AECOM Environment

Prepared for:
National Grid
Brooklyn, NY

Prepared by:
AECOM
Manhattan, NY
60137362
January 2013

Interim Remedial Measure Work Plan for Product Recovery

Former Equity Works MGP Site
Brooklyn, New York
NYSDEC Site No.: 224050
Order on Consent Index #: A2-0552-0606

Environment

Prepared for:
National Grid
Brooklyn, NY

Prepared by:
AECOM
Manhattan, NY
60137362
January 2013

Interim Remedial Measure Work Plan for Product Recovery

Former Equity Works MGP Site
Brooklyn, New York
NYSDEC Site No.: 224050
Order on Consent Index #: A2-0552-0606

Prepared by Mark McCabe, Program Manager

Reviewed by Peter S. Cox, Project Manager

Contents

List of Appendices

Appendix A Determination of Appropriate Slot Size for Recovery Well Screens

Appendix B Community Air Monitoring Plan

Appendix C Procedures for Bail Down Testing of Recovery Wells

List of Tables

List of Figures

Executive Summary

National Grid has prepared this Interim Remedial Measure (IRM) Work Plan for the implementation of product recovery activities within the footprint of the former Equity Manufactured Gas Plant (MPG) site (the Site) located in Brooklyn, New York. The proposed IRM, as well as environmental investigation and other associated remedial activities, are being conducted pursuant to a Multi-site Order on Consent and Administrative Settlement, Index # A2-0552-0606, between The Brooklyn Union Gas Company (BUG), now d/b/a National Grid, and the New York State Department of Environmental Conservation (NYSDEC).

The Site was operated as a MGP from approximately 1893 to 1929, first by the Equity Gas Light Company and later by BUG, with BUG transferring ownership of the Site in 1951. The Site currently consists of three adjoining properties – 222 Maspeth Avenue, 252 Maspeth Avenue, and 254 Maspeth Avenue. The 222 Maspeth Avenue property is used by Cooper Tank as a solid waste recycling facility.

Cooper Tank has been issued a NYSDEC Part 360 Permit for the expansion of operations on the 252 and 254 Maspeth Avenue properties. Conditions of that permit require the construction of a perimeter wall around open areas of the 254 Maspeth property and the installation of a concrete pad with a storm water collection system across the entire surface of the 252 and 254 Maspeth Avenue properties. Since the installation of the wall and concrete pad will significantly limit access to subsurface areas of the Site, NYSDEC has requested that National Grid conduct an IRM to control potential product migration while a final site remedy is developed through the DER 10 process. The IRM activities detailed in this work plan include the following:

- installation of 5 product recovery wells at appropriate locations within the central areas of the Site to reduce the quantity of MGP source material, and at 18 selected perimeter locations to control off-site migration of non-aqueous phase liquid (NAPL).
- on-going measurement and recovery of product that collects in the recovery wells.

The proposed IRM activities will be coordinated with the Cooper Tank re-development plans. Activities associated with the installation of the recovery wells and associated collection/ accumulation facilities are scheduled for late 2012 and the first quarter of 2013.

Product monitoring activities will be initiated in early 2013, with recovery activities conducted on an as required basis. Product recovery will be automated at locations that are either anticipated to have a consistent and significant rate of re-charge, or will have limited accessibility due to on-going Cooper Tank operations. Product accumulation and disposal will be conducted in accordance with the applicable requirements of 6NYCRR and NYSDEC DER-4, “Management of Coal Tar Waste and Coal Tar Contaminated Soils and Sediment”.

The IRM activities will be documented in the forms of a Completion Report summarizing the activities associated with the installation of the recovery wells, and quarterly Monitoring and Recovery Reports presenting the results from the on-going monitoring and product recovery activities.

1.0 Introduction

National Grid is submitting this Interim Remedial Measure (IRM) Work Plan for the implementation of product recovery activities within the footprint of the former Equity Works Manufactured Gas Plant (MPG) site (the Site) which consists of three adjoining properties – 222 Maspeth Avenue, 252 Maspeth Avenue, and 254 Maspeth Avenue located in Brooklyn, New York. The location of the Site and the orientation of the individual properties are illustrated in Figures 1-1 and 1-2, respectively.

This IRM Work Plan has been developed pursuant to a Multi-site Order on Consent and Administrative Settlement, Index # A2-0552-0606, between The Brooklyn Union Gas Company (BUG), now d/b/a National Grid NY, and the New York State Department of Environmental Conservation (NYSDEC), in accordance with applicable guidelines of the NYSDEC and the New York State Department of Health (NYSDOH).The IRM activities will consist of the following:

- installation of product recovery wells at appropriate locations within the central areas of the Site to reduce the quantity of MGP source material, and at selected perimeter locations to control off-site migration of non-aqueous phase liquid (NAPL).
- on-going measurement and recovery of product that collects in the recovery wells.

IRM activities are tentatively scheduled for late 2012 and early 2013, but may be modified to accommodate redevelopment activities planned by the current owner of the properties.

This document is organized in the following manner: the background of the 222, 252 and 254 Maspeth Avenue properties is summarized in Section 2; a conceptual site model related to the source and transport of NAPL at the Site is presented in Section 3; the objectives and activities for the IRM are detailed in Section 4; proposed reporting procedures are provided in Section 5; the proposed schedule and project responsibilities are presented in Section 6 and references are included in Section 7.

2.0 Site Background

A brief summary of the site history and description of the current property layout are provided below.

2.1 Site History and Description

The Site was operated as a MGP from approximately 1893 to 1929, first by the Equity Gas Light Company and later by BUG, using the carbureted water gas (aka, Lowes) process. BUG sold the Site in September 1951. Subsequently, the Site was used for storage (pipe and valves) during the period of 1965 to 1981, and is believed to have been vacant during the period of 1986 to 1988. The Site is thought to have been used as a solid waste transfer facility since 1990 under the ownership of various parties.

Based on historical information obtained during previous investigations, MGP-era structures were present on all three properties. Structures at 222 Maspeth Avenue included the southwestern end of the purifying house, the 430,000 cubic feet relief holder, a setting tank, a tar tank, drip tanks, and part of a tar separator .At 252 Maspeth Avenue, structures included the northeastern end of the purifying house, part of the tar separator, and exhausters. Structures at 254 Maspeth Avenue included the generator house, boiler house, tar tank, tar separator, and gas oil storage house).The locations of these structures are illustrated on Figure 1-2. Subsurface remnants of the relief holder, oil storage house and the oil tanks were observed during prior site activities.

2.2 Current Property Layout

Information related to the current ownership and use of the Site is provided below:

- 222 Maspeth Avenue – This property is owned by 222 Maspeth Avenue, LLC and is currently used as an active waste recycling/waste transfer station operated by Cooper Tank Recycling (Cooper Tank).Currently one enclosed building housing offices and one open building (no walls, with roof) housing waste recycling operations are located on the lot.
- 252 Maspeth Avenue – This property is owned by Giacomo and Giovanna Bordone and is currently leased by Cooper Tank. The property is used as a maintenance center for equipment and a two story concrete building is located on the north side of the property, along Maspeth Avenue.
- 254 Maspeth Avenue – This property is currently owned by 254 Maspeth Avenue, LLC. The property has been used for occasional storage of empty roll-off containers, parking of tractor-trailers, and Cooper Tank employee vehicle parking. Two rectangular, in-ground scales for determining truck tare weight and a storm water collection structure are located on the northern portion of the property.

Cooper Tank has been issued a NYSDEC Part 360 Permit for the recycling facility. This permit, which covers the expansion of the current 222 Maspeth Avenue operations into the 252 and 254 Maspeth Avenue properties, will require construction of a perimeter wall around open areas of the 254 Maspeth parcel, and the installation of a concrete pad with a storm water collection system across the entire surface of the 252 and 254 Maspeth Avenue properties.

3.0 Summary of Investigation Activities and Conceptual Site Model

3.1 Summary of Investigations and Interim Remedial Measures

Several investigations have been conducted on the 222, 252, and 254 Maspeth Avenue properties by both the property owners and National Grid. These include the following activities:

- Contemporary property owners:
  - A Phase II Environmental Subsurface Investigation (ESI) conducted in September 2004 by EEA Inc. (EEA) on behalf of Spencer Realty Corporation (the property owner) and Cooper Tank (the potential property buyer). EEA installed 6 soil borings on the property and collected soil samples which were analyzed for VOCs, SVOCs, and RCRA metals. SVOCs and various metals were detected in all six borings. VOCs were detected in two of the borings. The subsurface geology was characterized to the completion depth of the borings.
  - A Phase I Environmental Site Assessment (ESA) conducted in October 2004 by Gannett Fleming Environmental (GFE) on behalf of Cooper Tank, who was the potential buyer of the property. GFE conducted a records search, interviews, and site visit. Surficial soil staining was observed on site.
  - A geotechnical investigation by GFE performed geotechnical investigation on behalf of Cooper Tank in September 2006 (GFE, 2006). GFE installed five soil borings to investigate the geology below the 252 and 254 Maspeth properties.
- National Grid
  - A RI conducted by AECOM from September 19, 2009 to February 12, 2010 on the 222, 252, and 254 Maspeth Avenue properties, and off-site along Vandervoort Avenue. On-site, three test pits were excavated, 14 soil borings were completed, 12 monitoring wells installed, one temporary well was installed and surface soil, subsurface soil, and groundwater samples were collected and analyzed during the RI. The investigations confirmed that MGP-related compounds are present in the soil and groundwater beneath the 222, 252, and 254 Maspeth Avenue properties.
  - Ongoing RI Addendum activities conducted by AECOM since September 19, 2011. On the 222, 252, and 254 Maspeth Avenue properties two test pits were excavated, seven soil borings were completed, five monitoring wells were installed, DNAPL bail down tests were performed at one former groundwater supply well and at three RI monitoring wells, and subsurface soil and groundwater samples were collected and analyzed during the RI Addendum. The results provided further delineation of the distribution of MGP-related compounds beneath the three site properties.
  - During September 2011, an IRM pre-design investigation (PDI) was conducted by AECOM. Twenty-one test-pits were advanced to delineate vadose zone soil impacts around RI investigation locations SB-4, SB-12, and TP-2, and along the footprint of the proposed perimeter wall of the 254 Maspeth Avenue property and within the 252 Maspeth

Avenue property. Soil samples were observed for the presence of MGP related compounds, and select samples were collected for laboratory analyses for waste characterization. A shallow soil removal IRM work plan was completed based on the results of the PDI. The shallow soil removal IRM was completed from September 18 to 26, 2012, with approximately 1,400 tons of soil removed from excavations on the 254 Maspeth Avenue property, and transported off-site for treatment by thermal-desorption.

- A PDI for this product recovery IRM Work Plan and a potential barrier wall work plan was completed by AECOM from August 13 to 31, 2012. Seven soil borings were advanced to 55 feet below ground surface (ft bgs) with continuous standard penetration tests, converted to semi-temporary product recovery wells, and soil samples were collected for geotechnical analyses.

3.2 Conceptual Site Model

3.2.1 Site Geology

A summary of investigation locations from AECOM site activities is provided as Figure 3-1. The figure also illustrates the location of a representative cross-section A-A′, which is presented as Figure 3-2. Fill at the site is a mixture of silt and fine to coarse sand with some gravel and includes a significant percentage of non-native materials (brick, wood, metal, coal, concrete, etc.) extending to the meadow mat. Beneath the fill, a layer of meadow mat (peat and clay) is encountered between 15 and 25 ft bgs, and acts to separate the underlying native soils from the overlying fill. The meadow mat likely represents the former ground surface prior to development (filling) in the Site area.

Underneath the meadow mat, the native soils tend to be sands with varying percentages of silts and clays (collectively referred to as fines).With depth, the percentages of fines tend to increase until a transition (at 42 to 52 ft bgs) to dense, hard clay with silt and sand stringers, hereafter the “Intermediate Clay.” This unit is not continuous across the Site, and was not observed to the southwest of the relief holder. Sand with some gravel is encountered beneath the Intermediate Clay (approximately 60 to 70 ft). Beneath the 252 and 254 Maspeth properties, and the northeast half of the 222 Maspeth Property, a second clay lens is observed between 75 and 82 ft bgs, hereafter the “Lower Clay.” This unit attenuates to the southwest and northeast. Beneath the Lower Clay is a unit of sands and silts.

The Gardiners Clay, a grey and very stiff silty clay, is encountered between 90 and 108 ft bgs, and is laterally continuous beneath the Site. At soil boring SB-20J on the 222 Maspeth Avenue Property, crystalline bedrock was encountered directly beneath the Gardiners Clay at a depth of 192 ft bgs.

