitored. Periodic evaluations of the vibration monitoring program will be conducted to determine the program’s adequacy and continuing requirements.

2.3.12.3 Vibration Monitoring

Vibration will be measured as peak particle velocity (PPV) in inches per second (in/s). Pre-construction baseline vibration monitoring will be performed for a one-week period prior to the start of intrusive activities. By definition, PPV is the maximum rate of change of position (displacement) with respect to time as measured on the ground surface. The frequency of vibration is the number of oscillations that occur in one second. The frequency unit is expressed in hertz (cycles per second). The PPV must be recorded in three (3) perpendicular axes to represent three direction-displacement movements as a result of ground-born vibration, and the maximum allowable PPV is determined based on the maximum measure along any of the three axes. Monitoring equipment proposed for the construction vibration measurements include the Instantel Minimate Plus, the GeoSonics 3000 EZ plus, or their equivalent. All the monitoring equipment will be utilized according to the manufacturer’s specifications.

The results from the monitoring effort will be evaluated using guidelines developed by the U.S. Bureau of Mines (USBM) and California Department of Transportation (Caltrans). Research results based on PPV will be used to set acceptable vibration limits for the work, expressed as a Warning Action - Limit and Stop Work Action - Limit. These action threshold limits will be developed as part of the final design of the remedy and may be revised following the pre-construction baseline vibration monitoring and building structural survey.

The vibration monitoring plan will include:

- Placing monitoring units equipped with geophones capable of tri-axial displacement measurements next to existing above-ground structures adjacent to the construction areas.

- Performing continuous vibration monitoring during each of the construction phases to adequately document the ground-borne vibration from the construction activities. Data recording will commence prior to the start of each shift. At the end of each shift, data collected will be downloaded and reviewed. A summary report will be prepared on a weekly basis.
- If the vibration “warning action-limit” is exceeded, the situation will be reviewed and the cause of the vibration will be identified. A corrective action plan will be formulated, implemented and monitored. If the vibration “stop work action-limit” is exceeded or abnormal monitoring data is recorded, work will stop to allow for review of the vibration data. If the vibrations exceed the stop work action-limit, the monitoring units will set off an alarm that will signal for the stop of construction work. The causes of vibration will be investigated, and vibration mitigation procedures can then be reviewed and implemented as needed before work proceeds. Additional monitoring units may be required to evaluate conditions for work going forward, to identify potential issues so that mitigative actions will be taken to prevent excessive vibrations.
- At the end of construction, the data will be summarized in a Final Report. Summary tables of the warning/action events recorded during the monitoring, and associated causes observed for each event, will be included.

2.3.12.4 Crack Monitoring

Additionally, tell-tale crack monitors (or strain gauges) will also be used to document the status of existing hairline cracks in the existing above-ground facility structures. Prior to the start of the construction activities, baseline crack gauge measurements will be conducted to document any existing hairline cracks identified for each concerned building. Crack measurements will be collected twice a week typically midweek during the construction activities and after construction has been completed for the week. However, if high vibration levels are recorded during the actual vibration monitoring, more frequent crack monitoring may be conducted at the discretion of the engineer.

2.3.12.5 Mitigation Measures

The vibration mitigation measures listed below will be considered and utilized, where practicable, to minimize, to the greatest extent feasible, the vibration levels near the construction site:

- Inform stakeholders about construction method, possible effects, quality control measures, precautions to be used, and the channels of communication available to them.
- Phase construction operations so as not to occur at the same time. The cumulative vibration impacts produced are less when each vibration source operates separately.
- Minimize the use of impact devices, such as jackhammers, pavement breakers, and hoe rams. Where possible, use concrete crushers or pavement saws rather than hoe rams for tasks such as concrete removal.
- Avoid vibratory rollers and packers near sensitive areas.
- Schedule work to limit weekend and night time work.
- Minimize the duration of any high vibration activities.

2.3.12.6 Vibration Mitigation

The following procedures are recommended if a measured level exceeds the action limits or if the crack monitors indicate new or larger cracks.

In the event that a “Warning Action Limit” is reached:

- The on-site engineer will review monitoring data, the magnitude of exceedance, the time duration for each occurrence and the number of occurrences of such exceedances, and the source causing them in order to determine whether a mitigation action is warranted.
- The engineer will prepare a plan of action for the activity causing the exceedances, if warranted.
- If directed by the engineer or the construction manager, the Contractor must implement the plan of action within 24 hours according to the mitigation plan to ensure that the “Stop Work Action Limit” is not reached; and
- The frequency of man-attended observations of the affected instrument will be increased and additional instruments may be installed, if necessary.

In the event that a “Stop Work Action Limit” is reached:

- The Contractor must cease all construction activities and meet with the Project Team to discuss the need for mitigation actions.
- The engineer will determine the cause of such exceedance and prepare a plan of action for the activity causing for the exceedance. In addition to vibration monitoring results, the engineer should check on-site crack monitors (strain gauges) to determine if there has been any change with such exceedances.
- If directed by the engineer or the construction manager, the Contractor must implement the plan of action within 12 hours of submittal of the mitigation plan so that the “Stop Work Action Limit” would not occur afterwards.
- Installation of additional instruments, if necessary, to cover large areas affected.

2.3.12.7 Crack Monitoring Exceedance

If there is a change in an existing crack or if new cracks are observed during visual inspections, all site work will stop until the engineer can evaluate the integrity of the monitored structures. Similar to the vibration monitoring exceedance, the activities and machinery will be evaluated to determine the correlation between the ongoing activities and the onset of structural cracks. Work procedures will be evaluated and modified, as necessary, to prevent further exceedance of the monitoring criteria. All work activities will only proceed at the discretion of the engineer and after the source of the exceedance has been determined and corrected.

3. Permits and Authorizations

No New York State, or Federal permits or approvals are known or believed to be required for the work. The work is being conducted under an Order on Consent with NYSDEC. The selected Contractor will work with the Engineer to obtain the necessary New York City Building permit needed to complete the work.

4. Schedule

A baseline schedule for the design and implementation of the IRM is presented below. The actual project schedule may exceed the baseline, should work proceed more quickly than has been anticipated in developing the baseline. Key milestones are referenced to the submittal date of the IRM Work Plan:

- NYSDEC approval of the IRM Work Plan --
- Submit 60% Design to NYSDEC 6 months
- NYSDEC issues comments on 60% Design 7 months
- Submit 90% Design to NYSDEC 11 months
- NYSDEC issues comments on 90% Design 12 months
- Submit 100% Design to NYSDEC 14 months
- NYSDEC issues approval on 100% Design 15 months
- National Grid Procurement Process 15 to 22 months
- Contractor Mobilization 22 months
- Completion of IRM activities 35 months

The contractor mobilization date for the implementation of the IRM will also be dependent on the availability of a suitable site (size and location) for the relocation of Cooper Tank's business.

5. Post Construction Plans

National Grid will continue the management of residual material at the Equity site through the implementation of procedures detailed in the ISMP and operation of the NAPL Recovery System.

5.1 Interim Site Management Plan

An ISMP (AECOM, 2012) is in place for the property to alert Site workers and construction, utility and maintenance crews, and their contractors ("Construction Workers") that there are environmental conditions on the 222 Maspeth Avenue, 252 Maspeth Avenue, and 254 Maspeth Avenue properties in Brooklyn, New York that may impact surface intrusive (i.e., greater than 6 inches deep, such as drilling, excavation, utility repairs, fence repairs, tree planting, construction, etc.) activities and present a hazard to the public and environment. Work within the above properties has the potential for contact with environmental impacts during surface intrusive activities. The primary goal of the ISMP is to ensure that any surface intrusive work will be done in such a manner that construction/site workers will be prevented from exposure to environmentally impacted material at the Site through work zone controls, appropriate monitoring, and safe work practices. A secondary goal of the ISMP is to ensure unauthorized access to the NAPL recovery system is prevented.

The ISMP requires the Site owner(s) or their representative(s) to notify National Grid and NYSDEC at least 15 business days prior to the start of:

- Any intrusive activity that is anticipated to penetrate the Site surface, disturb the Site surface, or encounter the Site subsurface.
- Any contaminated soil handling activities, intrusive or non-intrusive.
- Any subsurface modifications or repairs to the existing stormwater collection system and other subsurface equipment (including scales), and utilities or future Site development/redevelopment.
- Any work that will require access to the NAPL recovery treatment system control trailer or fenced area or recovery well vaults.

