Fountain Avenue Landfill
Brooklyn, New York
NYSDEC Site No. 224003

Annual Post Closure Operation, Maintenance and Monitoring Report
January 2017 through December 2017

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New York City Department of Environmental Protection

Bureau of Wastewater Treatment
96-05 Horace Harding Expressway
2nd Floor, Low-rise Building
Corona, NY 11368- 5107

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Section 1–Introduction

This Post-Closure Annual Report (Report) has been prepared by the New York City Department of Environmental Protection (DEP) to fulfill the reporting requirements contained in the Fountain Avenue Landfill (FAL) Operation and Maintenance (O&M) Manual, the FAL Monitoring Plan, 6NYCRR Parts 360 and 363. This Report contains current background information and documents the operation, maintenance and monitoring activities performed from January 1 through December 31, 2017.

Section 2- Site Background

The FAL is an inactive hazardous waste disposal site located on 297 acres at the southern end of Fountain Avenue in Brooklyn, New York. It is bounded on the northwest by the Belt Parkway, on the southeast by Jamaica Bay, on the southwest by Hendrix Creek and on the east by Old Mill Creek. A site location map is provided in Figure 1.

The FAL was opened in 1961, when land-filling activities shifted from the Pennsylvania Avenue Landfill (PAL) located on the other side of Hendrix Creek. Under the responsibility of the New York City Department of Sanitation (DOS), the landfill received municipal and industrial wastes between 1961 and 1985. It is reported that, between 1974 and 1980, illegal dumping of hazardous wastes occurred at the Site. Liquid wastes reportedly disposed of at the FAL included waste oils, and spent plating baths, sludges, thinners and lacquers. Asbestos and medical wastes were also reported to have been discarded. In addition, contaminated waste oils were sprayed on site access roads for dust control.

The FAL was added to the New York State Registry of Inactive Hazardous Waste Disposal Sites initially as a Class 3 site, requiring further surveillance. In 1983, the FAL was reclassified as a Class 2 site, posing a significant threat to public health and the environment.

In 1974, ownership of the lands on which the FAL are situated transferred from the City of New York to the United States Department of the Interior, National Park Service, with the understanding that landfill operations could continue at the Site until the end of 1985.

On December 16, 1985 and again on April 17, 1990, New York State Department of Environmental Conservation (NYSDEC) executed Orders on Consent with DOS to close and remediate the Site. On May 15, 1992, DEP entered into an Order on Consent (Index 2-24-003) with the NYSDEC for the remediation of the FAL. In response, the DEP initiated a Remedial Investigation/Feasibility Study (RI/FS) in March 1993 to assess the nature and extent of contamination. The Remedial Investigation Report was released in May 1994, and the Feasibility Study Report was released in September 1994. The RI/FS revealed that certain areas and media at the Site required remediation. A summary of the findings follows:

- Soils – Surface soils exhibited semi-volatile organic compounds (SVOs) and metal levels that exceeded soil cleanup guidelines.
- Groundwater – Levels of volatile organic compounds (VOCs), SVOs, metals and Polychlorinated Biphenyls (PCBs) exceeding the drinking water standards were confined to groundwater samples collected from the leachate mound (Fill Aquifer). As a result, the Upper Glacial Aquifer does not require remediation.
- Surface Water – the primary landfill-related exceedances of surface water standards is chlorobenzene which is present in low concentrations in the leachate mound and in high concentrations in surface water at the drainage outlet into Old Mill Creek.
- Sediments – samples taken along the Hendrix Creek demonstrated levels of VOCs, SVOs, metals, PCBs and pesticides that generally exceeded the wildlife and human bioaccumulation guideline concentrations, but were below the benthic toxicity guidelines.

As specified by the Order on Consent, Interim Remedial Measures (IRMs) were implemented. An interim cover was placed to prevent casual contact with exposed waste and rip-rap was installed for shoreline protection.

The goals for the remediation program were set to eliminate or minimize the threats to the public health and the environment, by addressing the contamination of surface soils and waste disposal areas; by protecting surface waters through eradication of run-off and erosion from contaminated substrates and the migration of leachate into surrounding waters; by minimizing the impact of contaminated groundwater; by reducing soil and sediment contamination levels and removing the possibility of human or animal contact; and, by controlling and containing landfill gas emissions.

Subsequently, in 1995, the NYSDEC published their Record of Decision (ROD) for the FAL which mandated that the selected remedy for the site consist of "landfill capping with active gas collection and long term environmental monitoring." In accordance with the ROD, in October 2000, the DEP awarded Construction Contract No. LF-FAL-G4 for the remediation of the FAL. The main elements of the selected remedy included regrading of the top of the landfill to ensure proper drainage and minimize erosion, a landfill cap meeting the requirements of 6NYCRR Part 360 regulations, and landfill gas control with an active collection system consisting of extraction wells screened in the waste and connected via blowers to an enclosed flare. Construction of the final cover, stormwater management, landfill gas management, environmental monitoring and ancillary systems was completed in July 2009.

Once construction of the landfill components was completed, responsibility for their operation and maintenance was transferred from the DEP Bureau of Engineering Design and Construction (BEDC) to the DEP Bureau of Wastewater Treatment (BWT) and the operations, maintenance and monitoring contractor. The landfill cover, stormwater and ancillary systems were transferred to BWT on March 1, 2009. The landfill gas management system was transferred to BWT on August 1, 2009.