3.2.2 Distribution of MGP Residuals

The data collected to date suggest that the former gas holder located on the 222 Maspeth Avenue property is a source of coal tar in the subsurface at the Site. Note that other structures, including a tar tank, tar wells and tar separator are present on the property, and their potential contribution to site impacts have not been fully determined at this stage of the investigation. The current data suggests that, over time, the static head of the contents of the holder may have caused coal tar to be released into the subsurface at a depth of approximately 30 ft bgs. Tar has migrated to the east and south in the interbedded sand and silt beds above the Intermediate Clay (encountered between 40 and 52 ft bgs (Figure 3-3).These MGP residuals are currently observed as a dense non-aqueous phase liquid (DNAPL) present in isolated sand lenses within the depth interval of approximately 25 to 52 ft. bgs throughout an approximately 48,200 square feet (ft^2) area beneath the 222, 252, and 254 Maspeth

Avenue properties. Although the migration of DNAPL has been largely controlled by the heterogeneity of the grain sizes in the finely interbedded sands and silts, the overall migration pathway is following the contours of the Intermediate Clay surface, which is dominated by a depression beneath the 252 property. An eastward dipping slope is present in the Intermediate Clay surface, on which tar has been observed to migrate. Elevations of the Intermediate Clay surface at the 300 Maspeth Avenue property east of the 254 Maspeth Avenue property are higher, limiting the extent of off-site migration of tar above the Intermediate Clay surface to the east. Additional DNAPL delineation is pending to the north and west along Maspeth Avenue.

Although the Intermediate Clay appears to be a competent confining unit, it attenuates beneath the former gas holder on the 222 Maspeth Avenue property. As a result, a lesser quantity of coal tar appears to have migrated vertically to the Lower Clay lens and the Gardiners Clay. NYSDEC has stated that the IRM product recovery efforts can be limited to MGP residuals located above, and collecting on the Intermediate Clay.

Measurable thicknesses of DNAPL have been observed at the following wells above the Intermediate Clay lens during the course of investigation activities, as follows:

- 252 Maspeth Avenue
  - MW-14B – Thickness of mixed fluids: approximately 6 ft.
  - PDI-8 – Thickness of mixed fluids: approximately 12 ft.
  - MW-15B – Thickness of mixed fluids: approximately 10 ft.
- 254 Maspeth Avenue
  - MW-3B – Thickness of mixed fluids: approximately 4 ft.

DNAPL recovery tests were performed at wells MW-3B, MW-14B, and MW-15B. The tests indicate that wells MW-3B and MW-15B have relatively high transmissivities ranging from 0.5 to 1.8 ft^2/day, and estimated recovery rates ranging from 1.1 to 10.1 gallons/day. While some recoverable DNAPL is present at these locations, it is unclear how consistent the production may be. Generally, MW-14B had a very low transmissivity (i.e., less than 0.03 ft^2/day) and represents very low potential for hydraulic recoverability (i.e., less than 0.02 gallons/day). Note that the recoverability of DNAPL in the vicinity of PDI-8 will be evaluated as part of the proposed IRM activities.

4.0 IRM Scope of Work

National Grid is proposing to conduct the IRM to ensure the control of the off-site migration of DNAPL while site-wide investigation and remedial design activities are completed. The proposed product recovery activities will be coordinated with the Cooper Tank re-development activities.

The scope of the product recovery IRM calls for the installation of product recovery wells at locations that are thought to have the potential to collect mobile product, and are compatible with Cooper Tank's construction and long-term operational activities. The following discussion provides details for the installation of product recovery wells, as well as activities associated with routine monitoring and the recovery of collected product.

4.1 Recovery Well Installation

The proposed scope of work calls for the installation of recovery wells in the following areas of the Site:

- **On-Site**–5 recovery wells (RW-1 through 5) will be installed at locations, within the 252 Maspeth Avenue property to reduce the quantity of potentially mobile product.
- **Site Perimeter** –18 recovery wells (RW-16 through 23) along the perimeter of the Site on the 222, 252 and 254 Maspeth Avenue properties in areas that have the potential to provide a preferential pathway for DNAPL to migrate from the Site.

An illustration of preliminary well locations is provided on Figure 4-1. The 254/300 Maspeth Avenue perimeter locations assume a general spacing of approximately 18 ft - on center, with the exception of the area along the driveway of 254 Maspeth where the presence of a subsurface structure has required spacing of approximately 30 feet between the three proposed recovery wells (RW-16, -17 and -18).

Implementation of the IRM will require significant planning and coordination with the owners and operator of the Site. Recent discussions with Cooper Tank staff indicate that clearing and excavation activities to support the installation of an above-ground wall around open areas of the 254 Maspeth Avenue property will begin in December 2012. Perimeter recovery well locations on the 254 Maspeth property will generally be installed immediately adjacent to the footer for the wall; only RW-16 and RW-18 will be installed within the footer. At these two locations, Cooper Tank (with direction from National Grid) will install a 12-inch form, e.g. thin wall PVC pipe, within the foot print of the wall foundation to facilitate subsequent installation of the recovery wells once the wall construction has been completed.

4.1.1 Mobilization and Site Preparation

Mobilization for the IRM will be conducted after Cooper Tank's completion of the perimeter wall, and will include the staging of the necessary equipment and personnel to: manage investigation derived waste; implement the Health and Safety Plan (HASP) and setup an on-site decontamination facility.

Site preparation activities will include utility clearance and installation of site and traffic controls. Prior to the start of drilling and conduit excavation activities, Dig Safely New York will be contacted, and companies with subsurface utilities present in the work area will be requested to mark-out their utilities in areas immediately adjacent to the Site. The IRM contractor will delineate and mark off work areas, including parking and equipment storage, to facilitate the effective flow of site traffic for themselves and Cooper Tank vehicles. Proposed well locations will be surveyed by geophysical methods to identify possible locations of subsurface structures not indicated on available drawings. All well locations will be pre-cleared to a depth of 5 ft. below ground surface.

4.1.2 Recovery Well Design

Given the uncertainty of long-term product recovery rates, current plans called for the installation of a common well design at all locations. All well risers will be constructed of 6-inch diameter schedule 40 PVC. Recovery well screens will be constructed of 6-inch diameter 0.020-inch slot wire wrap stainless steel. Five (5) and 10 foot lengths of screen will be used, as required, to address soil intervals where significant quantities of potentially mobile product (i.e., saturated thickness greater than 1-inch) are present. Centralizers will be installed at the top and bottom of each screen. The screen size has been selected based on the grain-size information obtained during the Pre-Design Investigation. The results and associated calculations to support the selection of the appropriate screen size are presented in Appendix A. Each well will be equipped with a 5-foot long, 6-inch diameter, stainless steel sump to collect DNAPL. A cement basket (or similar cone-shaped device) shall be attached to the casing at the screen-sump connection. An illustration of an in-place recovery well, as installed using the procedures detailed below, is provided in Figure 4-2.

A summary of the anticipated depths for well installation is provided in Table 4-1. The table also provides the anticipated screen interval for locations where data is currently available. The appropriate depth/screen intervals for the remaining locations will be determined in the field based on observations of soil characteristics and impacts. Note that field observations will also be used to verify the appropriate construction depths/screening intervals at locations where preliminary data is available, with modifications made as required.

4.1.3 Well Installation Procedures

The wells will be installed as follows:

- Soil borings will be advanced, and soil samples collected for observation.
- The bottom of the well screen will be set at the bottom of the observed NAPL saturated interval.
- The bottom of the well will not be screened through a low permeability interval (e.g., the Intermediate Clay) where NAPL could discharge from the well back into another permeable interval at a significant rate.
- In the event that multiple intervals of NAPL saturation are observed (separated by low permeability soils) they will be screened individually.

Note that the annulus of the bore hole for all locations will be at least four inches greater than the riser and screen diameter. A quantity of cement/bentonite grout that has been calculated to fill the annulus between the sump and the bore hole to the screen-sump connection will be placed in the bottom of the boring. The well casing assembly, consisting of the sump, cement basket, screen, and casing will be lowered into the borehole so that the cement/bentonite grout forms a seal with the bottom of the cement basket. A sand filter pack will then be placed around the well screen and the riser (to a minimum of two feet above the top of the well screen).

The annular space above the filter pack will be filled with a bentonite seal (3 to 4 feet thick).Note that additional bentonite seals will be used at locations with multiple screen intervals are installed. The annular space above the bentonite seal will be filled with a grout mixture utilizing a tremie pipe to fill the annulus from the grout seal to one foot below the top of casing (TOC). If necessary and settling of the grout mixture occurs, the annulus will be filled again with the grout mixture to 1 foot below TOC. Each recovery well will be completed in a 4-foot by 4-foot traffic rated well vault. The elevation of the top of the vaults will be set to be flush with the proposed final concrete ground surface for the facility. Installed wells will be surveyed for elevation and location using a licensed New York surveyor. A minimum of 24-hours post-installation, each well will be developed using surge and pump procedures to remove drilling fluids and fine grain material from the sump, well screen, and filter pack. Note that all locations will be equipped with the infrastructure (i.e., conduits for electrical service and tubing) for the subsequent automation of product recovery, if required. The proposed locations of the conduit runs are illustrated on Figure 4-3.

4.1.4 Waste Management

Investigation waste generated during the well installation will be collected in properly labeled USDOT approved storage containers (55-gallon drums) or a small bulk roll-off container and grouped by environmental matrix (soil, water, personal protective equipment (PPE)/plastic, construction debris). Note that to the extent possible, soil generated from the installation of conduit will be reused to backfill the associated trench excavations. Remaining soil from the excavations will be managed at an off-site permitted facility by an approved National Grid contractor.

The drums (or roll-off container) will be stored in a secure area on Site. In the event that activity schedules preclude the use of existing analytical profiles the investigation derived wastes will be characterized with laboratory analyses which may include: Toxicity Characteristic Leaching Procedure (TCLP), corrosivity, ignitability, reactivity, total petroleum hydrocarbons (TPH), and poly-chlorinated biphenyls (PCBs). Waste transportation and disposal of all contaminated wastes at an off-site permitted facility will be managed by an approved-National Grid contractor.

4.1.5 Site Restoration

All remnants of the well installation activities will be removed, leaving site conditions appropriate for the subsequent redevelopment of the property by Cooper Tank.

4.1.6 Environmental Controls

Environmental controls will ensure that the work activities do not spread impacted soil and MGP wastes outside the IRM work areas and maintain the protection of human health and the environment. Site control and safety procedures will be consistent with the procedures presented in the NYSDEC-approved work plan for the implementation of the shallow soil IRM (AECOM, 2011) and the Interim Site Management Plan (AECOM, 2012).

Odor, Vapor, and Dust Control

Odor, vapor, and dust control may 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 fugitive emissions.

<u>Air Monitoring</u>

Site perimeter and work zone air monitoring will be performed per New York State Department of Health (NYSDOH) and Occupational Safety and Health Administration (OSHA) requirements. The Community Air Monitoring Plan (CAMP) for the project is presented in Appendix B of this document. A site-specific HASP will be developed and implemented by the IRM contractor.

4.1.7 Decontamination

Decontamination of equipment will be routinely performed in order to prevent the potential cross-contamination between boreholes and/or the spread of contaminated material outside of the IRM work areas. Large-scale equipment will be pressure washed prior to leaving the Site. Decontamination water generated during cleaning of tools and equipment will be temporarily stored on-site for later off-site disposal at an approved facility.

4.2 Monitoring and Product Recovery

Subsequent monitoring and product collection activities will be conducted on an as-required basis to a negotiated endpoint or until a final remedy is selected/implemented for site closure through the DER-10 process. The approaches for monitoring site conditions, as well as recovering and managing the collected product are discussed below.

4.2.1 Monitoring

Initial gauging activities will be conducted approximately 30 days after well development to ensure the starting product thickness, product head, and potentiometric surface head are all representative of formation conditions. Initially, an aggressive monitoring schedule (e.g., weekly for a period up to one month) will be implemented to collect sufficient data to identify locations where significant quantities of product are likely to be present, and to estimate associated recharge rates. The results from the evaluation will be used to develop a schedule for subsequent monitoring, or in some instances, the performance of bail down testing in support of the refinement of the NAPL Conceptual Site Model. The protocols for conducting bail down testing are provided in Appendix C.

Immediately before NAPL recovery, the depth to water, total well depth, and depth to NAPL will be measured and recorded. NAPL and water depths will be measured to the nearest 0.01 ft below TOC using an interface probe; the thickness of NAPL will be measured with a graduated, stainless steel weighted tape. All readings will be evaluated for reasonableness/accuracy and re-measured, if necessary. For example, product coatings that only occur on one side of the tape, or are intermittent, may be an indication an inaccurate reading and will be re-measured. The volume of NAPL within each well will be calculated prior to removal using the design dimensions of the well and measured thickness of the product.