National Grid will review and provide comments on all planned surface-intrusive activities, and may opt to have a representative on-site, as appropriate, to observe that any surface-intrusive work activities are done in compliance with the ISMP.

The ISMP requires that all surface intrusive work be performed in compliance with 29 CFR 1910.120 and utilize appropriate Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Responses (HAZWOPER) trained workers. Such work must also be conducted under a Health and Safety Plan (HASP) and a Community Air Monitoring Plan (CAMP). The ISMP also requires that certain engineering controls be used to protect public safety during such work. The ISMP also details specific measures to be taken for on-site material management, waste management, stormwater pollution prevention, and equipment decontamination.

5.2 NAPL Recovery

NAPL recovery activities will continue using the existing 23 wells located on the 222, 252 and 254 Maspeth Avenue parcels, as well as the 4 deep wells proposed for the area beneath the Former No. 1 Relief Holder tank, with the intention of maintaining NAPL levels within the sumps at each of the locations. Automated wells (12) will recover NAPL on a regular basis while NAPL in the remaining wells is recovered during quarterly monitoring events. The recovery activities will be documented in an annual report to NYSDEC.

5.3 Groundwater Monitoring

In addition to ongoing NAPL monitoring and recovery prior to and during the proposed IRM work outlined in this Work Plan, groundwater monitoring will be performed as a baseline event within one-year of commencing the IRM work and for one-year following completion of the IRM work at a key subset of existing monitoring wells and recovery wells including two new monitoring wells outlined on Figure 5-1. The two new monitoring wells, identified as MW-200 and MW-201, will be positioned adjacent to and downgradient from the future location of the ISS mass at the 252

Maspeth Avenue parcel. These wells will be screened in the permeable zone below the intermediate clay and above the lower clay unit where DNAPL was previously noted during the RI (Table 5-1). Prior to advancement, each boring location will be cleared for utilities following National Grid and AECOM utility pre-clear protocols/standard operating procedures (SOP) and low energy/soft-dig excavation techniques. Once the locations are cleared by soft-dig methods to a minimum of 5 ft bgs, soil borings will be advanced by sonic drilling methods. During borehole advancement, isolation casing will be advanced as needed to isolate any zones of residual NAPL and prevent downward migration of impacts in the borehole. Soils will be logged continuously for visual impacts and screened with a photoionization detector (PID) from ground surface to the terminus of the borehole. Wells will be 4-inches in diameter and will have a 10-foot sump capable to providing a temporary reservoir for any accumulating DNAPL. Any DNAPL accumulating in the wells will be removed during routine NAPL recovery monitoring outlined in Section 5.2.

NAPL gauging and groundwater monitoring will be performed on a monthly basis for 6-months following the ISS work at two well locations closest to the ISS mass (MW-201 and RW-4) and on a quarterly basis at other wells to evaluate potential changes in dissolved phase concentrations as a result of the ISS work and to monitor and potentially recover mobilized DNAPL following IRM activities. A summary of the sampling rationale and analysis is outlined on Table 5-1 and provides monitoring for key constituents of interest detected during the RI, including volatile organic compounds (VOCs) using USEPA Method 8260B, semi-volatile organic compounds (SVOCs) using USEPA Method 8270C, and free cyanide using USEPA Method 9016. Monitoring results including chronological comparisons to RI and baseline data will be provided to NYSDEC during the groundwater monitoring program.

6. References

AECOM 2012, Interim Site Management Plan, Former Equity Works MGP Site, Brooklyn, Kings County, NY, NYSDEC Site No.: 224050, Order on Consent Index #: A2-0552-0606, November 2012.

AECOM 2016, Remedial Investigation Report, Former Equity Gas Works Site, 222-245 Maspeth Avenue, Brooklyn, Kings County, NY, NYSDEC Site No.: 224050, Order on Consent Index #: A2-0552-0606, March 2016

AECOM 2018, Fourth Annual Report, Interim Remedial Measure for NAPL Recovery, August 2017 through July 2018, Former Equity Works MGP Site, Brooklyn, Kings County, NY, NYSDEC Site No.: 224050, Order on Consent Index #: A2-0552-0606, September 2018.

AECOM 2019, Supplemental Investigation Report-222 Maspeth Avenue, Former Equity Works MGP Site, Brooklyn, Kings County, NY, NYSDEC Site No.: 224050, Order on Consent Index #: A2-0552-0606, March 2019.

AECOM 2019, Pre-Design Investigation Work Plan, 222 Maspeth Avenue Property, Former Equity Works Manufactured Gas Plant (MGP) Site, Brooklyn, New York, NYSDEC Site No.: 224050, Order on Consent Index #: A2-0552-0606, June 2019.

AECOM 2019, Pre-Design Investigation (PDI) Data Report, 222 Maspeth Avenue Property, Former Equity Works Manufactured Gas Plant (MGP) Site, Brooklyn, New York, NYSDEC Site No.: 224050, Order on Consent Index #: A2-0552-0606, October 2019.

Anchor QEA, LLC 2012, Draft Data Applicability Report, Remedial Investigation/Feasibility Study, Newtown Creek, May 2012.

Anchor QEA, LLC 2015, Addendum to Draft Data Applicability Report (DAR), Remedial Investigation/Feasibility Study, Newtown Creek, April 2015.

NYSDEC 2010, Final Technical Guidance for Site Investigation and Remediation, DER-10, New York State Department of Environmental Conservation, May 2010.

Table

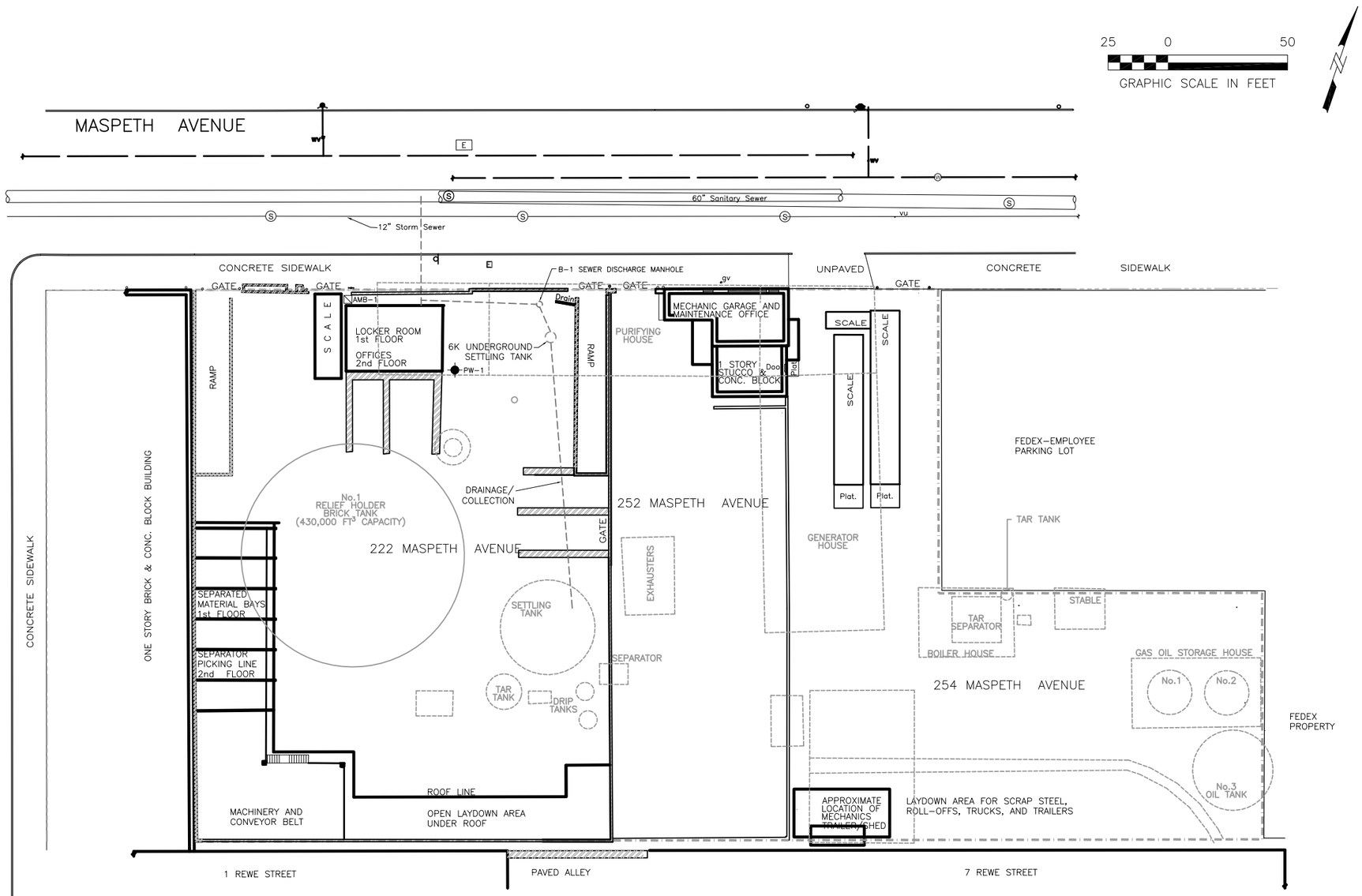
Table 5-1
Summary of Post-IRM Groundwater Sampling Rationale and Analyses
Former Equity Works MGP Site 222-254 Maspeth Avenue
Brooklyn, New York