The ROD called for a pre-approved Post-Closure Monitoring, Sampling and Analysis Plan (the Plan), to commence within one month of DEP's receipt of NYSDEC's written acceptance of the

FER. The Plan requires monitoring water-level elevation and groundwater quality in twelve monitoring wells, and monitoring for the presence of methane in seven gas monitoring wells located beyond the perimeter of the cap. The Plan was approved in March 2009. Subsequently, NYSDEC approved the following modifications to the groundwater monitoring portion of the Plan in their letter of May 9, 2011 to the DEP:

- Monitoring can be performed independently of the tide cycle
- The low-flow purging and sampling method can be used to collect the samples
- Sampling can be performed annually in rotating calendar quarters instead of quarterly
- During the first five-year review period, monitoring should be performed for all Plan parameters
- Based on the results from the first five annual monitoring rounds, the NYSDEC may allow non-detected parameters to be excluded from subsequent annual monitoring rounds, except as indicated below
- Monitoring for all Plan parameters will be performed once every five years, coinciding with the last year of each five-year review period

Additionally, per Part 360 the groundwater samples are to be analyzed by a State-certified environmental laboratory and validated by an independent data validation company.

The Final Engineering Report (FER) was submitted to NYSDEC for review on September 7, 2011. The FER was accepted by the NYSDEC on January 31, 2012. The formal Post-Closure Monitoring period officially began on February 1, 2012. The first official round of quarterly gas monitoring was performed in February 2012, within one month of the start of the Post-Closure period. With the concurrence of the NYSDEC, the first round of annual groundwater monitoring was performed during the second quarter of 2012 to coincide with the annual groundwater monitoring round at the PAL, so the sites are on the same monitoring schedule. Annual groundwater monitoring will be performed in rotating calendar quarters (i.e., once every five quarters) thereafter similar to PAL.

In July 2012, the NYSDEC changed the classification of the FAL site from a Class 2 to a Class 4 site on the Registry of Inactive Hazardous Waste Disposal Sites since it was properly remediated and requires site management.

Section 3– Annual Summary

This Report covers the period from January 1 through December 31, 2017. It summarizes the operation, maintenance and monitoring activities at the Site during this period.

3.1 Landfill Gas Management System

The landfill gas management system represents one of the elements of the selected remedy in the Site's ROD. The ROD required the selected remedy "to ensure full collection and control of

landfill gas". This system must also meet the requirements of 6NYCRR Part 360 to limit off-site gas migration to the lower explosive limit at the property line (i.e., 5% gas in air) and 25% of the LEL in structures (i.e., 1.25% gas in air). It should be noted that during this reporting period, the new requirements of 6NYCRR Part 363 went into effect on November 4th which modified the action level for methane at the property line to 1.25% gas in air. In 2011, due to below-threshold NOx emissions, the NYSDEC downgraded the Air Title V Facility Permit for the operation of the landfill gas management system to an Air Facility Registration (Certificate # 2-6105-00687/00003). The flaring system was also monitored in accordance with the EPA's Greenhouse Gas Reporting Rule through 2016, at which time the EPA determined that no further monitoring/reporting was required.

The system features 265 gas extraction wells (EWs), a below-grade polyethylene collection header piping network with 56 isolation valves, three 2,600-scfm centrifugal blowers, condensate collection system, an enclosed high temperature flare system, process instrumentation and controls, a programmable logic control (PLC) management system, a fire alarm system and an emergency condition alarm auto-dialer phone system. A plan of the overall Landfill Gas Management System is shown on Figure 2 illustrating the location of the extraction wells, header pipes and flare facility.

The main headers that convey the landfill gas slope continuously around the landfill to a low point adjacent to the blower and flare station located at the southeastern corner of the landfill. Each of the headers is connected to a condensate drain line at their low point. These drain lines and the drain lines from the three blower demisters (knock out pots) empty into the 8,000 gallon condensate tank located within the flare station. On February 23rd and November 7th, a total of 7,000 gallons of condensate was removed by a private waste hauler during each event for proper off-site disposal respectively. The condensate was sampled prior to disposal and the laboratory reports are included in Appendix A of the Quarterly Reports.

The landfill gas collection system is comprised of three closed loops, each of which is split into two headers. The system includes 56 isolation valves boxes for pressure and flow adjustments and to isolate of portions of the system for repairs. As the six (two 8-inch and four 12-inch) headers come up into the blower and flare station they each contain a manually operated butterfly valve for individual header vacuum adjustment, temperature and vacuum gauges, and monitoring ports. They then join into the 12-inch main header on the vacuum side of the blower station. This main header contains an electric modulating butterfly valve which automatically adjusts the valve position to control the landfill vacuum or flow according to PLC programming. This is followed by an electro-pneumatic butterfly valve which, actuated by compressed nitrogen, automatically closes in the event of any system failure or shutdown.

The landfill gas then flows through three 12" plug valves into the three demisters, exits through 12" piping which is reduced to 8" before entering the blowers, exits the blowers through 8" plug valves and discharges through a single 16-inch header and flame arrestor into the enclosed flare. The system is operated with one blower in service and the remaining two on standby. Blowers are switched periodically and preventive maintenance is performed to ensure all three blowers remain

in good operating condition. The flare support system includes a propane fired pilot, a purge air blower, two manual and two automatic dampers, and temperature control with three thermocouples. The flare operation is normally on automatic control using the bottom thermocouple at a target temperature of 1,600 ^{o}F. Figure 3 exhibits the layout of the Flare and Blower Station.