On a periodic basis the total depth of the well will be measured and compared against installed depth. In the event that the initial depth is lost due to debris or silt, a plan will be developed to restore the well.

4.2.2 Product Recovery

Although variations in recharge rates from well to well are expected, they will be addressed by increasing or decreasing the frequency of collection activities, as required, with the potential to automate recovery at individual wells to ensure that the capacities of the collection sumps are not exceeded. Note that the recovery wells located on the 222 Maspeth parcel will be automated after the initial gauging event due to the anticipated placement of Cooper Tank equipment and limited access for conducting subsequent manual monitoring and recovery activities. The following sections provide discussions of the proposed monitoring/ recovery activities for both manual and automated approaches.

4.2.2.1 Manual Recovery

The initial schedule for product collection will be developed based upon the results from the gauging activities. NAPL collection will be performed using a pump and dedicated tubing or bailers (e.g., stainless or poly as appropriate) as determined in the field based on observed NAPL characteristics and depth.

Mixed fluids will be recovered into 5 gallon pails until the calculated effective well volume is achieved and the fluid being removed appears to be clear (i.e., it appears that NAPL is no longer being removed).Any collected water will be decanted and its volume will be measured and recorded. The field team will transfer the contents from the temporary containers into temporary 55-gallon drums or the above ground accumulation tank (Section 4.2.2) to be located at the Site.

All tools and equipment that come into contact with NAPL material will be properly decontaminated prior to leaving each well. All solid and liquid waste generated from field activities will be managed by AECOM field staff. Solid waste, including PPE, rags, tubing, and plastic will be placed into 55-gallon drums, labeled, and stored on a spill palette, pending transport and disposal by an approved National Grid contractor. Storm water that collects within the spill palette will be managed with the investigation waste (Section 4.1.4) if it is observed to be impacted, e.g., contain impacted soil or sheen.

As discussed previously, additional bail down testing will be conducted on individual wells that collect significant quantities (e.g., 0.5 ft of measured thickness) of product to determine the potential for long-term recovery at those locations and support a recommendation for the use of an automated collection system. Proposed changes to the approach will be reviewed with NYSDEC prior to implementation.

4.2.2.2 Automated Recovery

The locations on the 222 Maspeth Avenue property and other locations exhibiting the potential for significant recharge rates (i.e., recharge rates that cannot be cost-effectively supported by manual recovery) will be equipped with in-well, air actuated plunger type pumps to recover product as it collects in the sump. The well pumps will be controlled with timers and a level sensor that assures the presence of liquids. The timer settings will be field adjusted based upon the observed recharge rates. Collected product from each automated well will be conveyed to the temporary containers/ accumulation tank using a dedicated length of tubing protected in subsurface runs of conduit.

4.2.3 Accumulation and Disposal of Collected Product

A small (< 500 gallon capacity) above ground tank will be installed in a secure location (i.e., protected from vehicle traffic) in the south west corner of the 254 Maspeth Avenue property for the temporary accumulation of collected product. The tank will have high liquid level detector to prevent over-filling and be equipped with secondary containment. The accumulation tank will be permitted and operated in accordance the applicable requirements of 6NYCRR and NYSDEC DER-4, “Management of Coal Tar Waste and Coal Tar Contaminated Soils and Sediment.”

The collected product will be transported and managed at an off-site disposal facility in accordance with NYSDEC Part 360 requirements. Representative samples of the contents of the tank will be collected and analyzed as required to support the disposal activities. Samples will be submitted for the following laboratory analysis:

- Volatile organic compounds (VOCs) using Environmental Protection Agency (EPA) Method 8260, semivolatile organic compounds (SVOCs) using EPA Method 8270, total organic carbon using EPA Method 9060. TCLP Volatile Organic Compounds (VOCs) by USEPA SW 1311/8260, TPH by USEPA 1664, Corrosivity by USEPA 9040, Ignitability by USEPA 1010, Reactive Cyanide by USEPA 9012 and Reactive Sulfide by USEPA 9034.

Additional analysis of the collected product may be conducted to better understand the physical characteristics of the material, including viscosity, density, interfacial, and surface tension analysis using the American Society for Testing and Materials (ASTM) Methods D445 and D1481.

5.0 Reporting

The IRM activities will be documented in the forms of a Completion Report summarizing the activities associated with the installation of the recovery wells, and quarterly Monitoring and Recovery Reports presenting the results from the on-going monitoring and product recovery activities. The proposed contents of the reports are outlined below.

5.1 Completion Report

The IRM Completion Report will include a discussion of the following:

- A discussion of the field activities related to well installation.
- A photographic record for the field activities.
- A description of changes made to the scope of work for the IRM.
- Well construction diagrams.
- A figure illustrating the surveyed locations of the wells.
- A description of the site restoration activities.
- Documentation of the proper management of IDW.

The IRM Completion Report will be certified by a professional engineer licensed in the State of New York.

5.2 Monitoring and Recovery Reports

The quarterly Monitoring and Recovery Reports will provide a summary of the monitoring events conducted during the period, including:

- A summary of observations from each well.
- Depths to water and product in each well.
- Observed product thickness in each well.
- Trends in observed product thickness in each well.
- Quantity of mixed fluids recovered from each well.
- Manifests for the off-site management of waste.
- Recommendations for the subsequent monitoring and recovery activities.

The quarterly Monitoring and Recovery Reports will be certified by a professional engineer licensed in the State of New York.

6.0 IRM Schedule and Project Responsibilities

6.1 Project Schedule

Recent discussions with Cooper Tank staff indicate that clearing and excavation activities to support the installation of an above-ground wall around open areas of the 254 Maspeth parcel will begin in November 2012.

During the period of November and December 2012, National Grid will coordinate the design of the well network with Cooper Tank. Field work will be initiated in mid-February 2012, with the objective of completing the installation of the recovery wells, as well as the conduit runs/ pull boxes to all locations prior to April 1, 2013 when the installation of concrete on ground surfaces of the 252 and 254 Maspeth Avenue properties is scheduled to begin. Manual monitoring and product collection activities will be initiated as wells are installed; the required frequency of subsequent monitoring will be determined by conditions in the field.

6.2 Project Responsibilities

The principal organizations involved in the design and implementation of the proposed IRM will be National Grid, the NYSDEC, the NYSDOH, AECOM, the IRM Contractor(s), the Site Owners and Facility Operators.

6.2.1 National Grid

National Grid is responsible to the NYSDEC for the remedial design, implementation, and evaluation of this IRM in accordance with the Order on Consent and Administrative Settlement. National Grid, through their consultant, AECOM, has the authority to monitor and control the quality of construction and related activities to ensure conformance with the engineering design plans and specifications. National Grid has the authority to select and dismiss the Contractor(s) used to assist them with fulfilling these responsibilities. National Grid also has the authority to select and accept or reject design plans, specifications, materials, and workmanship of the contractors and subcontractors.

6.2.2 NYSDEC and NYSDOH

The NYSDEC Division of Environmental Remediation and the NYSDOH will review National Grid's IRM Work Plan for substantial compliance with the agency's regulations. Substantial deviations from the requirements or approved work plans will be submitted to the NYSDEC and NYSDOH for approval. The NYSDEC and NYSDOH must approve the IRM as meeting the remedial goals.

6.2.3 AECOM

AECOM is the Construction Administrator (construction Manager and Engineer) responsible for the IRM design and implementation. AECOM will be the field engineer/supervisor during the work and will make recommendations to National Grid regarding field decisions during construction. AECOM will implement the CAMP, conduct the monitoring and product recovery activities and prepare/certify the IRM Completion Report and quarterly Monitoring and Recovery Reports for the project.

6.2.4 Remediation Contractors

The Remediation Contractors ("Contractors") referred to in this Work Plan will be selected by National Grid from qualified remediation contractors. The Contractor will be responsible for the performance of the work in accordance with this Work Plan and contract documents including specifications and design drawings. The Contractor shall be responsible for the Health and Safety of Contractor's employees, its Subcontractors, suppliers, agents, inspectors, visitors, the general public, and any others associated with or interacting with Contractor who provides labor, goods, or other services on the Project site. The Contractors will report directly to AECOM either as AECOM subcontractors or National Grid contractors. The Contractors will be given a copy of the Order on Consent and Administrative Settlement and will be required to comply with it as a condition of their contracts.

6.2.5 Property Owner/Facility Operator

The IRM will be coordinated with the Site Owner and the Facility Operator to minimize the effect of the IRM activities on facility operations. The Site Owners and the Facility Operator will provide access to National Grid and others, in accordance with an access agreement, so that the IRM can be implemented as provided in this Work Plan. The Site Owners and the Facility Operator have no responsibility for the remedial design, implementation, and evaluation of the IRM.

7.0 References

AECOM, 2011. Equity Former MGP Site 254 Maspeth Avenue Property Interim Remedial Measure Work Plan. December 16, 2011.

AECOM, 2012. Interim Site Management Plan, Equity Works Former Manufactured Gas Plant Site, Brooklyn, New York, NYSDEC Site No.: 224050, Order on Consent Index #: A2-0552-0606. November 28, 2012.

National Grid, 2012. National Grid Environmental Procedure 2-A, Aboveground Storage Tank Management, December 2012.

NYSDEC, 2002. Management of Coal Tar Waste and Coal Tar Contaminated Soils and Sediment (DER-4), January 11, 2002.

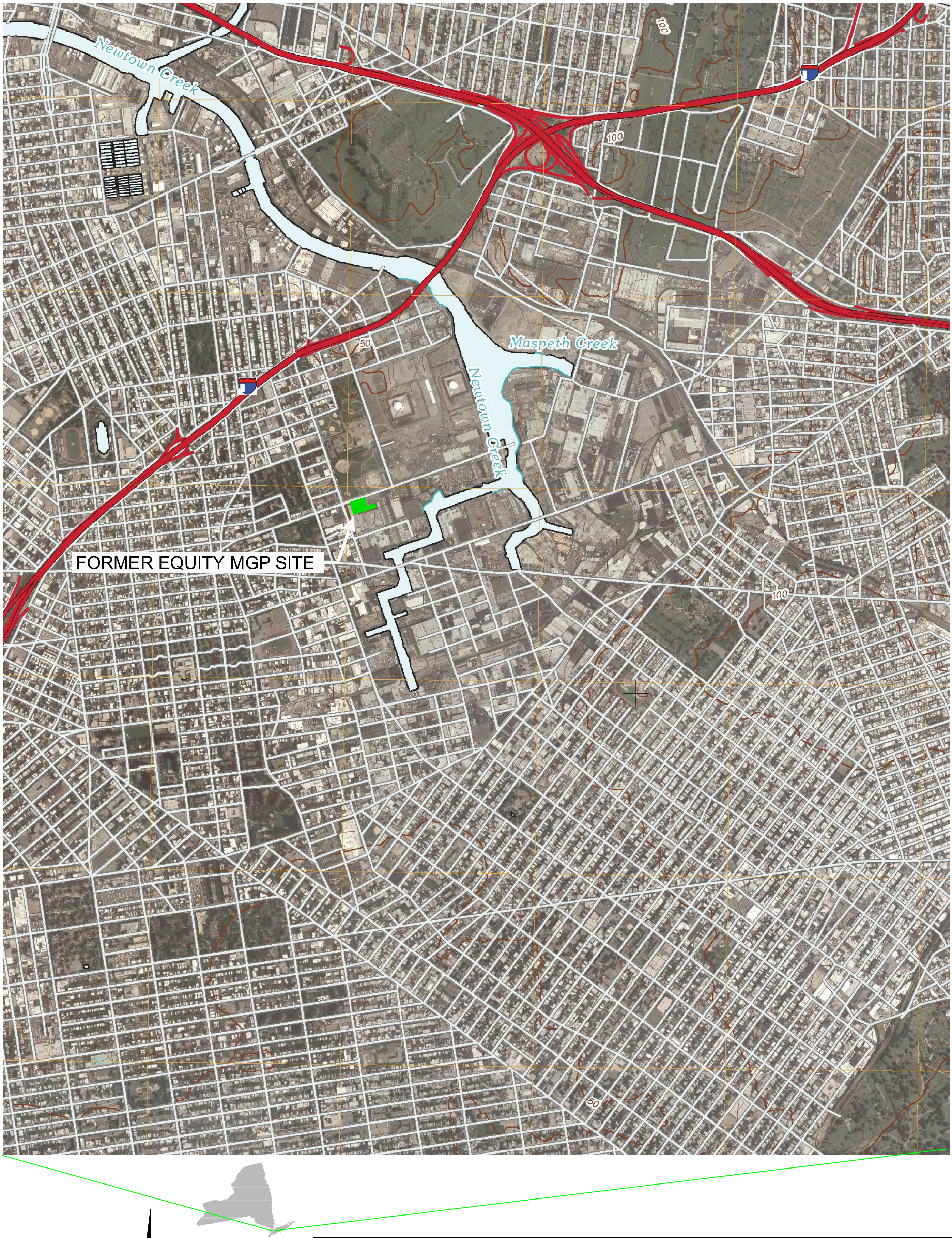
Tables

Table 4-1
Preliminary Recovery Well Installation Parameters

RecoveryWells	Depth of Boring (ft bgs)	Screened Intervals (ft bgs)		
On-Site Locations				
RW- 1	44			24 to 39
RW- 2	43			38 to 48
RW- 3	43			38 to 48
RW- 4	55	15 to 20	25 to 35	40 to 50
RW- 5	No Data			No Data
Perimeter Locations				
RW- 6	52		12 to 17	37 to 47
RW- 7	No Data			No Data
RW- 8	47			32 to 42
RW- 9	No Data			No Data
RW- 10	No Data			No Data
RW- 11	44		14 to 19	29 to 39
RW- 12	No Data			No Data
RW- 13	No Data			No Data
RW- 14	44		14 to 24	29 to 39
RW- 15	No Data			No Data
RW- 16	47			27 to 42
RW- 17	48			28 to 43
RW- 18	No Data			No Data
RW- 19	No Data			No Data
RW- 20	No Data			No Data
RW- 21	53			38 to 48
RW- 22	No Data			No Data
RW- 23	No Data			No Data