AECOM

Sample Location	Sample Rationale	Number of Samples	Laboratory Analysis
Existing Monitoring/Recovery Wells			
MW-1 A/B and MW-9 C	- Monitor groundwater at upgradient edge of site at shallow, intermediate, and deep portions of overburden aquifer.	3	VOCs, SVOCs, and Free Cyanide
MW-6 A/B and MW-10 C	- Monitor groundwater at upgradient edge of site at shallow, intermediate, and deep portions of overburden aquifer.	3	VOCs, SVOCs, and Free Cyanide
MW-2 A/B*	- Monitor groundwater downgradient of ISS area at the shallow and intermediate portions of overburden aquifer.	2	VOCs, SVOCs, and Free Cyanide
RW-4	- Monitor groundwater downgradient of ISS mass at intermediate portion of overburden aquifer at zone consistent with DNAPL in ISS area. No DNAPL present in this well historically.	1	VOCs, SVOCs, and Free Cyanide
RW-14	- Monitor groundwater downgradient of ISS mass at intermediate portion of overburden aquifer at zone consistent with DNAPL in ISS area. No DNAPL present in this well historically.	1	VOCs, SVOCs, and Free Cyanide
Proposed New Monitoring/Recovery Wells			
MW-200	- New 4-inch well to monitor groundwater downgradient and proximal to ISS mass at deeper portion of the overburden aquifer between the intermediate clay and the lower clay unit. Set in area of suspected DNAPL to monitor and potentially recover DNAPL if present at recoverable quantities. Proposed screen interval from 55 to 80 feet bgs and proposed sump interval from 80 to 90 feet bgs based on data from nearby RI borings SB-20 and SB-20J.	1	VOCs, SVOCs, and Free Cyanide
MW-201	- New 4-inch well to monitor groundwater downgradient and proximal to ISS mass at deeper portion of the overburden aquifer between the intermediate clay and the lower clay unit. Set in area of suspected DNAPL to monitor and potentially recover DNAPL if present at recoverable quantities. Proposed screen interval from 63 to 81 feet bgs and proposed sump interval from 81 to 91 feet bgs based on data from nearby RI boring SB-29.	1	VOCs, SVOCs, and Free Cyanide
	Field Samples	12	
	Trip Blank (1/Cooler - VOCs Only)	2	
	Field Duplicates (1/10)	2	
	Matrix Spike (1/20)	1	
	Matrix Spike Duplicate (1/20)	1	
	Total Samples/Event	**18**	

Notes:
VOCs - Voltatile organic compounds using EPA Method 8260B
SVOCs - semi-volatile organic compounds using EPA Method 8270C
Free Cyanide - Using EPA Method 9016
* - Will be sampled if present and still viable for sampling
bgs - below ground surface

Figures



NOTES:
1.) SITE FEATURES (BUILDINGS, WALLS, UTILITIES, ETC.) TAKEN FROM MONTROSE SURVEYING CO., LLC. OF RICHMOND HILL, NY. THOSE SURVEYS (MASPETH AVE 222 ON 9/21/04 AND MASPETH AVE 252 & 254 ON 3/10/06) PROVIDED BY COOPER TANK RECYCLING.

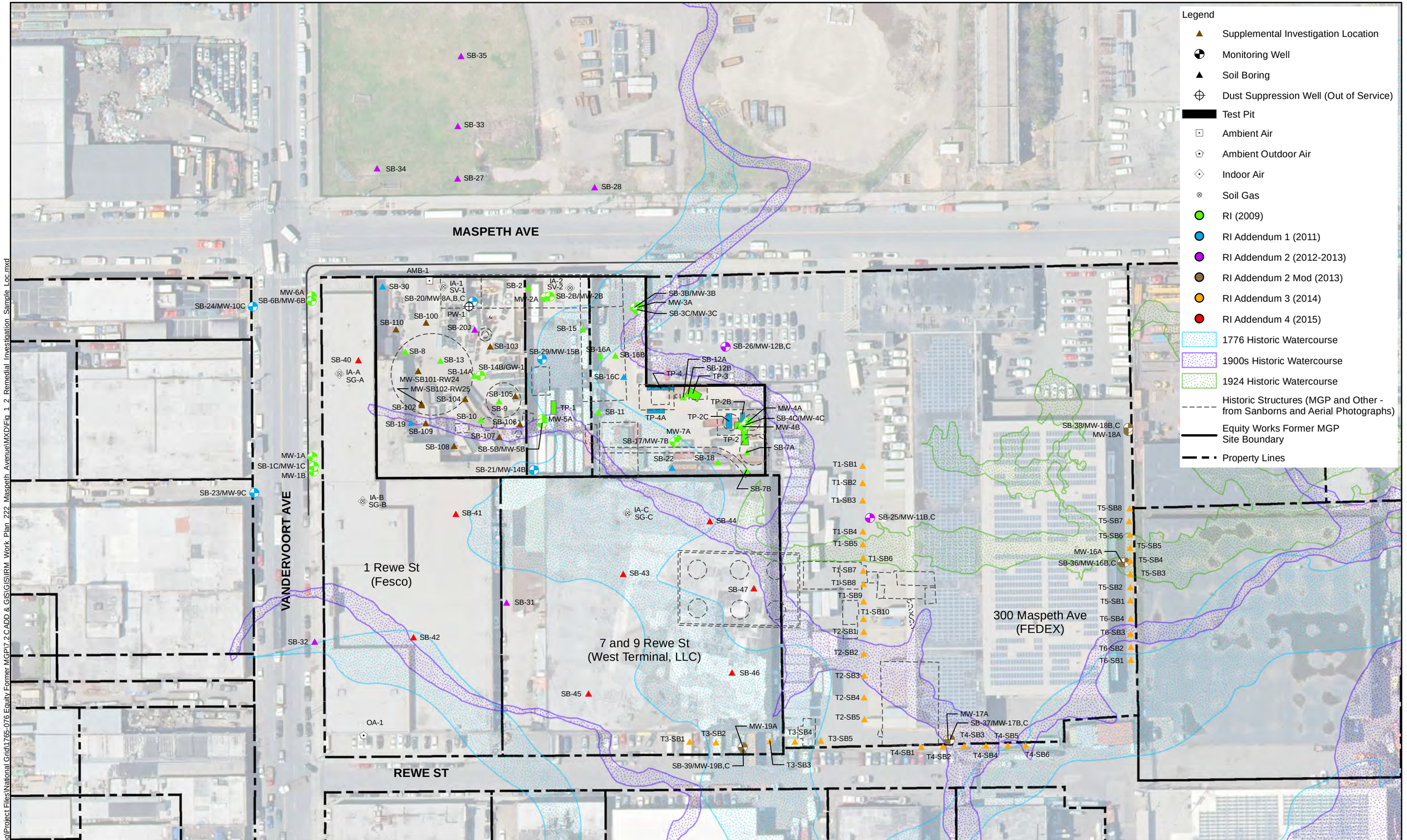
2.) LOCATIONS OF HISTORIC MGP STRUCTURES BASED ON SANBORN FIRE INSURANCE MAPS.

3.) OFFICE BUILDING AND SCALE ON 222 MASPETH AVE. ADJUSTED FROM MONTROSE SURVEY BASED ON FIELD OBSERVATIONS.
* LOCATIONS BASED ON FIELD TIE–INS BY AECOM.