On November 30th, the FDNY performed the annual system inspection which was found to be satisfactory. During this reporting period, the landfill gas flaring system processed 781,820,000 SCF of landfill gas. The flare ran for 93.2% of the time at an average flow of 1,596.56 scfm. The flare operation down time totaled 599 hours or 6.8% of the twelve-month interval. Down time was experienced due to multiple flame failures, poor gas quality, the FDNY inspection and subsequent operational restrictions and maintenance work on the system. Flow data is summarized in the following table.

Fountain Avenue Landfill
Flare Operation - 2017

Month	**CH4** (% by Volume)	**Time in service** (Hours)	**Flow (SCF)**
January	28.06	719.0	70,000,500
February	21.67	670.0	66,800,000
March	18.70	744.0	67,351,333
April	19.17	632.0	58,526,667
May	18.77	673.0	66,481,000
June	17.40	695.0	65,694,000
July	17.53	719.5	67,038,000
August	18.18	591.0	60,056,000
September	18.81	670.0	65,008,667
October	18.25	693.0	67,818,333
November	19.40	611.0	57,963,000
December	18.89	744.0	69,082,500
Average	***19.57***		***65,151,667***
Total		**8,161.5**	**781,820,000**

All 265 EWs are inspected and monitored for gas content (percent CH_4, CO_2 and O_2), temperature and vacuum pressure each month. Deficiencies such as missing signage, track cleaning or sampling port repair were corrected, when possible at the times of the inspections. The extraction wells will continue to require slope adjustments as the landfill continues to settle. The LFGMS continues to experience problems due to condensate accumulation in the headers. Although there was no discernable increase in the condensate tank inventory, condensate displacement resulted in improved operations. The solar powered pumps that were installed at EW-54 and EW-168 to remove stormwater from the well vaults are no longer operational and will be repaired or replaced

at an appropriate time in the future. The LFG-3 reports are included in Appendix A of the corresponding Quarterly Reports.

Daily inspections are conducted and readings are recorded on the LFG-1 inspection logs. The monthly summary reports of the LFG-1 daily inspections can be found in Appendix A of the Quarterly Reports.

Bi-weekly (LFG-2) and quarterly (LFG-4) inspections were conducted, and copies are included in Appendix A of the Quarterly Reports. Deficiencies encountered at the flare and blower station during scheduled inspections, and still pending include the damaged insulation at the top of the flare stack and the Condensate Tank Sentinel that needs replacement. In the interim, the condensate inventory is monitored twice a week. The flow/vacuum modulating valve was inspected in September and is currently on manual mode and is working normally.. The recommended operational equipment components that were impacted by the Hurricane Sandy surge and designated for replacement should be replaced when the remaining Hurricane Sandy repairs are performed. A separate Contract No. 1400-FLP was procured by DEP to complete the remaining Hurricane Sandy repairs. The order to commence work date was September 25, 2017 and the contract term is 365 days. Other equipment components exposed to the Hurricane Sandy surge that are currently operational but not designated for replacement will continue to be monitored and assessed over time and may be replaced in the future, if necessary. The landfill gas flare flow meter readings continue to remain in range. The flow meter is scheduled to be serviced and calibrated in January 2018.

3.2 Final Cover System

The landfill final cover system prevents stormwater infiltration into the landfill and landfill gas migration into the atmosphere. The ROD stipulated the construction of a 6NYCRR Part 360 landfill cap. The landfill final cover system is comprised of layers, from top to bottom, as follows:

- Vegetative topsoil layer with a minimum thickness of 6 inches.
- 12-inch thick barrier protection layer.
- Geocomposite drainage layer as follows.
    - A cushion geotextile in the Type 1 Cover System (areas with <5% slopes); or
    - A double-sided geocomposite in the Type 2 Cover System (areas with >5% slopes).
- Linear Low Density Polyethene (LLDPE) geomembrane material.
    - Smooth 40-mil thick LLDPE geomembrane in the Type 1 Cover System (areas with <5% slopes); or
    - Textured 40-mil thick LLDPE geomembrane in the Type 2 Cover System (areas with >5% slopes).
- 6-inch-thick Type II cover soil layer was placed over the re-graded waste material.

The O&M Manual requires the final cover system be inspected on a monthly basis and after each major rainfall event equal to or exceeding the 2-year 24-hour precipitation event (3.5 inches in 24 hours). The surface of the landfill was divided into sixteen inspection zones. All 16 inspection

zones are shown in Figure 4, which is utilized to identify the system components. This figure is also utilized to identify the components of the stormwater and ancillary systems. A record of the Final Cover System inspection is summarized on a Monthly Checklist Form FCS-1, with deficiencies noted on the Deficiency and Problems Form (DP-1). The monthly inspection reports can be found in Appendix B of the Quarterly Reports. The Final Cover System is inspected for surface cracking, vegetative growth, vector penetration, settlement, erosion, slope stability, seepage, and vandalism. The inspection is performed by walking up and down the side slopes and across each zone several times. Work orders are issued for deficiencies noted during monthly inspections that cannot be addressed at the time. Deficiencies, including those pending from the previous reporting period, are some areas of erosion identified on the DP-1 Form that continue to be monitored and filled/seeded as necessary, and ponding in Inspection Zones G, H, and M. Other erosion of the beach embankment in Inspection Zone N will be addressed with the other Hurricane Sandy repair work.

3.3 Stormwater Management System

The stormwater management system is an integral part of the capping and closure system required under the 6NYCRR Part 360 regulations to protect the landfill final cover system. The system was designed to collect, transport and discharge stormwater to the surface waters surrounding the FAL in order to prevent stormwater ponding and erosion damage to the final cover system.