Note: All well risers will be constructed of 6-inch diameter scheule 40 PVC
Well screens will be constructed of 5 and 10 foot long 6-inch diameter 0.020- inch slot wire stainless steel casings
Wells will be equipped with of 5 foot long, 6-inch diameter stainless steel sumps
No Data - no available data, assume a single screened interval (10 ft.), and boring completion depth of 50 ft bgs)
Actual construction of all locations to be determined based on field observations.
ft bgs - feet below ground surface

Figures



AECOM

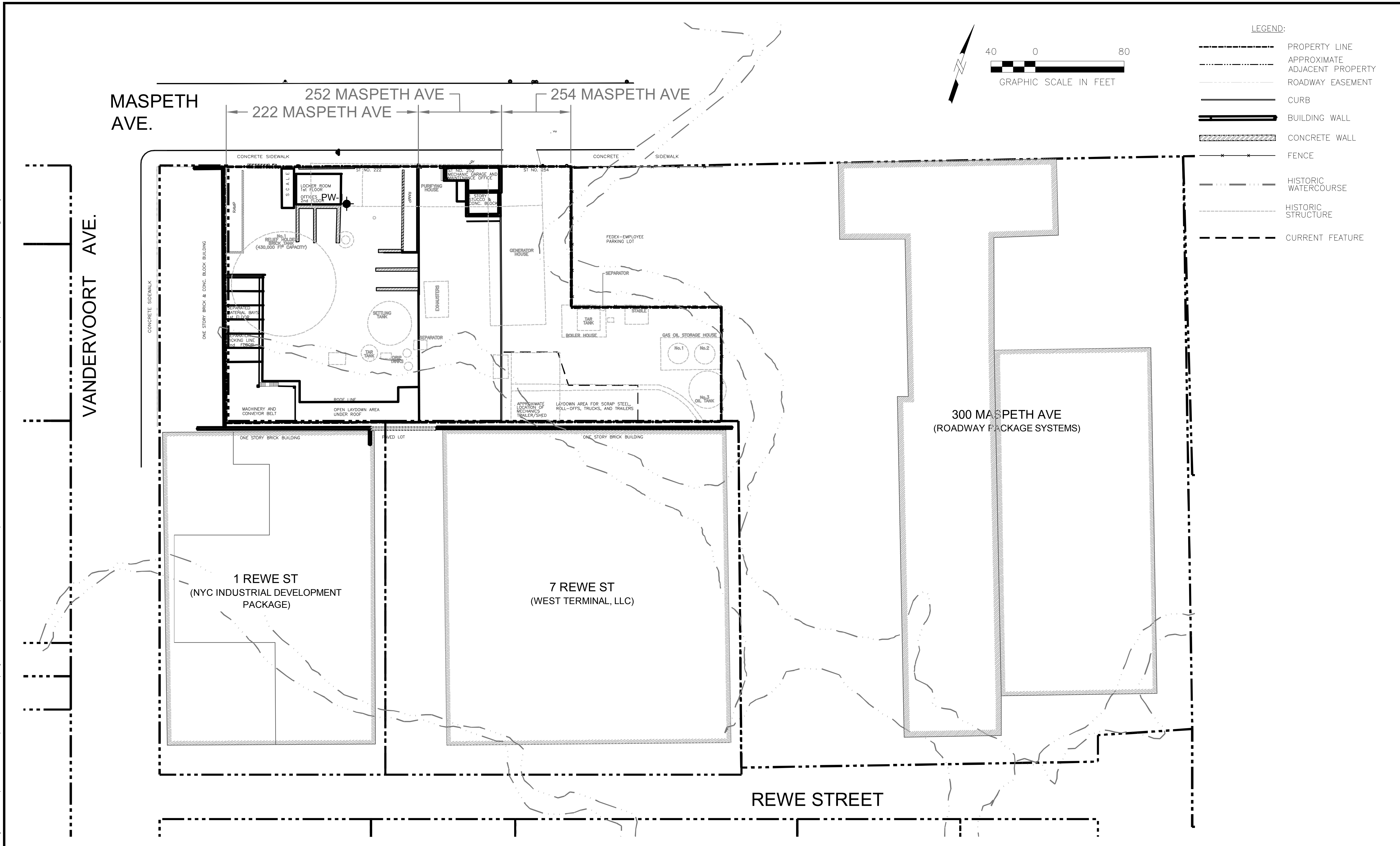
NATIONAL GRID
FORMER EQUITY WORKS MGP SITE,
BROOKLYN NY

DATE: 12/2012 DRWN: BcV/C-MA

SITE LOCATION

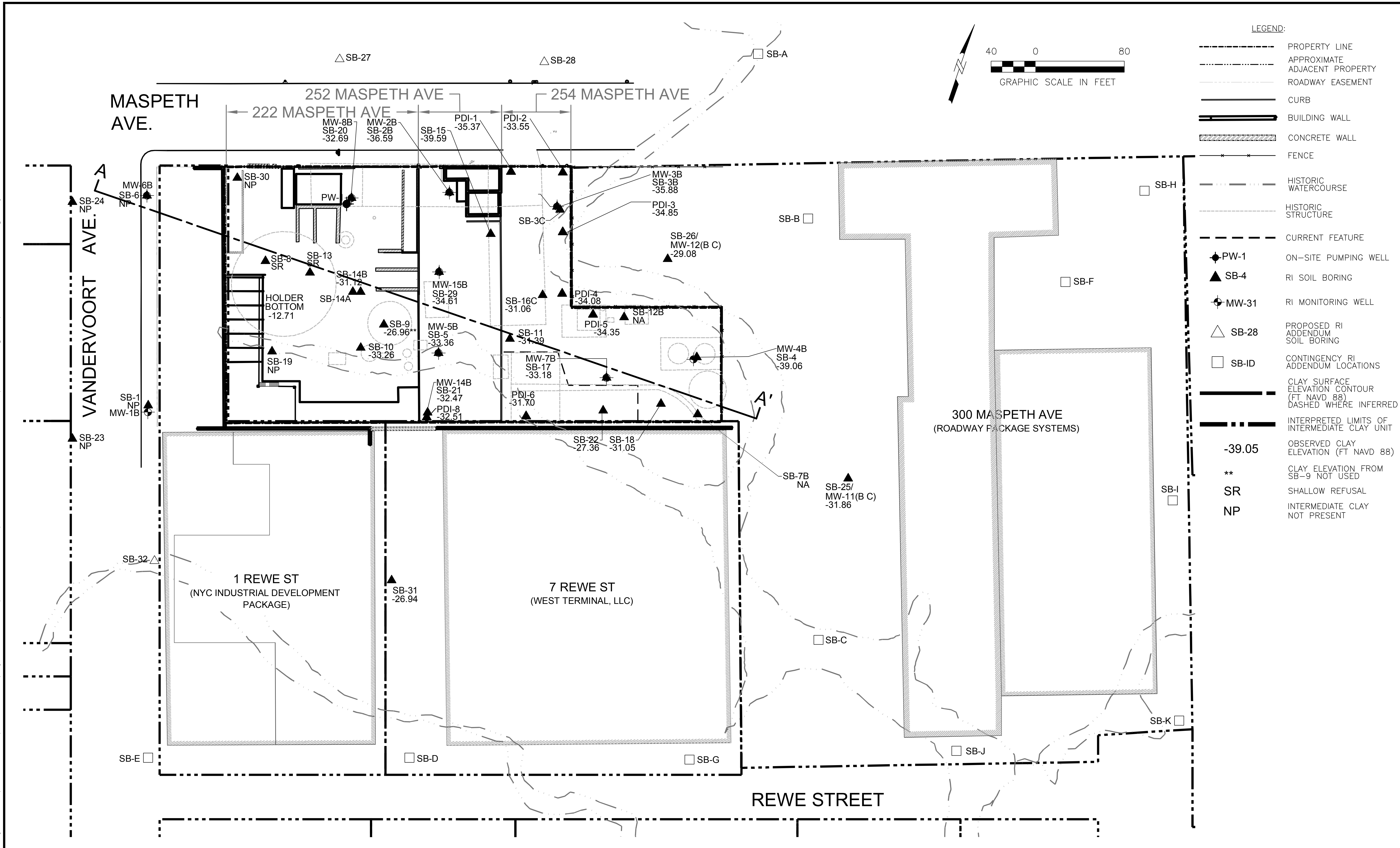
FIGURE 1-1

File: J:\Rem_Eng\Project Files\National Grid\1765-076 Equity Former MGP\7.2 CADD & GIS\2012-IRM_PRODUCT-RECOVERY\WorkPlan_figures\60137362-660-A1.dwg Layout: Site LocUSGSphoto User: vershonb Plotted



NATIONAL GRID FORMER EQUITY WORKS MGP SITE, BROOKLYN NY 60137362-400	SITE PROPERTIES
DATE: 12/2012 DRWN: BcV/C-MA	FIGURE 1-2

File: J:\Rem_Eng\Project Files\National Grid\1765-076 Equity Former MGP\7.2 CADD & GIS\2012-IRM_PRODUCT-RECOVERY\WorkPlan_figures\60137362-660-A1.dwg Layout: Site Limits User: vershonb Plotted: Dec 11