AECOM

NATIONAL GRID EQUITY WORKS FORMER MGP SITE, BROOKLYN NY			SITE LOCATION
DATE: 01/15/2020	DRWN: JB		FIGURE 1-1

File: P:\Jobs\Rem_Eng\Project Files\National Grid\1765-076 Equity Former MGP\7.2 CADD & GIS\GIS\RM_Work_Plan_222_Maspeth_Avenue\MXD\Fig_1_1_Site_Location.dwg Layout: Figure -1-1 Site Layout User: Bourdeau Plotted: Jan 15, 2020 - 3:02pm



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AECOM

0 50 100
Scale in Feet

NATIONAL GRID
EQUITY WORKS FORMER MGP SITE
BROOKLYN, NY

DATE: 01/15/2020 | DRWN: JB

FIGURE 1-2
REMEDIAL INVESTIGATION
SAMPLE LOCATIONS

Legend

- Boring/Well Location
- -9.59 Top of Meadow Mat Elevation (FT NAVD 88)
- NP Meadow Mat Not Present
- NAPL Saturated
- Coated Material, Lenses
- Blebs, Globs, Sheen
- Staining, Odor
- Petroleum Impacts Saturation & Sheens
- Petroleum Impacts Staining & Odors
- No Observed Impacts
- 1931 Dredging Channel
- Extent of NAPL Above/At Meadow Mat (Dashed Where Inferred)
- 1776 Historic Watercourse
- 1900s Historic Watercourse
- 1924 Historic Watercourse
- Historic Structures (MGP and Other - from Sanborns and Aerial Photographs)

Note
Symbol color represents worst-case observations of impacts in the 10 ft above the top of the meadow mat surface.

MASPETH AVE

REWE ST

VANDERVOORT AVE

1 Rewe St (Fesco)

7 and 9 Rewe St (West Terminal, LLC)

300 Maspeth Ave (FEDEX)

SB-35 -9.81
SB-33 -2.73
GPEC-SB334 -10.80
GPEC-SB333 -7.10
GPEC-SB222 -1.04
SB-34 -7.91
SB-27 -10.50
SB-28 -9.59
GPEC-SB331 -10.60
RW-7 -9.70
PDI-1 -3.37
RW-6 -8.70
SB#2 -2.00
RW-8 -7.70
PDI-2 -3.55
SB-30 -7.46
SB-2B/MW-2B -5.39
RW-9 -8.80
SB-3B/MW-3B -1.88
SB-6B/MW-6B -5.78
SB-24/MW-10C -3.45
SB-20/MW-8A,B,C -11.19
RW-1 -8.60
SB#3 -11.50
SB-100 -5.20
SB-20J -7.20
SB-15 -4.59
RW-10 -7.70
SB-110 -3.60
SB-40 -6.64
SB-103 -4.00
RW-2 -8.20
SB-29/MW-15B -8.11
RW-12 -7.70
SB-16B -4.79
PDI-3 -6.85
SB-26/MW-12B,C -7.06
SB-14B/GW-1 -6.12
SB#4 -11.50
RW-13 -7.30
RW-11 -9.70
SB-14A NP
RW-3 -9.30
SB-16C -7.06
PDI-4 -5.08
SB-105 -0.50
RW-14 -7.00
SB-12B -5.72
SB-4C/MW-4C -7.06
SB-9 -1.66
SB-10 -6.26
SB-106 -2.20
RW-15 -8.70
RW-16 -8.30
SB-5B/MW-5B -5.31
SB-19 -6.58
SB-109 -5.90
SB-11 -4.39
PDI-5 -3.35
SB-17/MW-7B -5.18
SB-7A NP
RW-4 -8.60
SB-107 -2.50
RW-5 -8.40
SB#5 -1.75
SB-108 -5.10
RW-19 -7.20
RW-17 -30.60
SB-1C/MW1C -7.14
RW-23 -7.00
PDI-6 -1.70
SB-22 -8.36
SB-18 -3.05
SB-7B -2.23
T1-SB1 -8.99
T1-SB2 -11.48
SB-23/MW-09C -7.30
RW-22 -7.00
RW-20 -8.00
RW-18 -8.40
SB-25/MW-11B,C -8.87
SB-41 -7.66
SB-21/MW-14B -7.47
SB-44 -4.43
T1-SB4 -10.11
RW-21 -4.80
T1-SB5 -6.20
T1-SB6 -6.65
PDI-8 -4.51
T1-SB7 -6.63
T1-SB8 -7.71
SB-43 -11.70
SB-47 -4.52
T1-SB9 -7.19
T1-SB10 -10.26
SB-31 -7.95
SB-32 -6.55
SB-42 -7.76
T2-SB1 -9.03
T2-SB2 -8.75
SB-46 -9.45
T2-SB3 -6.31
SB-45 -5.42
T2-SB4 -7.80
T2-SB5 -7.21
SB-37/MW-17B,C -8.12
T3-SB2 -6.98
T3-SB3 -7.18
T3-SB4 -6.63
T3-SB5 -6.63
T4-SB1 -3.59
T3-SB1 -4.53
T4-SB2 -4.60
T4-SB3 -5.59
T4-SB4 -4.74
SB-39/MW-19B,C -4.60
SB-38/MW-18B,C -11.15
T5-SB8 -9.35
T5-SB7 -8.29
T5-SB6 1.81
T5-SB5 -0.73
T5-SB4 0.69
SB-36/MW-16B,C 3.82
T5-SB3 -2.88
T5-SB2 -4.29
T5-SB1 -2.58
T6-SB4 -4.01
T6-SB3 -5.43
T6-SB2 -5.86
T6-SB1 -14.75

N

0 50 100
Scale in Feet

AECOM

NATIONAL GRID
EQUITY WORKS FORMER MGP SITE
BROOKLYN, NY

DATE: 01/15/2020 | DRWN: JB

FIGURE 1-3
MEADOW MAT SURFACE ELEVATIONS AND VISUAL/OLFACTORY OBSERVATIONS

Path: P:\Jobs\Rem_Eng\Project Files\National Grid\1765-076 Equity Former MGP\7.2 CADD & GIS\GIS\RM_Work_Plan_222_Maspeth_Avenue\MXD\Fig_1_3_Meadow_Mat_Surface_Elev_Contours.mxd

Legend

- NAPL Saturated
- Coated Material, Lenses
- Blebs, Globs, Sheen
- Staining, Odor
- No Observed Impacts
- -24.9 — Top of Intermediate Clay Elevation (FT NAVD 88)
- NP — Intermediate Clay Not Present
- Intermediate Clay Surface Elevation Contour (FT NAVD 88) Dashed Where Inferred
- Interpreted Limits of Intermediate Clay Unit
- Extent of NAPL Above/At Intermediate Clay
- Topographic Slope of Intermediate Clay Surface
- Equity Works Former MGP Site Boundary
- Property Lines
- Historic Structures (MGP and Other - from Sanborns and Aerial Photographs)

Notes

1. Symbol color represents worst-case observations of impacts in the 10 ft above the top of the clay surface.
2. The following points were not used to generate the clay contours based on professional judgement: SB-28, SB-9, RW-10, SB-21, PDI-2, RW-1, RW-6, RW-5, RW-11, SB-37, PDI-8, PDI-4, PDI-6, SB-105.

MASPETH AVE

REWE ST

VANDERVOORT AVE

1 Rewe St (Fesco)

7 and 9 Rewe St (West Terminal, LLC)

300 Maspeth Ave (FEDEX)

SB-35 -28.81
SB-33 -20.73
GPEC-SB222 -19.54
GPEC-SB334 -19.4
GPEC-SB333 -25.8
GPEC-SB331 -24.9
SB-34 NP
SB-27 -22.00
SB-28 -23.59
RW-7 -32.7
PDI-1 -35.37
RW-8 -32.7
RW-6 -31.7
PDI-2 -30.55
SB-6B/MW-6B NP
SB-24/MW-10C NP
SB-30 NP
SB-2B/MW-2B -29.59
SB-20/MW-9A,B,C -32.69
SB-110 NP
SB-29/MW-15B -34.61
SB-100 -20.7
SB-90 -24.20
RW-2 -35.2
SB-103 -26.0
SB-40 NP
SB-14B/GW-1 -31.12
SB-9 -26.96
SB-104 -26.5
SB-105 -23.5
SB-10 -28.76
SB-106 -31.2
SB-5B/MW-5B -33.31
SB-19 NP
SB-109 NP
SB-107 -27.5
RW-5 -29.4
RW-4 -33.6
SB-108 -20.6
RW-22 -28
RW-18 -32.4
SB-1C/MW1C NP
SB-23/MW-09C NP
RW-23 -26
PDI-8 -32.51
RW-20 -34
RW-21 -31.8
SB-21/MW-14B -28.47
SB-41 -21.16
SB-31 -22.95
SB-42 NP
SB-32 NP
SB-43 -33.70
SB-45 -30.92
SB-46 -28.45
SB-39/MW-19B,C -30.10
RW-1 -29.6
SB-15 -30.09
RW-3 -34.3
SB-16C -31.06
RW-12 -30.20
SB-16B -30.75
PDI-4 -26.08
RW-15 -28.7
SB-11 -31.39
RW-19 -34.2
RW-17 -30.6
PDI-6 -29.70
SB-22 -24.36
SB-18 -31.05
SB-44 -30.43
RW-9 -34.3
SB-3B/MW-3B -35.88
RW-10 -30.7
PDI-3 -33.85
SB-26/MW-12B,C -29.06
RW-11 -29.70
RW-13 -30.3
RW-16 -29.3
SB-4C/MW-4C -39.06
PDI-5 -30.35
SB-17/MW-7B 33.18
SB-38/MW-18B,C -31.15
SB-25/MW-11B,C -31.87
SB-36/MW-16B,C -36.18
SB-47 -32.02
SB-37/MW-17B,C -28.12