This system consists of several components which require monitoring, inspection, and periodic maintenance. The system has been divided into three subsystems (SWM-1, SWM-2 and SWM-3) for ease of inspection and reporting. These subsystems include:

- SWM-1: Stormwater drainage swales, wetlands and revetment area
- SWM-2: Outlets, culverts, and rip-rap inlet and outlet protection, and
- SWM-3: Downchute pipes, manholes, pipe trenches and energy dissipation structures.

The O&M Manual requires that stormwater management systems SWM-1, SWM-2 and SWM-3 be inspected on a monthly basis and immediately after each major rainfall event equal to or exceeding the 2-year 24-hour precipitation event (3.5 inches in 24 hours). A record of the inspection is summarized on Monthly Checklist Forms SWM-1, SWM-2, SWM-3 and DP-1 in accordance with the requirements of the O&M Manual. A Deficiency and Problems Form DP-1 is completed to summarize the items marked not satisfactory (NS) in the stormwater system checklist forms.

Deficiencies identified during the period covered by this Annual Report do not necessarily affect the overall performance of this system. Inspection of the system during and after storm events, indicate that it is working adequately. The swales and culverts were mowed, weed-wacked, cleaned out, and excessive vegetative growth was removed and repairs performed. Work orders are issued when necessary to perform repair work as identified in on the DP-1 Forms. Repair details for Hurricane Sandy storm damage previously identified have been developed and will be

implemented when the remaining Hurricane Sandy repairs are performed. The DP-1 Form also identifies other locations where sediment and standing water have been observed and provides corrective actions for each location. Where necessary, investigations are being performed, repair details are being developed and repairs will be addressed. The monthly inspection reports can be found in Appendix B of the Quarterly Reports.

3.4 Ancillary Systems

The ancillary systems (ANS) are those support systems at the FAL that are used for site access and security. The ancillary systems include seven (7) access roads (A, B, C, D, E, F and G as shown on Figure 4), along with fences, gates, and locks. The roadways are integral in providing access to perform required inspection, monitoring and maintenance activities. In addition, since the selected remedy resulted in leaving waste on-site, the security fences and gates provide important institutional controls to prevent site access to unauthorized individuals.

The O&M Manual requires that the ANS be inspected on a monthly basis and immediately after each major rainfall event equal to or exceeding 2-year 24-hour precipitation event (3.5 inches in 24 hours). A record of the inspection is summarized on Monthly Checklist Forms ANS-1 and DP-1 (for ANS-1) in accordance with the requirements of the O&M Manual. The inspections can be found in Appendix B of the Quarterly Reports.

Damage and wear are inherent in unpaved roads. Potholes on the access roads are recurring and are filled in as part of routine maintenance. Conditions that do not interfere with road safety are addressed with annual road repairs. Repair of the remaining damage caused by Hurricane Sandy to sections of the embankment adjacent to Road A along the Jamaica Bay shoreline of the landfill will be implemented when the remaining Hurricane Sandy repairs are performed.

Holes found in the perimeter fence are repaired after each monthly inspection, and during the warm season the perimeter is inspected and holes are repaired on a weekly schedule. Missing “No Trespassing” signs along the perimeter fence are replaced when noted during the weekly inspections. Locks are inspected and lubricated quarterly, and as needed. Safety inspections are performed monthly. Damaged and missing “Confined Space” and/or “Hazard” signs were also replaced.

3.5 Post-Closure Environmental Monitoring

As noted previously in Section 2, the Monitoring Plan for the FAL went into effect on February 1, 2012 following acceptance of the FER by the NYSDEC, and now incorporates modifications approved by the NYSDEC in 2011. The Monitoring Plan addresses the performance evaluation of the effectiveness of the cap and/or landfill gas collection system in controlling leachate and landfill gas migration. The Monitoring Plan entails annual monitoring in rotating calendar quarters (i.e., once every five quarters) of the groundwater elevation and quality at twelve wells (HF wells) located around the perimeter, outside the limits of the closure cap, as shown in Figure 5.

The Monitoring Plan also entails quarterly monitoring of soil gas quality in seven perimeter gas monitoring wells (GMW wells) located outside the limits of the cap at the perimeter of the landfill site as shown on Figure 5. Wells GMW-1 and 2 are located in the northwest corner of the site adjacent to Hendrix Creek. Wells GMW-3, 4 and 5 are located along the northern perimeter of the landfill parallel to the site property line at the Belt Parkway. Wells GMW-6 and 7 are located in the north eastern corner of the site, east of the perimeter road. Well GMW-6 is located west of the parking lot while Well GMW-7 is located west of Old Mill Creek. Additionally, the landfill surface gas was monitored semi-annually. The gas monitoring portion of the Monitoring Plan was performed prior to the NYSDEC acceptance of the FER on January 31, 2012 to verify the proper operation of the gas collection system and confirm that off-site gas migration was not occurring.

3.5.1 Gas Monitoring Program

Soil gas readings at the seven perimeter gas monitoring wells were taken quarterly on February 22nd, May 8th, August 7th and October 30th and are summarized in Table 1. The locations of the perimeter soil gas monitoring wells are shown in Figure 5.

Monitoring at these perimeter gas monitoring wells was performed in accordance with 6NYCRR Part 360 landfill regulations in effect at that time to ensure that subsurface methane gas was less than the lower explosive limit (LEL) of 5% gas in air at the property line. Effective November 4th, monitoring at these perimeter gas monitoring wells will be performed in accordance with the new 6NYCRR Part 363 landfill regulations to ensure that subsurface methane gas is less than 25% of the LEL or 1.25% gas in air at the property line.