AECOM

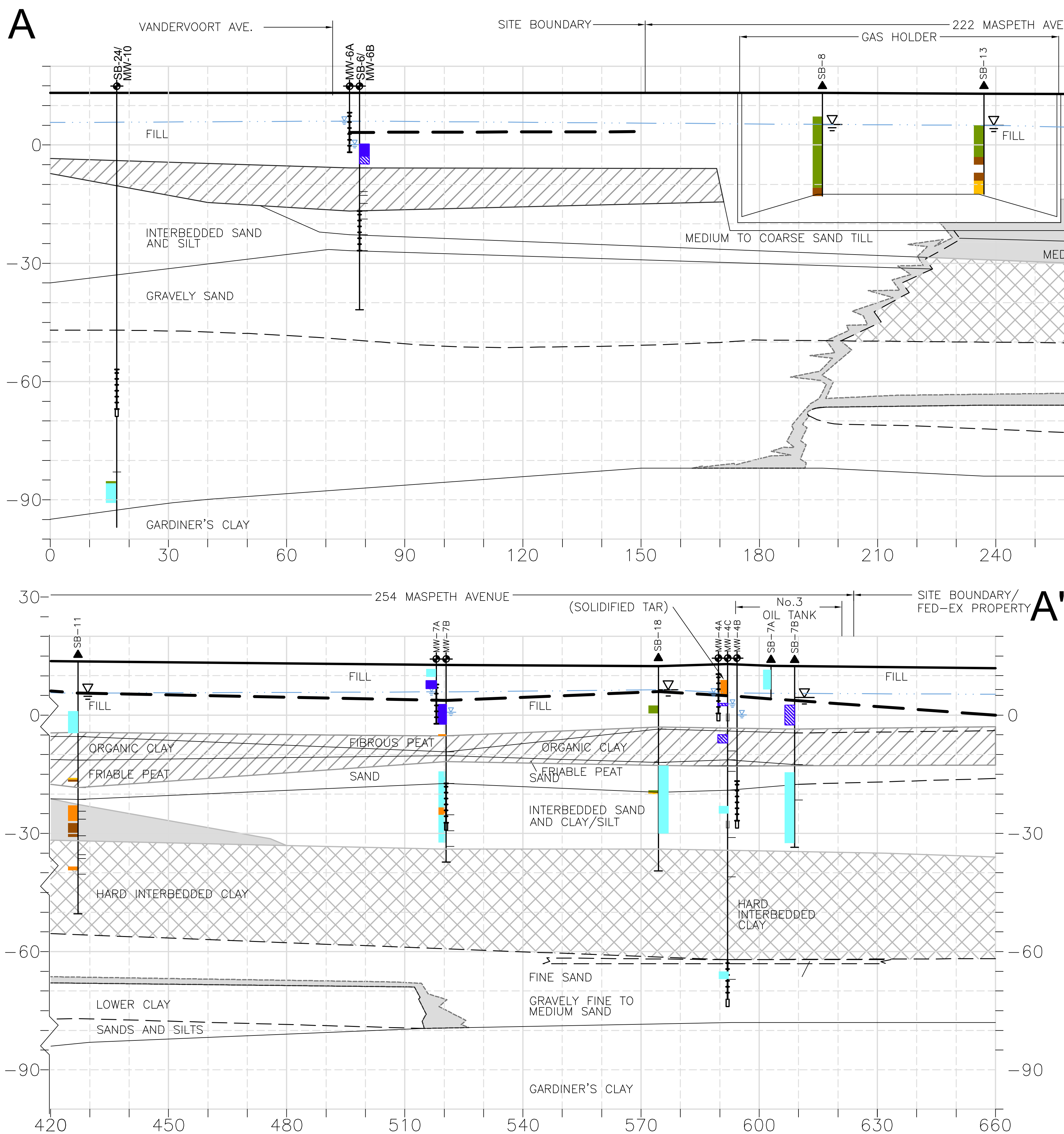
NATIONAL GRID
FORMER EQUITY WORKS MGP SITE, BROOKLYN NY

60137362-400

DATE: 12/2012 | DRWN: BcV/C-MA

INVESTIGATION LOCATIONS AND CROSS SECTION LOCATION PLAN

FIGURE 3-1



LEGEND:

- EXISTING GROUND SURFACE
- GROUNDWATER ELEVATION
- WATER TABLE SURFACE
- DIVIDE BETWEEN MODERN INDUSTRIAL FILL AND FILL WITH MGP RESIDUALS
- SCREENED INTERVAL
- SUMP INTERVAL
- SUBGRADE SOIL TYPE CONTACT
- SUBGRADE SOIL TYPE CONTACT INFERRED
- BORING/WELL TERMINUS
- MEADOW MAT (INTERBEDDED FIBROUS PEAT, ORGANIC AND MARINE CLAY AND FRIABLE PEAT – SEE LOGS FOR BORING SPECIFICS)
- HARD, PLASTIC, INTERBEDDED CLAY
- APPROXIMATE IMPACT INTERVAL FOR TAR SATURATED INTERVALS AND LENSES
- PATHWAY OF TAR IN TAR SATURATED INTERVALS AND LENSES. BASED ON A REAL EXTENT OF TAR SHOWN ON CLAY CONTOUR FIGURES 3 THROUGH 5.
- TAR SATURATED
- INTERBEDDED LENSES OF SATURATED TAR
- BLEBS, GLOBS, LENSES, COATINGS
- TAR SHEEN/STAINING
- TAR/NAPHTHALENE-LIKE ODORS
- PETROLEUM SHEEN/STAINING
- PETROLEUM ODORS
- MW-4A RI MONITORING WELL
- SB-4 RI SOIL BORING

NOTE:

Monitoring wells MW-6A, MW-5A, MW-7A, MW-4A, and MW-4B have been added to the cross-section adjacent to the deeper well pair/triplet for comparison. These locations were graphically adjusted for clarity and do not represent field locations.

MW-4C is offset by 35' from the cross-setion. Lithology from -30 to -74 feet has been projected onto the cross-section.

* Gardiner's Clay at SB-6B based on stratigraphy at SB-1C.

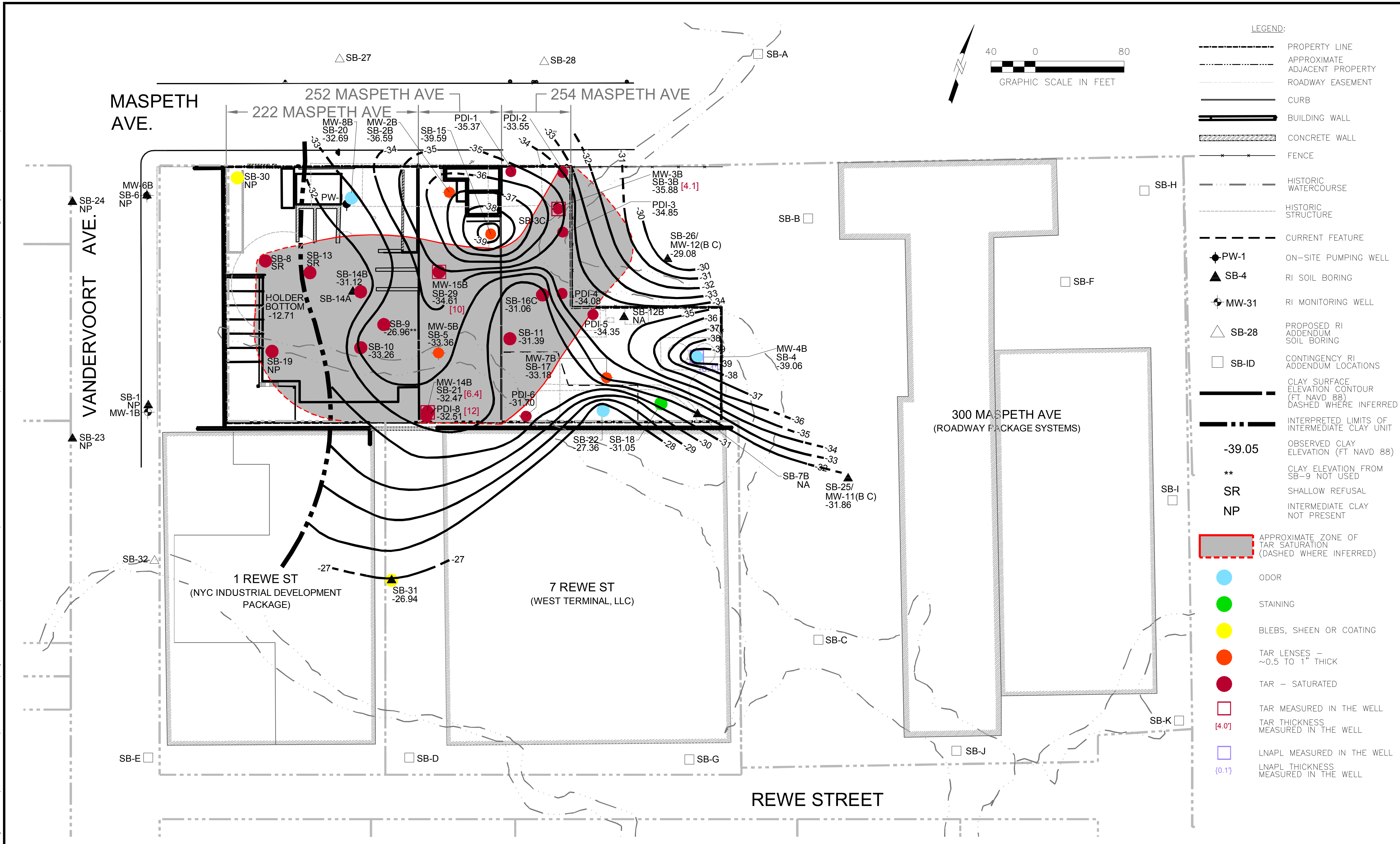
AECOM

NATIONAL GRID
FORMER EQUITY WORKS MGP SITE, BROOKLYN NY
60137362-400

DATE: 12/2012 | DRWN: BcV/C-MA

CROSS SECTION A-A'

FIGURE 3-2



File: J:\Rem_Eng\Project Files\National Grid\1765-076 Equity Former MGP\7.2 CADD & GIS\2012-IRM_PRODUCT-RECOVERY\WorkPlan_figures\60137362-660-A1.dwg Layout: INT-CLAY (B&W) User: vershonb Plotted: L

AECOM

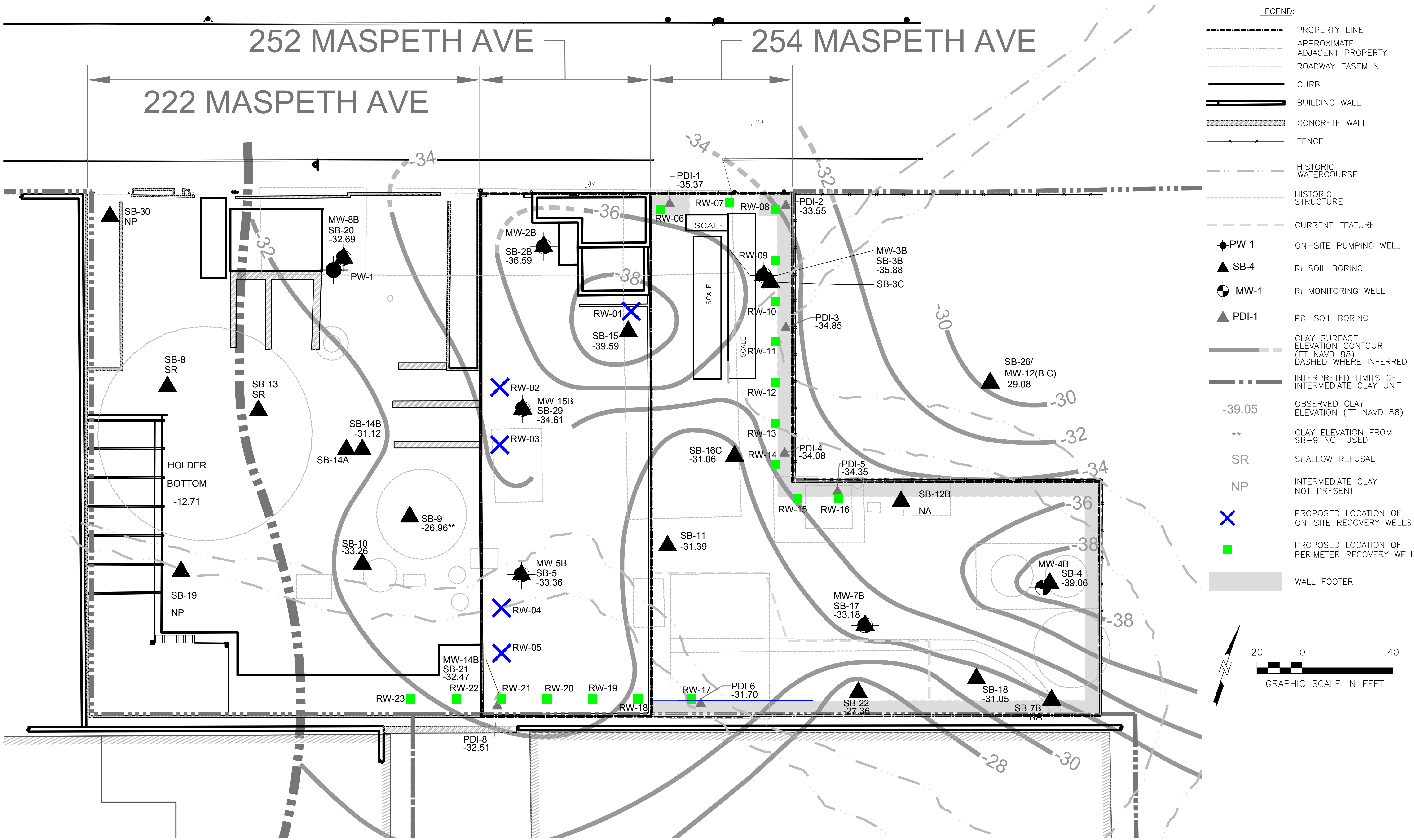
NATIONAL GRID
FORMER EQUITY WORKS MGP SITE, BROOKLYN NY

60137362-400

DATE: 12/2012 | DRWN: BcV/C-MA

SUMMARY OF VISIBLE IMPACTS ABOVE INTERMEDIATE CLAY SURFACE CONTOURS

FIGURE 3-3



NOTES:

1. Final locations of proposed recovery wells will be reviewed with COOPER TANK to address facility operations and structures.