AECOM

N

0 50 100

Scale in Feet

NATIONAL GRID
EQUITY WORKS FORMER MGP SITE
BROOKLYN, NY

DATE: 01/15/2020 | DRWN: JB

FIGURE 1-4
INTERMEDIATE CLAY SURFACE ELEVATION CONTOURS AND VISUAL/OLFACTORY OBSERVATIONS

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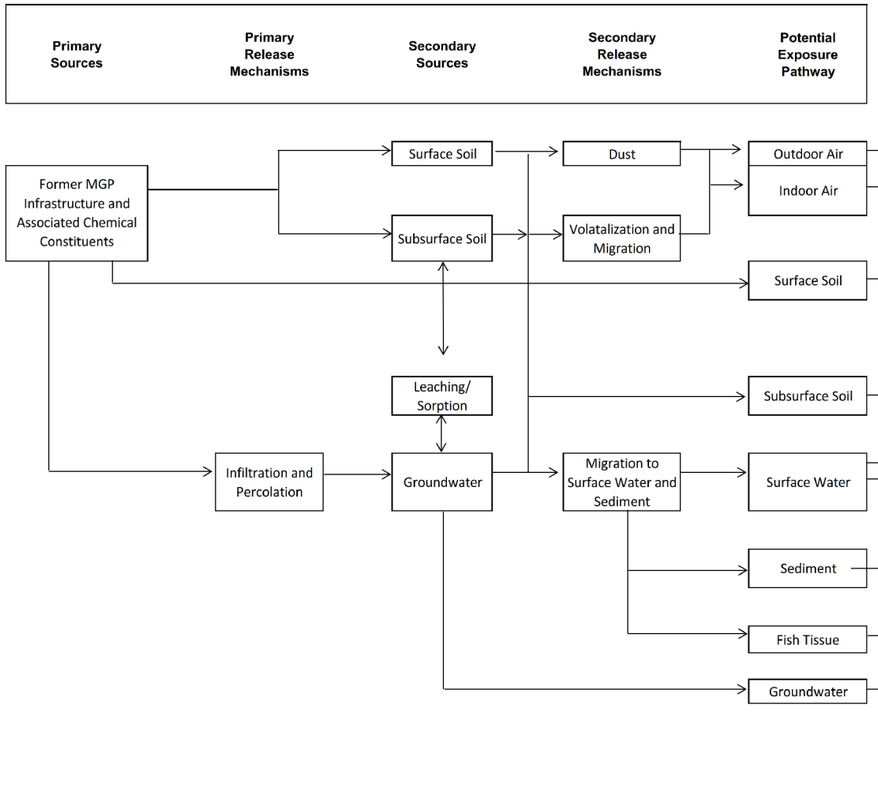

Primary Sources	Primary Release Mechanisms	Secondary Sources	Secondary Release Mechanisms	Potential Exposure Pathway	Potential Exposure Route	Potential On-Site Receptors: Indoor Commercial/Maintenance Workers	Potential On-Site Receptors: Outdoor Commercial/Maintenance Worker	Potential On-Site Receptors: Construction Worker	Potential On-Site Receptors: Site Visitor/ Trespassers	Potential Off-Site Receptors: Current and Potential Future Residents	Potential Off-Site Receptors: Current and Potential Future Indoor Commercial Workers	Potential Off-Site Receptors: Current and Potential Future Outdoor Commercial Workers	Potential Off-Site Receptors: Construction Workers
Former MGP Infrastructure and Associated Chemical Constituents		Surface Soil	Dust	Outdoor Air	Inhalation	○	○	●	○	○	○	○	●
				Indoor Air	Inhalation	○	○	○	○	○	○	○	○
		Subsurface Soil	Volatalization and Migration	Indoor Air	Incidental Ingestion	○	○	●	○	○	○	○	●
				Surface Soil	Dermal Contact	○	○	●	○	○	○	○	●
					Incidental Ingestion	○	○	●	○	○	○	○	●
				Subsurface Soil	Dermal Contact	○	○	●	○	○	○	○	●
		Leaching/ Sorption											
	Infiltration and Percolation	Groundwater	Migration to Surface Water and Sediment	Surface Water	Inhalation								
					Incidental Ingestion								
				Sediment	Dermal Contact								
				Fish Tissue	Ingestion								
		Groundwater		Groundwater	Inhalation	○	○	●	○	○	○	○	●
					Incidental Ingestion	○	○	●	○	○	○	○	●
					Potable Ingestion								
					Dermal Contact	○	○	●	○	○	○	○	●

Key

●	Pathway considered to be complete
○	Pathway considered to be incomplete or insignificant
	Exposure pathway not applicable for the associated receptor
(a)	Investigation has been performed by USEPA

AECOM

NATIONAL GRID
EQUITY WORKS FORMER MGP SITE
BROOKLYN, NY

DATE: 01/15/2020 | DRWN: JB

FIGURE 1-5
QHHEA CONCEPTUAL SITE MODEL

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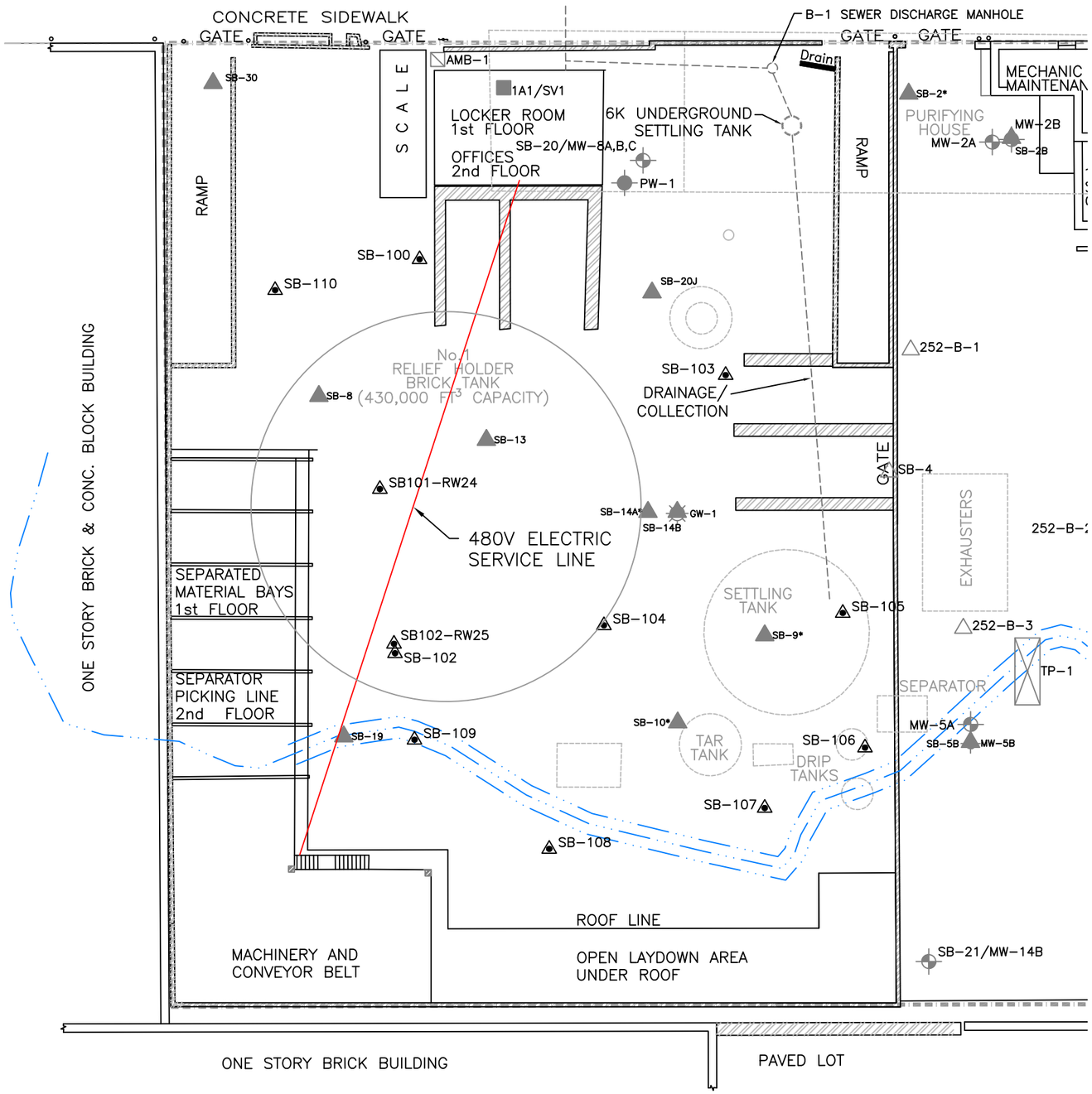