During the quarterly rounds of perimeter gas monitoring, methane readings ranged from 0.2% to 0.6% at monitoring wells GMW-1 through GMW-5, from 2.6% to 3.3% at monitoring well GMW-6 and from 42.3% to 46.1% at monitoring well GMW-7.

It should be noted that GMW-7 is screened in a tidal marsh deposit. This finding was documented following the installation of the monitoring well and reported to the NYSDEC. Methane readings within this well have been consistently high since its installation. Monitoring of GMW-7 prior to the post-closure monitoring period, resulted in some methane readings above 50%, opening of the neighboring gas extraction wells provided no relief. The well is being passively vented. All of the methane levels detected within GMW-7 were higher than the upper explosive limit (i.e., 15% gas in air), but is attributed to this gas monitoring well being screened in the naturally-occurring tidal marsh deposits present at depth at certain locations, not due to landfill gas migration. To confirm that there is no potential for off-site gas migration, bar hole readings were taken in the shallow subsurface soil in the vicinity of Well GMW-7 all detecting 0.0% methane; confirming that the methane detected in this well is from the deeper tidal marsh zone.

While the results from Well GMW-6 met the 6NYCRR Part 360 regulations in effect at the time, they would have exceeded the new 6NYCRR Part 363 regulations effective November 4th. However, historically it has been shown that the existence of methane within GMW-6 at times may also be attributed to this gas monitoring well being screened in the vicinity of a naturally-

occurring tidal marsh deposit present at depth in this area (see discussion above for gas monitoring well GMW-7).

On June 26th and November 27th, landfill surface gas readings were taken, with no detections observed throughout the landfill. Although the O&M Manual does not require surface emission monitoring since the landfill does not meet the applicability requirements of 6NYCRR Part 208, the DEP has included this task in the OM&M Contract. Under 6NYCRR Part 208.4, landfill gas collection systems are required to be operated so that methane concentrations are less than 500 ppm above background at the landfill surface. The landfill surface gas monitoring performed during this reporting period meets the requirements stipulated under 6NYCRR Part 208.4. Sample locations are shown in Figure 6, and results in Appendix C, of the First and Third Quarter Reports.

The perimeter gas monitoring and the surface gas monitoring performed to date indicate that the landfill gas being generated by the FAL is being contained by the collection and treatment system and preventing off-site methane migration. It is expected that landfill gas concentrations will decrease over time as the landfill ages.

3.5.2 Groundwater Monitoring Program

Modifications to the groundwater portion of the Monitoring Plan were approved by NYSDEC prior to the start of the post-closure period. The changes were to the groundwater sampling procedures and analysis. Specifically, purging of three well volumes prior to sampling is no longer required because stabilization and low-flow sampling is used for collection of all the samples. Additionally, based on a review of hydrologic information contained in the RI Report, it was determined that ground-water monitoring can be performed independently of the tidal cycle.

Other modifications to the Monitoring Plan included performing groundwater monitoring in rotating calendar quarters (i.e., once every five quarters). Since the 2017 groundwater monitoring round was performed in the second quarter, the next scheduled groundwater monitoring round would be performed in the third quarter of 2018 (i.e., five quarters later).

The 2017 annual groundwater-monitoring round was performed on June 5th through 13th. It entailed measuring the depth to water in nine of the 12 monitoring wells in the Plan and collecting samples from 10 of the 12 monitoring wells in the Plan. The locations of all 12 wells are shown in Figure 5. The wells are numbered and have a letter designation that corresponds to the depths of their screen zones, specifically:

- U for fill aquifer (saturated zone above the tidal marsh deposit (TMD)),
- S for upper portion of the upper glacial aquifer (10-20 feet below the bottom of the TMD)
- D for lower portion of the upper glacial aquifer (45-55 feet below the bottom of the TMD)

Water-level data could not be collected from Well HF-104U because it was dry, or from Well HF-104D because its casing was kinked. Samples could not be collected from Wells HF-102U or HF-104U because they were nearly dry and dry, respectively. These are not significant data gaps

because since groundwater elevations in the wells are tidally-influenced, the water-level data are not used to prepare groundwater-flow maps. As indicated by their "U" designations, Wells HF-102U and HF-104U are screened in the fill aquifer. The fact that they were not sampled in 2017 is not a significant data gap either because since the fill aquifer is unsaturated at these locations, there was no potential for contaminant migration via the groundwater pathway via the fill aquifer at these well locations.

Per the Plan, the groundwater samples were collected with either a submersible pump or a peristaltic pump and tubing via the low-flow purging and sampling procedure, and were analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), leachate indicator parameters and inorganic parameters. Although in 2017 the NYSDEC approved a reduction in the frequency of monitoring for pesticides and polychlorinated biphenyls (PCBs) from annually to once during every five-year review period, the 2017 samples were analyzed for these two parameter groups to be consistent with the monitoring schedule for PAL, which is also performed once during each five-year review period. The QA/QC-related samples required by the Plan were also collected and analyzed. The laboratory results for one of the samples were validated by an independent data validator. The field data, Laboratory Final Report and Data Usability Summary Report were submitted in Appendix D of the 2017 Second Quarter Report.