AECOM

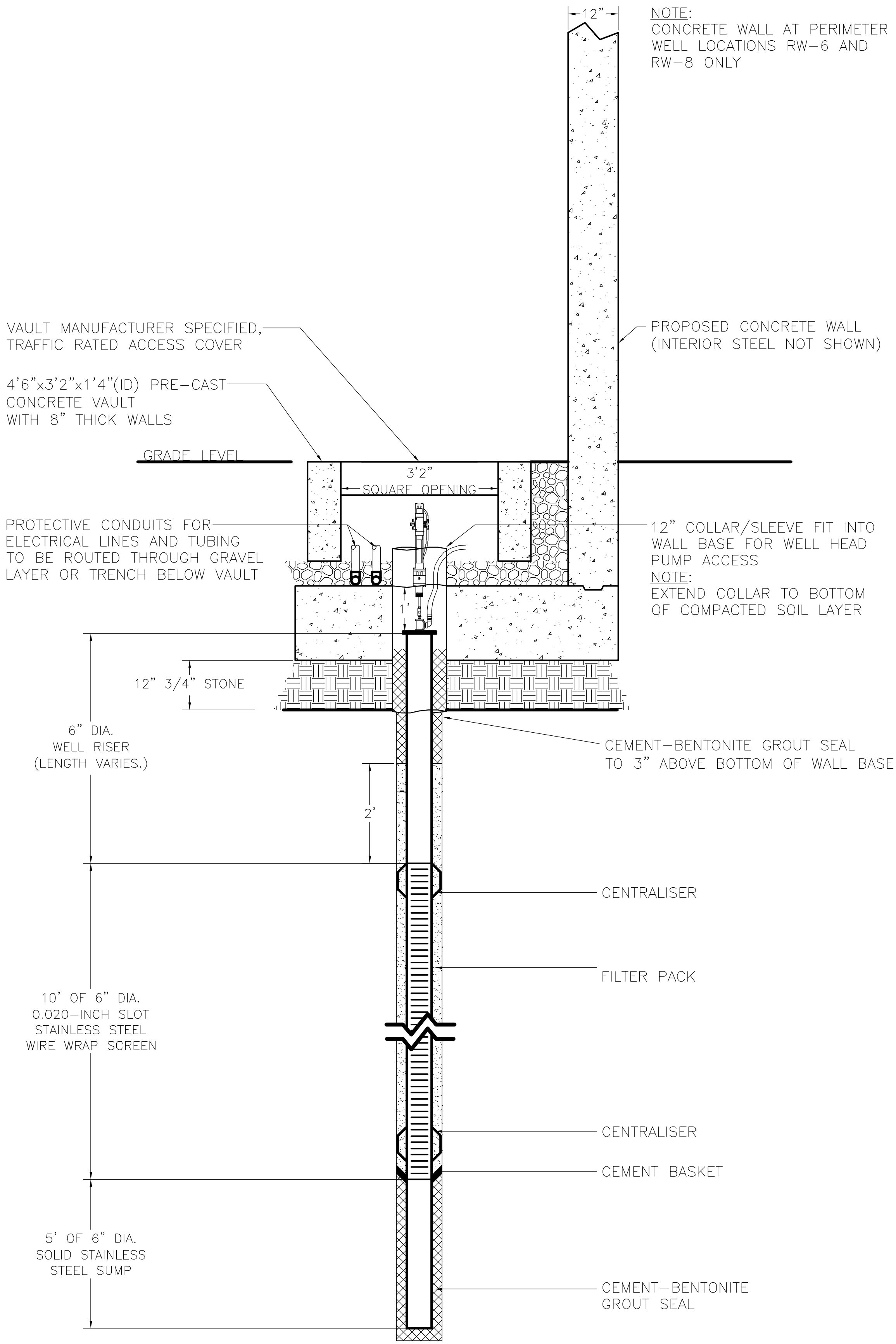
NATIONAL GRID
FORMER EQUITY WORKS MGP SITE, BROOKLYN NY

60137362-400

DATE: 12/11/12 | DRWN: BcV/C-MA

LOCATIONS OF ON-SITE AND PERIMETER RECOVERY WELLS

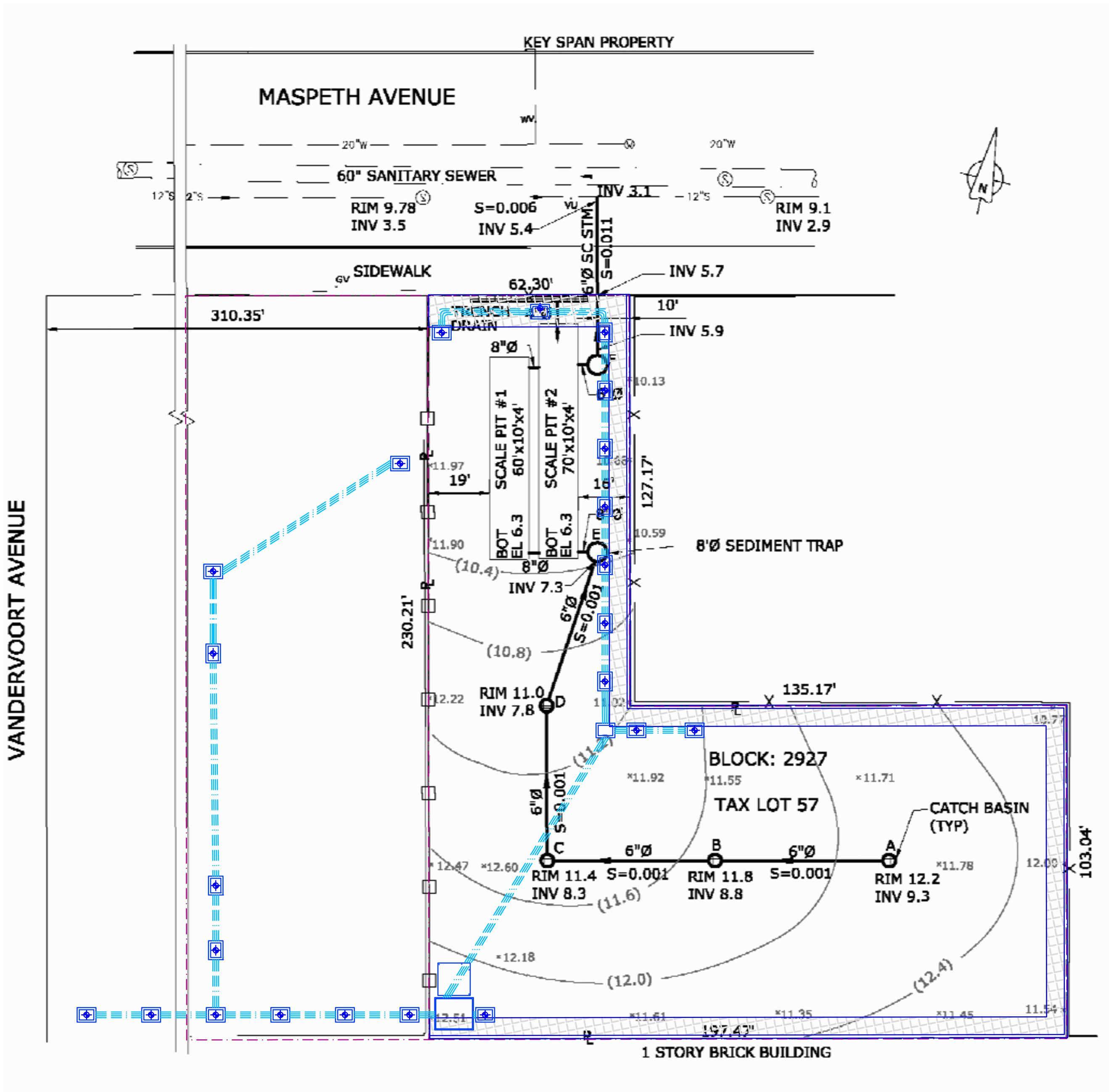
FIGURE 4-1



AECOM

NATIONAL GRID FORMER EQUITY WORKS MGP SITE, BROOKLYN NY	**RECOVERY WELL CONSTRUCTION**
DATE: 12/2012 | DRWN: BcV/C-MA	**FIGURE 4-2**

File: J:\Rem_Eng\Project Files\National Grid\1765-076 Equity Former MGP\7.2 CADD & GIS\2012-IRM_PRODUCT-RECOVERY\WorkPlan_figures\60137362-660_A4.dwg Layout: GF-scan_A User: vershonb Plotted: Dec



LEGEND

- PROPOSED LOCATION OF RECOVERY WELLS
- PROPOSED LOCATION OF ROAD RATED VAULT
- PROPOSED LOCATION OF ACCUMULATION/STORAGE SHED
- PROPOSED LOCATION OF CONDUIT PIPES AND TRENCHING
- EXTENT OF WALL FOOTER

25 0 50
GRAPHIC SCALE IN FEET

AECOM

NATIONAL GRID
FORMER EQUITY WORKS MGP SITE,
BROOKLYN NY
60137362.660

DATE: 12/2012 DRWN: BcV/C-MA

LOCATIONS OF PRODUCT RECOVERY INFRASTRUCTURE

FIGURE 4-3

Appendix A

Determination of Appropriate Slot Size for Recovery Well Screens

Appendix A

Determination of Appropriate Slot Screen Size for Recovery Well Screens

Table A-1 provides a summary of the grain size distribution results from the Pre-Design Investigation (PDI) geotechnical borings advanced at the proposed recovery well locations. As illustrated, the majority of intervals contain silty gravel and sand, with fewer intervals of silty sand, silty soil and stone fragments. The d50 results presented in the table represent the median grain size, defined as the grain diameter for which half the sample by weight is smaller and half is larger.

The d50 values have been used to define the requirements for filter pack and screen slot sizes for the recovery wells. Based on recommendations by Walker (1975), Barcelona et al. (1985), Driscoll (1986), and the EPA, the most conservative (i.e., largest recommended filter pack) should be no more than 6 times the d50 of any grain size distribution over the screened interval. This calculation was performed, with the results then used to select an appropriate standard filter pack size, as well as an associated standard slot screen size for each location. Note that the slot size was required to be on the order of 0.01 in. smaller than the standard filter pack size for each location. A summary of the results from these calculations is provided in Table A-2. As illustrated, the appropriate slot sizes for the majority of locations were determined to be either 0.01 in. or 0.03 in. As a result, a slot size of 0.02 in. will be proposed for site-wide use to minimizing siltation of the wells while maximizing their connectedness to the surrounding formation.

Table A-1 Summary of Grain Size Results

Sample ID	Sample Depth	Screening Interval	Grain Size Distribution					
			d85 (mm)	d60 (mm)	d50 (mm)	d30 (mm)	d15 (mm)	d10 (mm)
PDI-3	29-31 ft bgs	Silty Gravel and Sand	1.7202	0.5793	0.4015	0.1843	0.0846	0.0406
PDI-1	33-35 ft bgs	Silty Gravel and Sand	0.7199	0.2732	0.2053	0.1025	NA	NA
PDI-2	39-41 ft bgs	Silty Sand	0.2181	0.1213	0.0923	NA	NA	NA
PDI-5	39-41 ft bgs	Silty Soils	0.286	0.1394	0.1066	NA	NA	NA
PDI-4	33-35 ft bgs	Silty Gravel and Sand	0.5314	0.2592	0.2146	0.1490	0.0803	0.0654
PDI-6	39-41 ft bgs	Silty Gravel and Sand	0.4192	0.2313	0.2006	0.1509	0.0832	0.0680
PDI-8	35-37 ft bgs	Stone Fragements, Gravel and Sand	1.1422	0.0612	0.5177	0.3550	0.2557	0.1929
PDI-8	29-31 ft bgs	Silty Gravel and Sand	0.6156	0.2404	0.1844	0.1093	0.0700	0.0336

Notes:

NA- not analyzed

Table A-2 Appropriate Filter Pack and Screen Slot Size

Sample ID	Sample Depth	Screening Interval	Grain Size d50		Maximum Recommended Filter Pack Size	Standard Filter Pack		Standard Screen Slot Size
			(mm)	(in)	(in)[1]	Size (in)[2]	No.	(in)[2]
PDI-3	29-31 ft bgs	Silty Gravel and Sand	0.4015	0.0158	0.0948	0.081	2	0.07
PDI-1	33-35 ft bgs	Silty Gravel and Sand	0.2053	0.0081	0.0485	0.043	1	0.03
PDI-2	39-41 ft bgs	Silty Sand	0.0923	0.0036	0.0218	0.018	00	0.01
PDI-5	39-41 ft bgs	Silty Soils	0.1066	0.0042	0.0252	0.024	00n	0.01
PDI-4	33-35 ft bgs	Silty Gravel and Sand	0.2146	0.0084	0.0507	0.043	1	0.03
PDI-6	39-41 ft bgs	Silty Gravel and Sand	0.2006	0.0079	0.0474	0.043	1	0.03
PDI-8	35-37 ft bgs	Stone Fragements, Gravel and Sand	0.5177	0.0204	0.1223	0.099	3	0.09
PDI-8	29-31 ft bgs	Silty Gravel and Sand	0.1844	0.0073	0.0436	0.043	1	0.03

Notes:

1 - Calculated by multiplying 6 times the minimum d50 in the screening interval

2 - Standard Screen Size approximately 0.01 in. smaller than proposed standarad filter pack size

Appendix B

Community Air Monitoring Plan

AECOM Environment

Prepared for:
National Grid
Brooklyn, NY

Prepared by:
AECOM
Manhattan, NY
60137362
December 2012

Community Air Monitoring Plan

Equity Former MGP Site
Brooklyn, New York
NYSDEC Site No.: 224050
Order on Consent Index #: A2-0552-0606

AECOM Environment

Prepared for:
National Grid
Brooklyn, NY

Prepared by:
AECOM
Manhattan, NY
60137362
December 2012

Community Air Monitoring Plan

Equity Former MGP Site
Brooklyn, New York
NYSDEC Site No.: 224050
Order on Consent Index #: A2-0552-0606

Prepared by Mark McCabe, Program Manager

Reviewed by Peter S. Cox, Project Manager

Contents

List of Appendices

List of Tables

List of Figures

1.0 Introduction

This document provides the Community Air Monitoring Plan (CAMP) that will be implemented during the Interim Remedial Measure (IRM) for product recovery at the Equity former manufactured gas plant (MGP) site (the Site) located at in Brooklyn, New York. The Site is the former location of a former MGP that was operated by a predecessor company to National Grid USA (National Grid). This CAMP has been prepared by AECOM Environment (AECOM) on behalf of National Grid to present the methods and procedures that will be used to evaluate air quality in the immediate vicinity of the site during IRM activities.