15 0 30

GRAPHIC SCALE IN FEET

NOTES:
1.) SITE FEATURES (BUILDINGS, WALLS, UTILITIES, ETC.) TAKEN MONTROSE FROM SURVEYING CO., LLC. OF RICHMOND HILL, NY. THOSE SURVEYS (MASPETH AVE 222 ON 9/21/04 AND MASPETH AVE 252 & 254 ON 3/10/06) PROVIDED BY COOPER TANK RECYCLING.
2.) LOCATIONS OF HISTORIC MGP STRUCTURES BASED ON SANBORN FIRE INSURANCE MAPS.
3.) LOCATION OF HISTORIC INVESTIGATION LOCATIONS BASED ON EEA INC., 2004 REPORT (254 MASPETH AVE) AND GANNETT FLEMING 2005 REPORT (252 MASPETH AVE).
4.) SITE CHARACTERIZATION INVESTIGATION LOCATIONS SURVEYED BY GEOD CONSULTING ON DECEMBER 11 AND 12, 2009.
5.) OFFICE BUILDING AND SCALE ON 222 MASPETH AVE. ADJUSTED FROM MONTROSE SURVEY BASED ON FIELD OBSERVATIONS.
* LOCATIONS BASED ON FIELD TIE-INS BY AECOM.

LEGEND:

- SITE BOUNDARY
- ROADWAY EASEMENT
- CURB
- BUILDING WALL
- CONCRETE WALL
- FENCE
- WATER UTILITY WITH ACCESS WAY
- WV. WATER UTILITY VALVE
- HYDRANT
- E UNDERGROUND ELECTRIC UTILITY VAULT
- 60" SEWER UTILITY WITH ACCESS WAY
- 12" SEWER UTILITY WITH ACCESS WAY
- BOLLARDS
- ELECTRIC UTILITY POLE
- MW-4A RI MONITORING WELL
- SB-4 RI SOIL BORING
- TP-3 RI TEST PIT
- AMB-1 AMBIENT AIR
- 1A1/SV1 INDOOR AIR/ SOIL VAPOR
- PW-1 ON-SITE PUMPING WELL
- GW-1 TEMPORARY MONITORING WELL
- 254-B-6 PREVIOUS INVESTIGATION SAMPLE LOCATION
- HISTORIC STRUCTURE
- HISTORIC WATERCOURSE
- CURRENT FEATURE
- SB-100 SUPPLEMENTAL INVESTIGATION LOCATION

NOTES:
1.) SITE FEATURES (BUILDINGS, WALLS, UTILITIES, ETC.) TAKEN FROM MONTROSE SURVEYING CO., LLC. OF RICHMOND HILL, NY. THOSE SURVEYS (MASPETH AVE 222 ON 9/21/04 AND MASPETH AVE 252 & 254 ON 3/10/06) PROVIDED BY COOPER TANK RECYCLING.

2.) LOCATIONS OF HISTORIC MGP STRUCTURES BASED ON SANBORN FIRE INSURANCE MAPS.

3.) OFFICE BUILDING AND SCALE ON 222 MASPETH AVE. ADJUSTED FROM MONTROSE SURVEY BASED ON FIELD OBSERVATIONS.
* LOCATIONS BASED ON FIELD TIE-INS BY AECOM.

AECOM

NATIONAL GRID
EQUITY WORKS FORMER MGP SITE
BROOKLYN NY

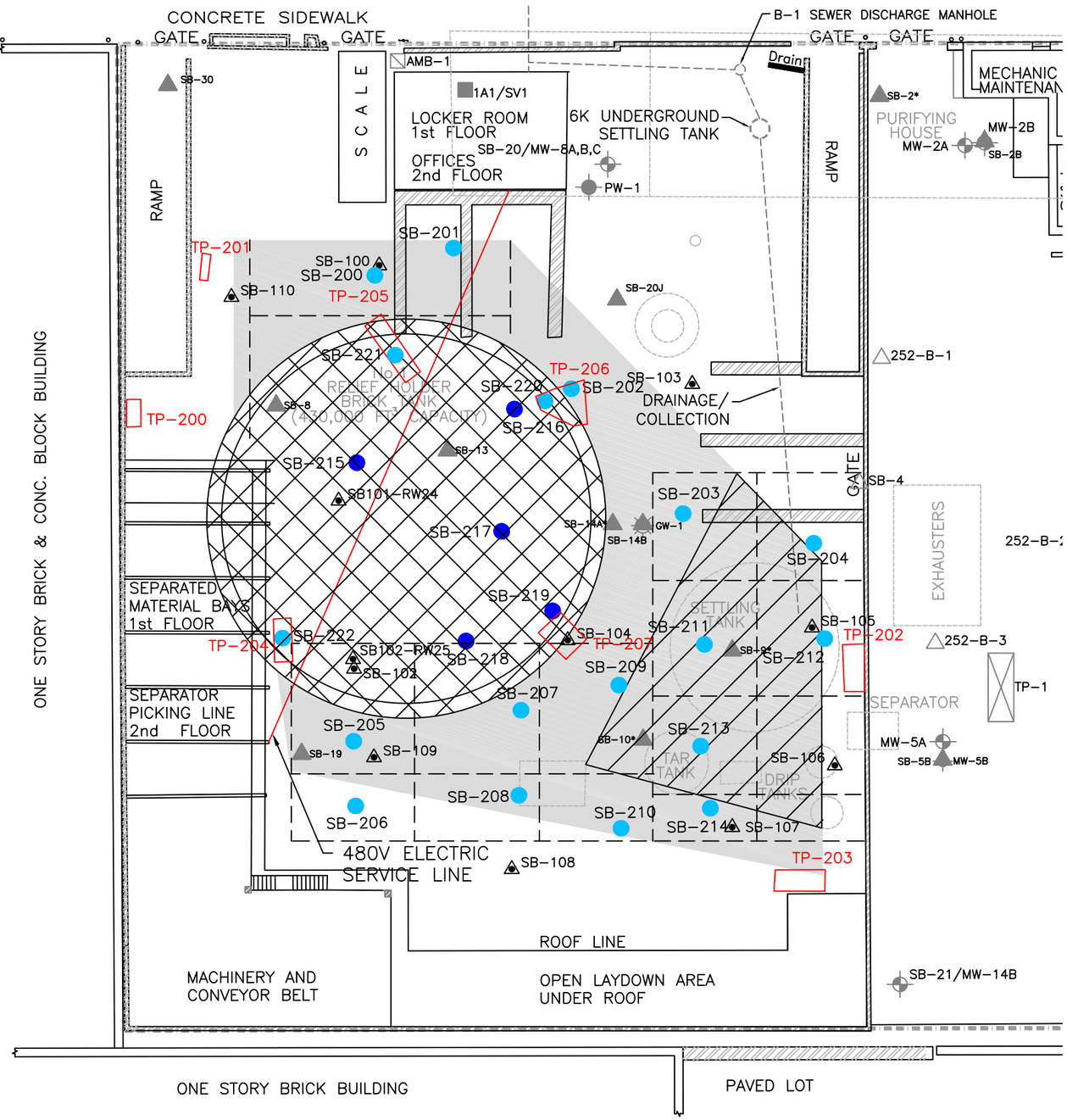
DATE: 01/15/2020 | DRWN: JB

SUPPLEMENTAL INVESTIGATION LOCATIONS

222 MASPETH AVENUE

FIGURE 1-6

File: P:\Jobs\Rem_Eng\Project Files\National Grid\1765-076 Equity Former MGP\2.2 CADD & GIS\GIS\RIM_Work_Plan_222_Maspeth_Avenue\MXD\Fig_1_6_Supplemental_Investigation_Loc.dwg Layout: FIG 1-6 User: BourdeauJ Plotted: Jan 15, 2020 - 3:19pm