Review of the field sampling logs indicates that apart from higher drawdowns (i.e., > 0.3 feet) in Wells HF-104S and HF-602U, the samples were collected in accordance with low-flow protocols. These minor deviations did not significantly impact the quality of the results for these wells because they are screened far enough below the water table. Therefore, there was no potential for cascading of water inside the wells during purging.

The results for the four parameter groups that were detected in 2017 (VOCs, SVOCs, leachate indicator parameters and inorganic parameters) are summarized and compared to the State's Class GA (potable) groundwater standards and guidance values in Tables 2 through 5, respectively. The other two parameter groups (pesticides and PCBs) were not detected in 2017, therefore summary tables for these parameters were not prepared. Note that Tables 2 and 3 only list the organic target analytes that were detected in at least one groundwater sample in 2017. Most of the VOCs and SVOCs analyzed for were not detected in any of the groundwater samples.

It should also be noted that due to the FAL's seaside location, the groundwater beneath it is naturally saline and therefore non-potable. However, the results were compared to the State's Class GA water-quality standards and guidance values because there are no standards or guidance values for saline groundwater. Accordingly, exceedances of these groundwater standards or guidance values do not necessarily indicate a significant concern with respect to protection of public health or the environment.

Overall, the 2017 results are consistent with previous results, and continue to indicate that the FAL is not a significant source of releases of hazardous or toxic substances to groundwater. The results also continue to indicate that site-related impacts are primarily limited to the fill aquifer in the vicinity of Well HF-608U. The fill aquifer is underlain by organic, low-permeability tidal marsh

deposits (TMD) in most areas of the site. Where present, the marsh deposits act as a barrier to the vertical movement of groundwater downward into the underlying Upper Glacial Aquifer (UGA).

Field Parameters – The 2017 final field parameter readings for each well were consistent with naturally saline groundwater. Specifically, they indicate that the groundwater is moderately conductive, has a slightly acidic to slightly basic pH, contains some dissolved oxygen and has low turbidity. Negative oxidation-reduction readings, indicating reducing conditions, were present, except in two wells screened in the UGA.

In 2017, the water in some the wells also exhibited physical characteristics indicative of potential water-quality impacts. Specifically, the water in Well HF-608U, which is screened in the fill aquifer, exhibited odor, an initial sheen, and a gray to amber discoloration. Amber discoloration was also observed in Well HF-102D, and odor was observed in Wells HF-104S, HF-602U and HF-608S. These field observations are generally consistent with prior monitoring round results.

VOCs – The results of the 2017 annual groundwater-monitoring round continue to indicate that the FAL is not a significant source of VOC impacts to ground water. Specifically, although each groundwater sample was analyzed for 46 target VOCs, only eight VOCs were actually detected. Acetone was detected in every well at low concentrations. However, all of these detections are attributed to background and/or laboratory contamination because acetone was also detected at similar concentrations in the associated quality-control samples. As shown in Table 2, nearly all of the other VOCs detections occurred in Well HF-608U, which is screened in the fill aquifer. Moreover, most of these detections were limited to low, estimated concentrations. The only exceedances of a VOC Class GA standard were for benzene and chlorobenzene in Well HF-608U, and they were relatively low in magnitude. Since the groundwater beneath the FAL is non-potable, and both of these VOCs break down in the environment, these exceedances are not a significant concern with respect to protection of public health and the environment.

SVOCs – The results of the 2017 annual groundwater-monitoring round continue to indicate that the FAL is also not a significant source of SVOC impacts to groundwater. Specifically, although each groundwater sample was analyzed for 63 target SVOCs, only eight were actually detected. Moreover, as shown in Table 3, almost all of these detections also occurred in Well HF-608U, and were primarily limited to low concentrations of each SVOC. The only other well in which SVOCs were detected was Well HF-104S. SVOC detections in this well were limited to low concentrations of two of the SVOCs detected at similar low concentrations in Well HF-608U. SVOCs were not detected in the other eight monitoring wells sampled in 2017. Exceedances of a SVOC Class GA standard were limited to dibenzofuran and naphthalene in Well HF-608U. These exceedances are not a significant concern with respect to protection of public health or the environment because the limit for naphthalene is a guidance value rather than an actual standard, and the groundwater beneath the FAL is naturally saline and therefore non-potable.

Pesticides – Pesticides were not detected during the 2017 groundwater-monitoring round. These results are consistent with prior monitoring results and indicate that the FAL continues to not be a source of pesticide impacts to groundwater.

PCBs – PCBs were also not detected during the 2017 groundwater-monitoring round. These results are also consistent with prior monitoring results and indicate that the FAL continues to not a source of PCB impacts to groundwater.

Leachate Indicators – The 2017 leachate indicator parameter results are consistent with the FAL being an old, closed and capped municipal landfill that is underlain by saline groundwater. Specifically, as shown in Table 4, except for BOD, cyanide and nitrate, these parameters were detected in nearly every well. BOD and cyanide typically do not occur at significant concentrations in saline groundwater, and nitrate is metabolized by bacteria in the groundwater. Cyanide was not detected in any of the wells sampled; and BOD and nitrate were only detected sporadically at low concentrations.

Moreover, the concentrations of parameters known to occur naturally in seawater, such as bromide, chloride, hardness, sulfate and total dissolved solids, tended to be highest in wells screened in the UGA where the groundwater is most saline. Other parameters, such as alkalinity, ammonia and color, appear to be site-related because their highest concentrations tended to occur in wells screened in the fill aquifer, above the TMD. The highest concentrations of most of the site-related leachate indicator parameters occurred in Well HF-608U, which is consistent with the VOC and SVOC results.