The Equity former MGP site is located at 222 – 254 Maspeth Avenue, Brooklyn, Kings County, New York 11211, northwest of the English Kills, between Grand Street and the Brooklyn Queens Expressway (Highway 278). The site is comprised of the following three parcels of land.

Table 1-1 Site Parcel Details and Status

Block/Lot Number	Owner's Name	Property Address	Status
Block 2927 Lot 44	222 Maspeth Avenue Inc.	222 Maspeth Avenue Brooklyn, NY 11215	Lot used as an active waste recycling/ waste transfer station. Currently one enclosed building housing offices and one open building (no walls, with roof) housing waste recycling operations are present on the lot. The lot is operated by Cooper Tank Recycling Co.
Block 2927 Lot 54	Giovanna Bordone	252 Maspeth Avenue Brooklyn, NY 11215	Currently one building is located on the lot (approximately 2,500 square feet). Used as a maintenance center for equipment. Currently leased by Cooper Tank Recycling Co.
Block 2927 Lot 57	254 Maspeth Ave, LLC.	254 Maspeth Avenue Brooklyn, NY 11215	Currently vacant land used for occasional storage of empty roll-offs and vehicle parking for Cooper Tank personnel working a 222 Maspeth Avenue.

The IRM activities are described in " Interim Remedial Measure Work Plan for Product Recovery, Equity Former MGP Site, Brooklyn, New York, NYSDEC Site No.: 224050 dated December, 2012. IRM activities will involve the installation of product recovery wells and associated infrastructure.

The objectives of this CAMP are to:

- Provide data on a real-time basis so that potential emission sources can be identified and controlled in a timely manner to be protective of off-site receptors
- Collect appropriate data to document compliance with the Action Levels determined by the New York State Department of Health (NYSDOH) to be protective of off-site receptors.

The community air monitoring program will be performed at upwind and downwind locations around the perimeter of the site, and will measure the concentrations of the indicator parameters required by NYSDOH during all ground-intrusive activities.. A copy of the NYSDOH generic CAMP is provided as Appendix A.

2.0 Constituents of Concern and Action Levels

2.1 Constituents of Concern

The former MGP site is known to have subsurface impacts dating from the site's historical use. The primary constituents of concern (COCs) include benzene, ethylbenzene, toluene, and xylene (BTEX compounds) and naphthalene. Their potential contribution to fugitive emissions from IRM activities will be addressed through the monitoring of total volatile organic compound (TVOC) levels.

MGP residuals also contain higher molecular weight polynuclear aromatic hydrocarbons (PAHs) that are significantly less volatile than the COCs discussed above, and have generally been adsorbed onto soil particles. The potential contribution of these constituents to fugitive emissions will be addressed through the monitoring of respirable particulate matter (RPM_{10}) levels.

Odors, though not necessarily indicative of high constituent concentrations, could create a nuisance, and will be monitored and controlled to the extent practicable.

2.2 Action Levels

NYSDOH has established Action Levels for the principal monitoring parameters, i.e. TVOC and RPM_{10}, to identify conditions when the use of additional control measures may be warranted. An Action Limit is the parameter concentration that, when exceeded, requires a work stoppage and corrective action prior to continuing remedial activities at the site. Note that the program has incorporated an additional Action Level for benzene since it is a specific indicator parameter for MGP residuals that can be effectively monitored on a real-time basis.

The program will also use an Alert Level (75% of the Action Level) for the parameters discussed above to facilitate the effective management of site conditions. The Alert Limit is the parameter concentration that, when exceeded, triggers the use of response actions such as the use of water spray or odor suppressant foam, without a work stoppage. The Alert/Action Levels for the program are summarized in Table 2-1.

Table 2-1 Action and Alert levels for the Equity IRM Program

Parameter	Alert Limit	Action Limit
TVOC – ppmv	3.7	5.0
Benzene	0.8	1
RPM_{10} - µg/m^3	100	150

Note: Limits are the detected concentrations minus background.

2.3 Site Conditions and Responses

The use of Alert and Action Levels as site management tools provides for the following definitions of site conditions:

- **Operational Level**: Concentrations of all parameters (minus background) are less than the Alert Limit.
- **Alert Level:** Concentration of at least one parameter (minus background) is greater than Alert Limit, but do not exceed the Action Limit.
- **Action Level**:
  - TVOCs: Concentration is greater than the Action Limit, but does not exceed 25 parts per million by volume (ppmv).
  - Benzene: Concentration is greater than the Action Limit.
  - RPM_{10}: Concentration is greater than the Action Limit.
- **Shut Down**: IRM activities must cease if the TVOC level exceeds 25 ppmv.

The site conditions levels are summarized in Table 2-2, with a summary of the associated monitoring requirements/activities provided in Figure 2-1

Table 2-2 Parameter Concentrations and Associated Site Condition Levels

Parameter	Operational Level	Alert Level	Action Level	Shut Down
TVOC – ppmv	$[C] \leq 3.7$	$3.7 < [C_{avg}] \leq 5.0$	$5.0 < [C_{avg}] \leq 25$	$[C_{avg}] > 25$
Benzene- ppmv	$[C] \leq 0.8$	$0.8 < [C_{avg}] \leq 1.0$	$[C_{avg}] > 1$	
RPM_{10} - µg/m^3	$[C] \leq 100$	$100 < [C_{avg}] \leq 150$	$[C_{avg}] > 150$	

Note: Limits are the detected concentrations minus background.

2.3.1 Alert Level Condition

In the event that the 15-minute average parameter concentration at the downwind location is greater than the Alert Limit, the contractor will be notified of elevated results and a possible Alert Level site condition. The result will then be compared to the corresponding upwind value to determine if the Alert Level condition is due to IRM activities. If so, the Alert Level condition will be verified and remain in effect as long as the 15-minute average parameter concentration (above background) is greater than the Alert Level but does not exceed the Action Limit.

Under an Alert Level condition, intrusive site work may continue but response actions must be implemented to reduce the elevated parameter concentrations. Example response actions are presented in Section 4. Note that the use of appropriate response actions will also be required upon detection of odors or visible dust at the site perimeter.

A meeting of appropriate site staff, e.g., Construction Manager and Contractors, as well as National Grid and NYSDEC, if present will be held within 30 minutes of the Alert Level site condition if the elevated results are not mitigated by the initial response actions.

2.3.2 Action Level Condition

An Action Level condition will go into effect if the average 15-minute parameter concentration at the downwind location exceeds the Action Limit. The result will then be compared to the corresponding upwind value to determine if the Action Level condition is due to IRM activities. If so, the Action Level condition will be verified and remain in effect as long as the 15-minute average parameter concentration (above background) is greater than the Action Level. At this time, the Contractor and National Grid will be notified of an Action Level condition.

Under an Action Level condition, the activities that created the exceedance will be temporarily stopped and one or more response actions (Section 4)) will be implemented. A meeting attended by appropriate site staff will be held within 30 minutes of the Action Level notification to review the effectiveness of the initial response and determine if additional actions are required. Work activities may resume provided that the parameter concentrations return to levels that are less than the Action Limit at following locations:

- TVOCs: TVOC levels 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less – but in no case less than 20 feet
- Dust: the downwind perimeter location

2.3.3 Shutdown Level

For TVOCs, if the concentration is above 25 ppm at the perimeter of the work area, activities must be shutdown until the source of the emissions is identified and controlled.

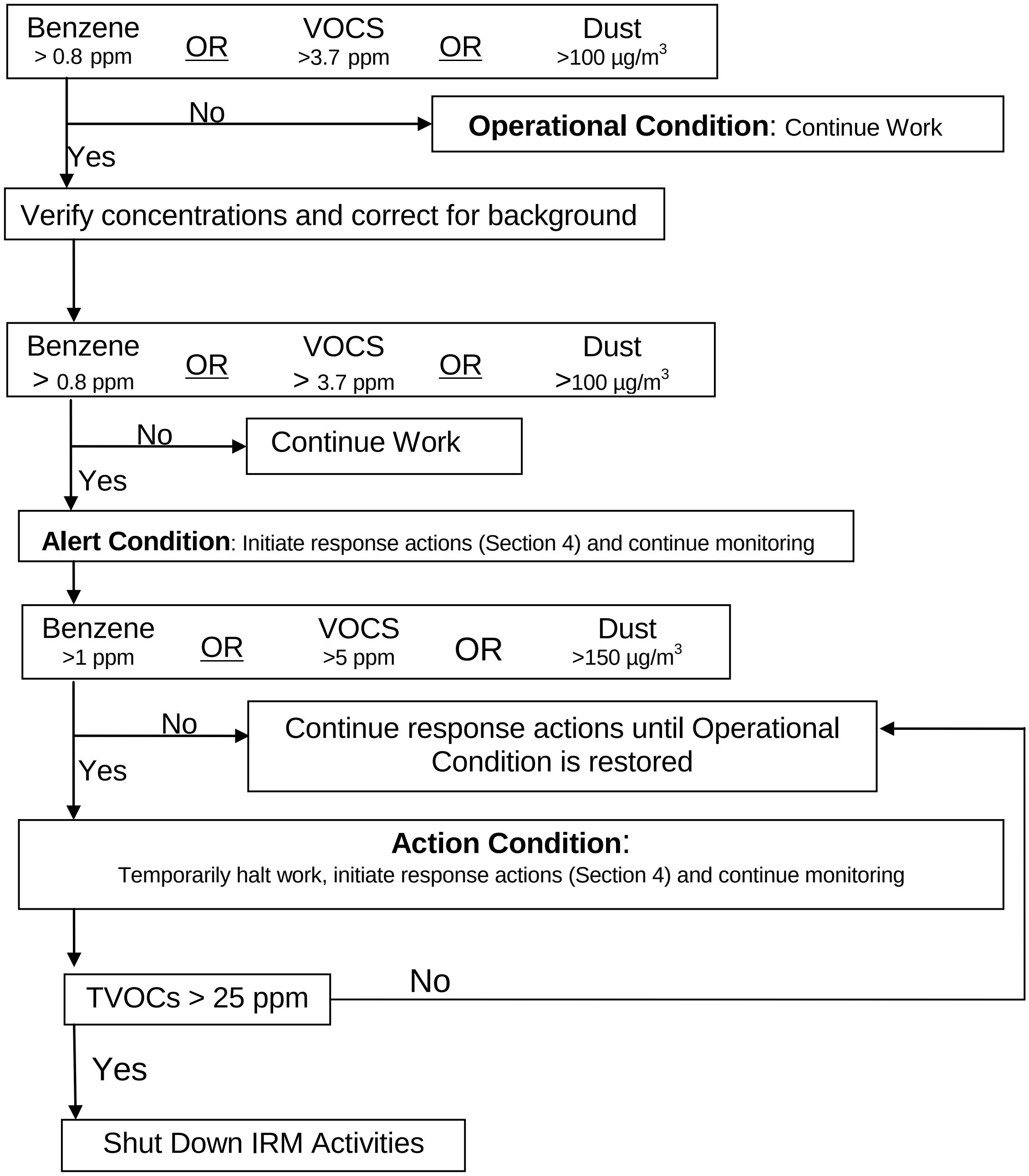


Figure 2-1 Site Conditions and Responses

3.0 Air Monitoring Equipment and Methods

The NYSDOH Generic CAMP requires that real-time monitoring be conducted during ground intrusive activities at sites managed under DER-10 guidance. The following discussion provides a detailed description of the air monitoring and reporting procedures that will be used during IRM activities at the site.