NOTES:
1.) SITE FEATURES (BUILDINGS, WALLS, UTILITIES, ETC.) TAKEN MONTROSE FROM SURVEYING CO., LLC. OF RICHMOND HILL, NY. THOSE SURVEYS (MASPETH AVE 222 ON 9/21/04 AND MASPETH AVE 252 & 254 ON 3/10/06) PROVIDED BY COOPER TANK RECYCLING.
2.) LOCATIONS OF HISTORIC MGP STRUCTURES BASED ON SANBORN FIRE INSURANCE MAPS.
3.) LOCATION OF HISTORIC INVESTIGATION LOCATIONS BASED ON EEA INC., 2004 REPORT (254 MASPETH AVE) AND GANNETT FLEMING 2005 REPORT (252 MASPETH AVE).
4.) SITE CHARACTERIZATION INVESTIGATION LOCATIONS SURVEYED BY GEOD CONSULTING ON DECEMBER 11 AND 12, 2009.
5.) OFFICE BUILDING AND SCALE ON 222 MASPETH AVE. ADJUSTED FROM MONTROSE SURVEY BASED ON FIELD OBSERVATIONS.
* LOCATIONS BASED ON FIELD TIE-INS BY AECOM.

LEGEND:

- SHALLOW SOIL BORINGS
- DEEP SOIL BORINGS
- TEST PITS
- PRE-CHARACTERIZATION SAMPLING GRID (BASE ON VOLUME)
- SOLIDIFY NAPL TO INTERMEDIATE CLAY (~45 FT BGS)
- EXCAVATE HOLDER CONTENTS TO 26 FT BGS
- ISS PRE-EXCAVATION TO 10 FT BGS
- SITE BOUNDARY
- ROADWAY EASEMENT
- CURB
- BUILDING WALL
- CONCRETE WALL
- FENCE
- WATER UTILITY WITH ACCESS WAY
- WV. WATER UTILITY VALVE
- HYDRANT
- E UNDERGROUND ELECTRIC UTILITY VAULT
- 60" SEWER UTILITY WITH ACCESS WAY
- 12" SEWER UTILITY WITH ACCESS WAY
- BOLLARDS
- ELECTRIC UTILITY POLE
- MW-4A RI MONITORING WELL
- SB-4 RI SOIL BORING
- TP-3 RI TEST PIT
- AMB-1 AMBIENT AIR
- 1A1/SV1 INDOOR AIR/ SOIL VAPOR
- PW-1 ON-SITE PUMPING WELL
- GW-1 TEMPORARY MONITORING WELL
- 254-B-6 PREVIOUS INVESTIGATION SAMPLE LOCATION
- HISTORIC STRUCTURE
- CURRENT FEATURE
- SB-100 SUPPLEMENTAL INVESTIGATION LOCATION

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GRAPHIC SCALE IN FEET

AECOM

NATIONAL GRID
EQUITY WORKS FORMER MGP SITE
BROOKLYN NY

PRE-DESIGN INVESTIGATION LOCATIONS

DATE: 01/15/2020 | DRWN: JB | **FIGURE 1-7**

File: P:\Jobs\Rem_Eng\Project Files\National Grid\1765-076 Equity Former MGP\7.2 CADD & GIS\GIS\RIM_Work_Plan_222_Maspeth_Avenue\MXD\Fig_Pre_Design_Invest_Loc.dwg Layout: RG 1-7 PREDESIGN INVESTIGATION LOC User: Bourdeau Plotted: Jan 16, 2020 - 3:23pm

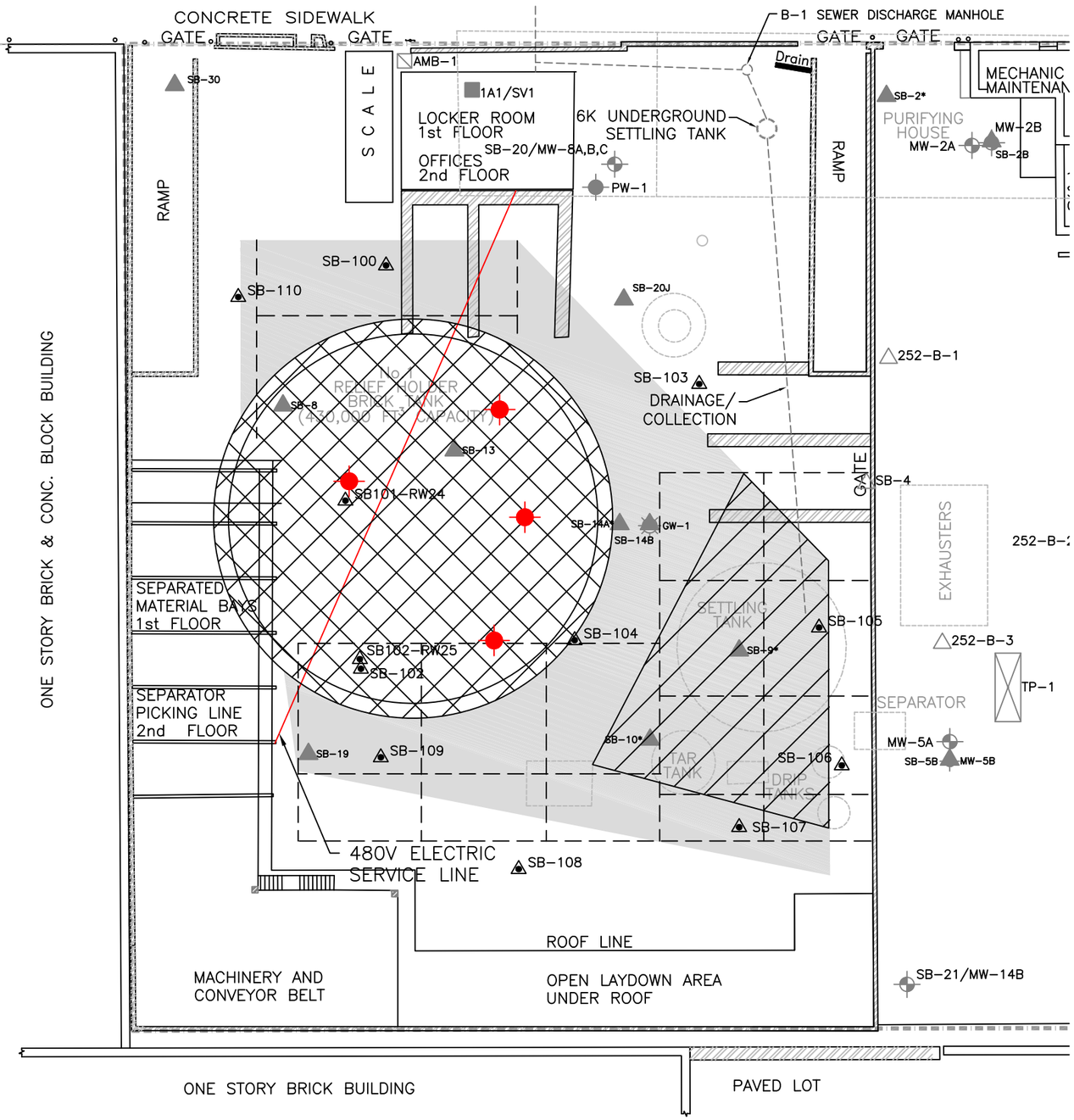
AECOM

NATIONAL GRID
EQUITY WORKS FORMER MGP SITE
BROOKLYN, NY

DATE: 01/15/2020 | DRWN: JB

FIGURE 2-1
EXISTING EQUIPMENT PLATFORM
222 MASPETH AVENUE

Path: P:\Jobs\Rem Eng\Project Files\National Grid\1765-076 Equity Former MGP\7.2 CADD & GIS\GIS\IRM Work Plan 222 Maspeth Avenue\MXD\Fig 2_1 Existing Equipment Platform 222 Maspeth Avenue.mxd