Class GA potable water-quality standards or guidance values exist for seven of the 13 detected leachate indicator parameters. Except for nitrate, which was only detected at low concentrations, each of these parameters was detected at concentrations higher than its respective Class GA water-quality standard or guidance value in a number of wells. However, it should be noted that most of these exceedances are for parameters attributable to the naturally saline groundwater. The relatively small number of exceedances for site-related parameters, such as ammonia and phenols, are not a significant concern with respect to protection of public health and the environment because the groundwater is non-potable. Moreover, ammonia does occur naturally at low concentrations in seawater and is not persistent in the environment, and the Class GA water-quality standard for phenols is aesthetics-based, not health-based.

Inorganic Parameters – The 2017 inorganic parameter results continue to indicate that the FAL is not a significant source of inorganic parameter impacts to groundwater. Specifically, as shown in Table 5, most of the target analytes, including the more toxic heavy (RCRA) metals, were either not detected or were only detected sporadically and/or at low concentrations. The concentrations of the frequently-detected parameters, such as boron, magnesium, potassium and sodium, were generally higher in the wells screened in the UGA than in the wells screened in the fill aquifer. The exception is Well HF-608U, which also contained the highest concentrations of VOCs, SVOCs and site-related leachate indicator parameters. This overall pattern indicates that these inorganic parameters are primarily associated with the naturally saline groundwater. The exceedances for these parameters are also primarily associated with the saline groundwater.

Except for the exceedances for barium and total chromium in Well HF-608U, heavy metal concentrations were lower than the State's Class GA water-quality standards, and most were either not detected, or only detected sporadically at low, primarily estimated concentrations. Specifically, arsenic and silver were each detected in only one well at low, estimated concentrations. Barium and total chromium were only detected sporadically, at low concentrations, except for the exceedances in Well HF-608U. Cadmium, lead, mercury and selenium were not detected.

Section 4– Conclusions and Recommendations

Based on the results of the Post-Closure activities performed during this reporting period, the FAL engineering controls and associated institutional controls are in place, performing properly and remain effective. The FAL remedy continues to be protective of public health and the environment and is compliant with the FAL ROD. The activities associated with the O&M Manual and the Post-Closure Monitoring Plan (as approved by the NYSDEC) continue to be implemented.

Routine system maintenance and repair of each of the remediation systems should continue in compliance with the requirements of the FAL O&M Manual. In general, it is recommended that the remaining areas of the Site affected by Hurricane Sandy should be restored to their existing condition prior to the storm event.

Specific conclusions and recommendations for each of the remedial systems are identified in the following paragraphs.

4.1 Landfill Gas Management System

The landfill gas management system is operational and is preventing off-site gas migration. The remaining recommended operational equipment components that were impacted by the Hurricane Sandy surge and designated for replacement should be replaced. Other equipment components exposed to the Hurricane Sandy surge that are currently operational but not designated for replacement should continue to be monitored and assessed over time and may be replaced in the future, if necessary. In addition, the recommended corrective actions when listed in Form DP-1, Landfill Gas System, Descriptions of Deficiencies and Problems, in Appendix A of the Quarterly Reports should be implemented.

4.2 Final Cover System

Overall the Landfill Final Cover System is in good condition and protecting landfill cap beneath it as intended. Conditions found are typical of those encountered during the landfill post-closure period, with only a few deficiencies noted. It is recommended that routine maintenance continue to be performed to control problem areas. This would include filling ruts caused by erosion, reseeding areas where necessary, and maintaining landfill surface slope to promote stormwater runoff. Mowing should be conducted as needed to control invasive species and to provide access for inspections and maintenance. In addition, perimeter areas of the Final Cover System affected

by Hurricane Sandy should be restored to their existing condition prior to the storm event. The recommended corrective actions listed in Form DP-1, FCS-1, Descriptions of Deficiencies and Problems, in Appendix B of the Quarterly Reports should be implemented.

4.3 Stormwater Management System

The Stormwater Management System continues to convey stormwater runoff to its outfall locations. Conditions found are typical of those encountered during the Landfill Post-Closure period, with a few deficiencies noted. In general, it is recommended that silt and vegetation in drainage swales continue to be periodically removed and sediment be removed from other portions of the drainage system. In addition, the remaining areas of the Stormwater Management System affected by Hurricane Sandy should be restored to their existing condition prior to the storm event. Specifically, the recommended corrective actions listed in Form DP-1 (SWM-1, SWM-2 SWM-3), Descriptions of Deficiencies and Problems, in Appendix B of the Quarterly Reports should be implemented.

4.4 Ancillary Systems

The roads of the Ancillary System continue to provide access throughout the site while the fencing and gates continue to allow for controlled site access. Conditions found are typical of those encountered during the Landfill Post-Closure period, with a few deficiencies noted. It is recommended that the remaining areas of the perimeter road and embankments affected by Hurricane Sandy should be restored to their existing condition prior to the storm event. In general, it is recommended that routine maintenance continue to be performed to control problem areas from expanding and worsening. This would include filling ruts and potholes in roads and repairing site fencing and gates when necessary. Specifically, the recommended corrective actions listed in Form DP-1, ANS-1, Descriptions of Deficiencies and Problems, in Appendix B of the Quarterly Reports should be implemented.

4.5 Post-Closure Environmental Monitoring

Overall, the results of the 2017 annual ground water-monitoring round are consistent with previous results, and continue to indicate that the FAL is not a significant source of releases of hazardous or toxic substances to groundwater.