3.1 Real-Time Monitoring

Real-time air monitoring for TVOCs and RPM_{10} will be conducted continuously during periods of intrusive activity at upwind and downwind locations along the perimeter of the site. Upwind TVOC concentrations will be measured at the start of each workday and periodically thereafter to establish background conditions. The locations of the instruments may be changed during the day to adapt to changing wind directions.

Portable (battery operated) monitoring stations will be used to collect the real-time data and will include the following components: station case and tripod; total organic vapor analyzer; particulate monitor and data logger. The monitoring data will be converted to 15-minute averages, and will be stored in data-loggers at each location. The averaged values will be compared to the Alert/Action Levels. The units will be equipped with an audible alarm to indicate exceedances of these levels. A portable meteorological station to record wind direction will be installed to accurately locate the up and downwind monitoring points.

3.1.1 Total VOC Monitoring

Ambient concentrations of volatile organic constituents will be measured using a PPB RAE, or equivalent, photoionization detector (PID). PIDs use an ultraviolet (UV) light of appropriate “strength” to ionize the COCs for the site. The associated response will be proportional to the constituent concentration, and will be reported as T VOCs in ppmv.

Instrument calibration procedures will be conducted according to the manufacturer’s recommendations. The PID will be zeroed using a sample of ambient air drawn through a canister filled with activated charcoal. The calibration of each PID analyzer will be accomplished using an isobutylene calibration gas of known concentration. The data output will be observed and the response recorded in the field data sheet. Note that moisture, in the form of high humidity can affect instrument sensitivity. If the UV lamp cannot be cleaned, it will be replaced.

Calibrations will be performed at the start of each test day and more frequently as needed. If a unit fails to respond properly to the calibration check procedures, the response will be adjusted to the correct value. If the field technician determines that the instrument has a problem that cannot be resolved by adjustment, the unit will be repaired or replaced.

3.1.1.1 Benzene Monitoring

Additional monitoring for benzene will be conducted in instances when an exceedance of the TVOC Alert Level has been verified. Constituent-specific results will be obtained using a Draeger Chip

Measurement System (CSM). Samples will be collected periodically during the Alert/Action conditions to document air quality at the downwind perimeter of the site, and reported as ppmv.

3.1.2 Particulate Monitoring

A MIE PDR-1200/Dustrak dust monitor, or equivalent, will be used to monitor respirable particulate (PM_{10}) levels.

Instrument calibration will be conducted according to the manufacturer's recommendations. At a minimum, each particulate monitor will be field checked daily using zero calibration air. At the beginning of each workday, when site investigation takes place, a calibration check will be performed on each unit at the measurement location. A zero (or particulate-free) test sample, using the appropriate particulate filter supplied by the manufacturer for this purpose, will be placed over the sample inlet. The data output for the monitor will be observed and the response recorded in the field data sheet. Additionally, a weekly upscale or smoke test of each particulate sensor shall be performed and the results recorded in the field data sheet. If the field technician determines that the instrument has a problem, the unit will be repaired or replaced.

Particulate monitoring is based on the measurement principle of near forward light scattering and may be effected by elevated levels of humidity or pollen which may be "counted" as particulate and provide an erroneously high value. During these types of situations the field technician will document atmospheric conditions, e.g. rain, high humidity or elevated pollen or mold spore count as reported by the local weather service.

3.1.3 Odor Monitoring

The disturbance of soil containing MGP residuals can produce odors similar to mothballs, roofing tar, or asphalt driveway sealer. However, the constituent concentrations associated with these odors are typically significantly less than levels that might pose a potential health risk. When odors attributable to the disturbance of impacted media are generated in the work area, observations will also be made at the down-wind limit of the former MGP site in order to assess the potential for off-site issues.

4.0 Emission Control Plan

Several general site management practices will be routinely implemented as primary measures to minimize potential fugitive emissions from IRM activities. They will include efforts to minimize the amount of time that impacted material is exposed to ambient air, and expedite the management of investigation derived waste loading of excavated soil and debris.

However, appropriate secondary measures will be enacted in instances where Alert/Action Level conditions exist or significant MGP odors/visible dust are observed at the perimeter of the site. Secondary controls may include the following:

- The use of temporary tarps or polyethylene covers for stockpiled soil.
- The use of odor suppressant foam to mitigate VOC emissions or odors. The foam or other agents, such BioSolve™ or hydro-mulch, may be used where tarps cannot be effectively deployed over the source material, or where tarps are ineffective for controlling emissions.

The final selection of controls will be dependent on field conditions encountered. The AECOM field representative will work through the applicable list of secondary controls until the emission issues are resolved, and will work closely with National Grid and NYSDEC during this task. The AECOM field representative, in consultation with National Grid, will also provide information on CAMP monitoring and controls to stakeholders in the community, as required.

5.0 Data Management and Reporting

A field log book and calibration forms will be maintained on-site throughout the field activities. Information to be recorded will include:

- Daily Site maps showing the locations of all monitoring locations
- Dates for sampling equipment installation, operations (including start/stop times) and removal
- Sampling equipment calibration dates, times and results
- Sampling equipment maintenance dates and results
- General field weather conditions (observations of temperature, wind direction, precipitation)
- Description of intrusive activities conducted during periods when elevated data values were recorded
- Descriptions of contingent measures/response actions implemented in response to elevated monitoring results
- Any unusual situations which may affect samples or sampling

The following information will be summarized at the conclusion of each day:

- Averaged TVOC concentrations compared to the Action Levels
- Benzene results (if generated) compared to the Action Levels
- Averaged RPM_{10} concentrations compared to the Action Levels

The following data summaries will be prepared and provided to National Grid on a weekly basis for transmittal to NYSDEC, NYSDOH:

- Compiled 15-minute average concentrations of TVOC and RPM_{10}
- Maximum 15-minute average concentrations of TVOC and RPM_{10}
- Discussion of Alert and Action Limits (minus background concentrations) reached during the week
- Description of corrective actions taken in response to exceedances of Action/Alert Levels or complaints
- Monitoring station location maps

A final end of program data report will be produced summarizing the monitoring operations and data collection results.

Appendix A

NYSDOH Generic CAMP

Appendix 1A
New York State Department of Health
Generic Community Air Monitoring Plan

Overview

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical- specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for volatile organic compounds (VOCs) and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate DEC/NYSDOH staff.

Continuous monitoring will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. "Periodic" monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

1. If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

2. If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

4. All 15-minute readings must be recorded and be available for State (DEC and DOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.

3. All readings must be recorded and be available for State (DEC and DOH) personnel to review.

June 20, 2000

Appendix C

Procedures for Bail Down Testing of Recovery Wells

Appendix C

Procedures for Bail Down Testing of Recovery Wells

Additional testing and evaluation may be conducted at locations that exhibit the potential for significant product recharge rates and are accessible for additional manual monitoring/recovery activities to refine the conceptual site model (CSM) for the site. A summary of the proposed approaches for determining product recharge rates and estimating the potential for effective long-term recovery are provided below.

Determination of the Effective Well Volumes

The results from the initial gauging activities will be used as input to the following equations to approximate the effective well volume, i.e., the volume of product within the well casing and borehole:

$$V_b = Cs * b_b \pi \left(r_b^2 - r_c^2\right)$$
$$V_c = b_c \pi r_c^2$$
$$V_t = V_c + V_b$$

Where:

V_t	=	Total effective product well volume
V_b	=	Volume of product in the borehole
V_c	=	Volume of product in the casing
b_b	=	product thickness existing within borehole
b_c	=	Gauged product thickness
r_c	=	well casing radius
r_b	=	well borehole radius
Cs	=	Estimated storage coefficient of the borehole, 0.15 to 0.285

Calculations using a Cs of 0.285 will likely overestimate borehole storage, while use of the 0.15 value will provide a low estimate of the capacity of the well. The volume of product removed as part of the activities described in the following section should be within the calculated range of volumes using these factors.

Bail Down Tests

Bail down tests will be performed at locations with significant product thickness/expected rapid recharge rates, i.e., DNAPL well thicknesses greater than 0.5 feet. The goal of the bail down test will be to collect a measurement for every change in product thickness from a static value of 1 percent in the first 100 minutes and every change in product thickness from a static value of 5 percent in the remainder of the test. The testing will be conducted following the gauging and recovery activities discussed in Section 4.2 of the work plan have been completed. The rate of change for product thickness recovery typically follows a logarithmic pattern so measurements will be closely spaced in the early phases of the test and progressively farther apart as the test proceeds. The following frequencies are provided as an initial recommendation and should be adjusted based on field observations:

- First elapsed 10 minutes of test: every 1 minute (10 measurements)
- 10 to 20 minutes: every 2 minutes (5 measurements)
- 20 minutes to 40 minutes: every 5 minutes (4 measurements)
- 40 minutes to 2 hours: every 10 minutes (8 measurements)
- 2 hours to 4 hours: every 30 minutes (4 measurements)
- 4 hours till end of first day (every 1 hour)
- Second day 2 to 3 times
- 1 measurement per day, for 5 days
- 1 measurement per week for 5 weeks until the product thickness has stabilized

If the change in product thickness between each event is less than 5 percent (e.g., if the initial product thickness is 1 foot, measurements should be collected every time the product thickness changes 0.05 feet) the frequency of measurements can be decreased. However, if the change in product thickness is greater than the percentages listed above then measurement frequency should be increased. The maximum practical time for collecting gauging measurements is 1 minute intervals. Note that product thickness should not decrease with time. If the measured product thickness appears to be decreasing at any point in the test, re-measure and/or check the proper functioning of the product/water interface probe.

Measurements should be obtained until the product thickness has stabilized to its static thickness. This will provide a more complete insight into the product distribution in the formation, and confirm the static fluid levels. A typical indication of the product thickness stabilizing is when the product thickness reaches a plateau for about a half of a log cycle (e.g., if product thickness is stable from 1000 to 3000 minutes (1/2 log cycle) the test would be finished).This should be documented with 3 measurements over that half log cycle. Plotting the recovered product thickness versus the log of time will help to forecast future events and provide data to support the completion point for the testing.

Evaluation of the Potential for Long-Term Recovery of Product

Several metrics have historically been used to quantify DNAPL mobility including measured DNAPL well thickness, DNAPL recovery rate, and soil core observations. However, measurements of well thickness often greatly exaggerate the potential for recovery, since even properly constructed DNAPL wells can represent unnatural capillary conditions in the aquifer, and may collect DNAPL thickness where, without the well, DNAPL in the adjacent soil would remain almost entirely immobile and at or near residual saturations. Recovery rates also present a problem, as they are dependent on the drawdown induced and the construction of the well (e.g., larger well diameters will intrinsically have higher recovery rates).

DNAPL transmissivity can provide an appropriate metric for evaluating the potential for product recovery. Transmissivity can be calculated using the four parameters previously discussed under certain conditions. DNAPL transmissivity which is analogous to water transmissivity (i.e., independent of most other factors water transmissivity defines the recoverability of water from an aquifer) is comparable across sites, across product types, is proportional to DNAPL saturation, and can be used to calculate the performance of any recovery configuration, i.e., various well sizes, water recovery rates, and recovery well spacing.

The steady state Thiem equation can be applied to most test data for initial calculations of DNAPL transmissivity. This equation assumes DNAPL discharge into the wells is approximately constant. The Thiem equation is described below:

$$\frac{LN(R/r_w)Q}{2\pi s} = T$$

Where:
Q – Average recovery rate of DNAPL for the well
T – DNAPL Transmissivity
s – Drawdown (calculated based on the change in water/DNAPL interface times a density factor)
R/r_w – Ratio of radius of Influence to well radius

The transmissivity of the formation adjacent to the wells (ft^2/day) can be used to identify locations where effective/sustained recovery is not likely, and support estimates of recovery rates/volumes and radius of influence for productive locations. The ITRC has indicated LNAPL transmissivity ranges from 0.1 to 0.8 ft^2/day represents a range where hydraulic recovery of DNAPL is no longer practicable. Values near 0.3 to 0.8 ft^2/day represent a point where the majority of NAPL remaining in the subsurface exists in a residual state.