NOTES:
1.) SITE FEATURES (BUILDINGS, WALLS, UTILITIES, ETC.) TAKEN MONTROSE FROM SURVEYING CO., LLC. OF RICHMOND HILL, NY. THOSE SURVEYS (MASPETH AVE 222 ON 9/21/04 AND MASPETH AVE 252 & 254 ON 3/10/06) PROVIDED BY COOPER TANK RECYCLING.
2.) LOCATIONS OF HISTORIC MGP STRUCTURES BASED ON SANBORN FIRE INSURANCE MAPS.
3.) LOCATION OF HISTORIC INVESTIGATION LOCATIONS BASED ON EEA INC., 2004 REPORT (254 MASPETH AVE) AND GANNETT FLEMING 2005 REPORT (252 MASPETH AVE).
4.) SITE CHARACTERIZATION INVESTIGATION LOCATIONS SURVEYED BY GEOD CONSULTING ON DECEMBER 11 AND 12, 2009.
5.) OFFICE BUILDING AND SCALE ON 222 MASPETH AVE. ADJUSTED FROM MONTROSE SURVEY BASED ON FIELD OBSERVATIONS.
* LOCATIONS BASED ON FIELD TIE-INS BY AECOM.

LEGEND:

- LOCATION OF PROPOSED DEEP NAPL RECOVERY WELL FOLLOWING EXCAVATION OF HOLDER CONTENTS
- PRE-CHARACTERIZATION SAMPLING GRID (BASE ON VOLUME)
- SOLIDIFY NAPL TO INTERMEDIATE CLAY (~45 FT BGS)
- EXCAVATE HOLDER CONTENTS TO 26 FT BGS
- ISS PRE-EXCAVATION TO 10 FT BGS
- SITE BOUNDARY
- ROADWAY EASEMENT
- CURB
- BUILDING WALL
- CONCRETE WALL
- FENCE
- WATER UTILITY WITH ACCESS WAY
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- MW-4A RI MONITORING WELL
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- AMB-1 AMBIENT AIR
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- GW-1 TEMPORARY MONITORING WELL
- 254-B-6 PREVIOUS INVESTIGATION SAMPLE LOCATION
- HISTORIC STRUCTURE
- CURRENT FEATURE
- SB-100 SUPPLEMENTAL INVESTIGATION LOCATION

15 0 30
GRAPHIC SCALE IN FEET

AECOM

NATIONAL GRID
EQUITY WORKS FORMER MGP SITE
BROOKLYN NY

PROPOSED TREATMENT AREA
222 MASPETH AVENUE

DATE: 01/15/2020 | DRWN: JB | **FIGURE 2-2**

File: P:\Jobs\Rem_Eng\Project Files\National Grid\1765-076 Equity Former MGP\7.2 CADD & GIS\GIS\RIM_Work_Plan_222_Maspeth_Avenue\MXD\Fig_Pre_Design_Invest_Loc.dwg Layout: RC 2-2 PROPOSED TREATMENT AREA User: Bourdeau Plotted: Jan 16, 2020 - 2:10pm

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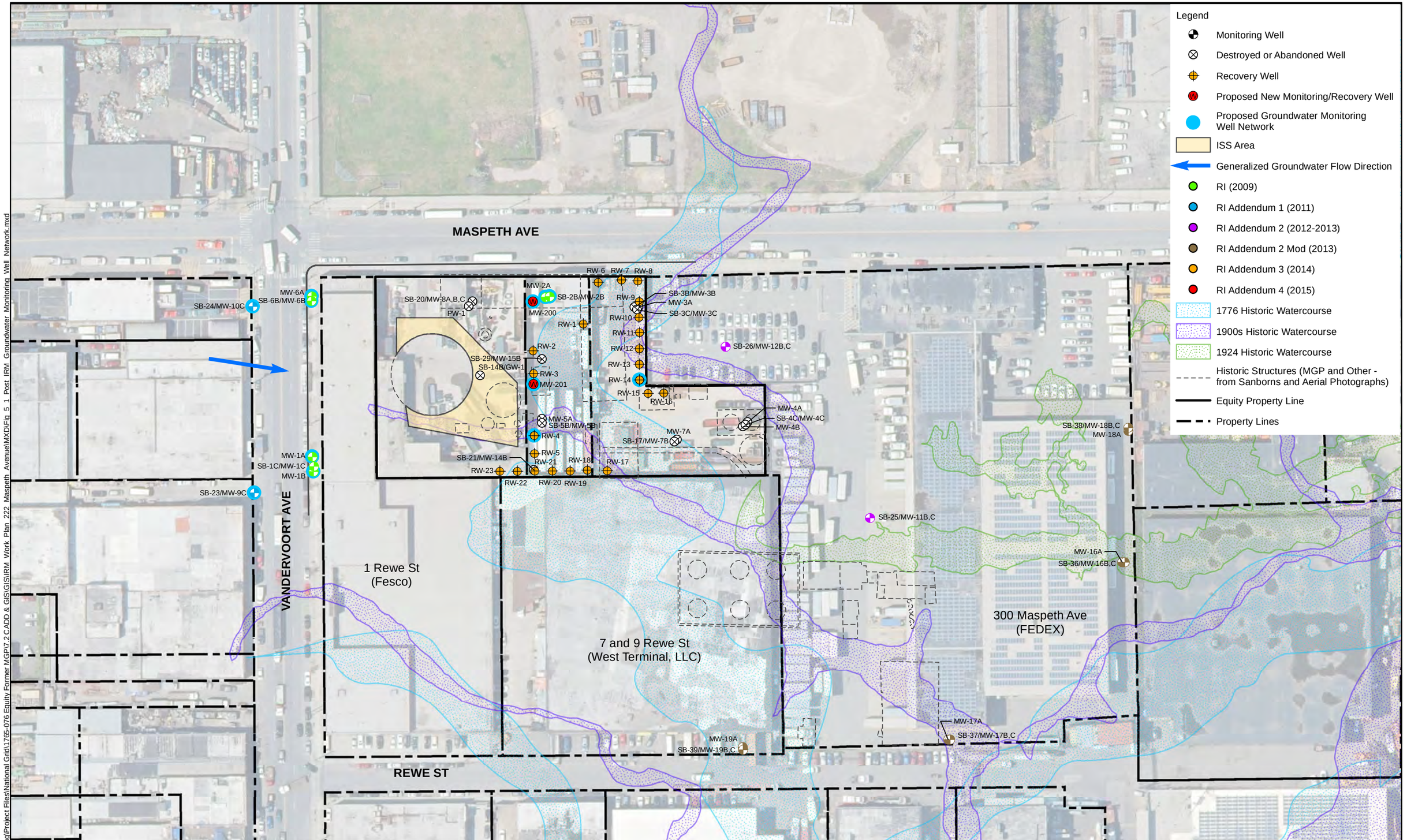
NATIONAL GRID
EQUITY WORKS FORMER MGP SITE
BROOKLYN, NY

DATE: 01/16/2020 | DRWN: JB

FIGURE 2-3
PERIMETER WALLS OF THE
222 MASPETH AVENUE

Path: P:\Jobs\Rem_Eng\Project Files\National Grid\1765-076 Equity Former MGP\7.2 CADD & GIS\GIS\IRM_Work_Plan_222_Maspeth_Avenue\MXD\Fig 2_3 Perimeter Walls of the 222 Maspeth Avenue.mxd



Legend

- Monitoring Well
- Destroyed or Abandoned Well
- Recovery Well
- Proposed New Monitoring/Recovery Well
- Proposed Groundwater Monitoring Well Network
- ISS Area
- Generalized Groundwater Flow Direction
- RI (2009)
- RI Addendum 1 (2011)
- RI Addendum 2 (2012-2013)
- RI Addendum 2 Mod (2013)
- RI Addendum 3 (2014)
- RI Addendum 4 (2015)
- 1776 Historic Watercourse
- 1900s Historic Watercourse
- 1924 Historic Watercourse
- Historic Structures (MGP and Other - from Sanborns and Aerial Photographs)
- Equity Property Line
- Property Lines

AECOM

N

0 50 100

Scale in Feet

NATIONAL GRID
FORMER EQUITY WORKS MGP SITE
BROOKLYN, NY
60137362.675

DATE: 03/30/2020 | DRWN: JB

FIGURE 5-1
POST-IRM GROUNDWATER MONITORING
WELL NETWORK

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