Based on the results of the post-closure landfill-gas monitoring performed during this annual reporting period, methane levels measured met the 6NYCRR Part 360 requirements in effect at the time indicating that the landfill gas being generated by the FAL is being contained by the collection and treatment system and preventing off-site methane migration. It is expected that landfill gas concentrations will continue to decrease over time as the landfill ages.

The key recommendation for post-closure monitoring is to continue to perform the environmental monitoring in accordance with Plan, as modified. Specifically, in accordance with the every-five-quarters schedule, the next annual groundwater-monitoring round should be performed during the

third quarter of 2018. In early 2017, the NYSDEC approved the NYCDEP's request to reduce the frequency of monitoring for pesticides and PCBs from annually to once during each five-year review period. Accordingly, the 2018 samples will analyzed for VOCs, SVOCs, leachate indicator parameters and inorganic parameters.

FIGURES

Figure 1: Fountain Avenue Landfill Site Map

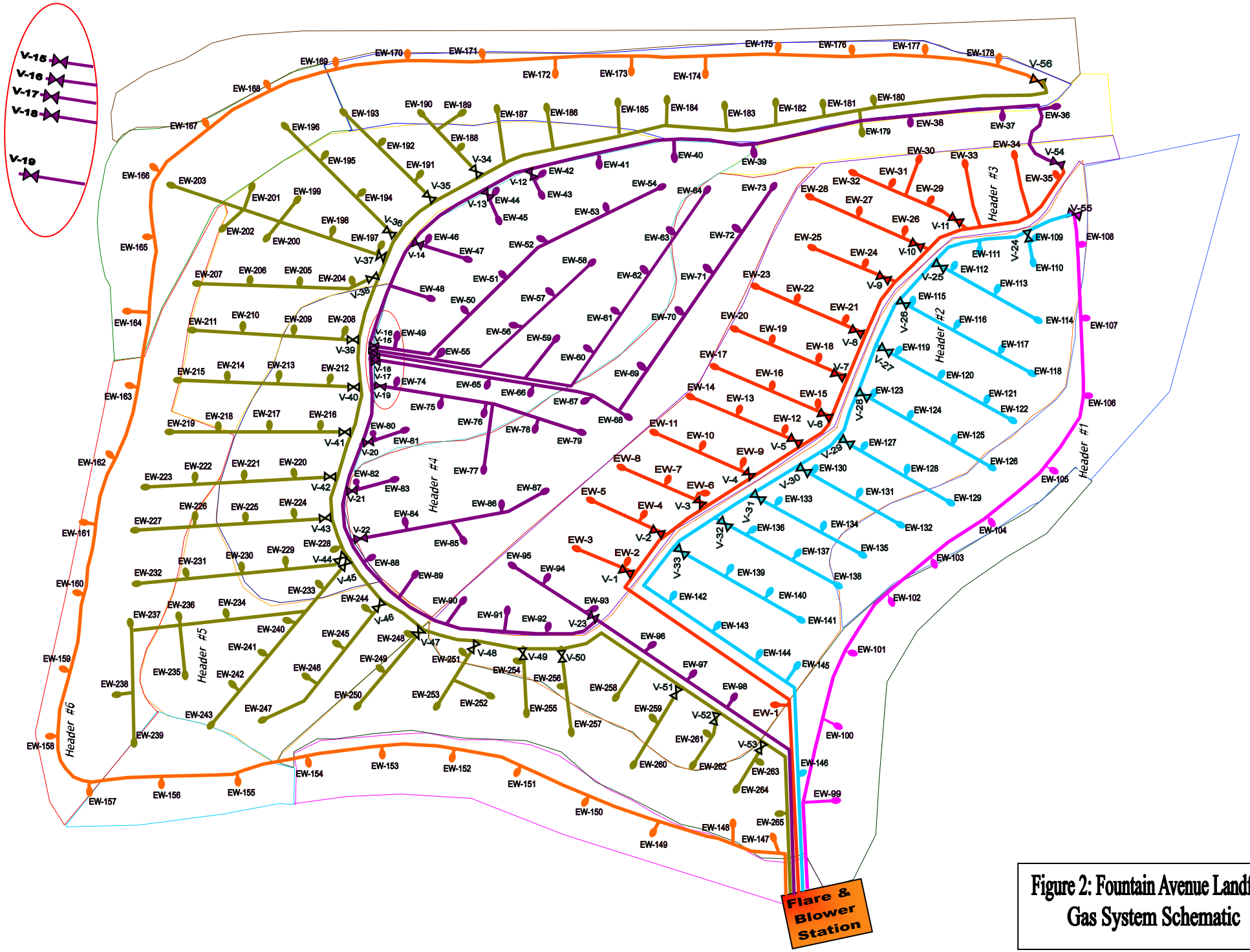
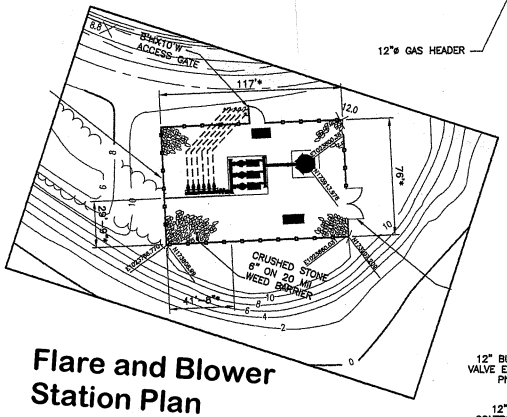
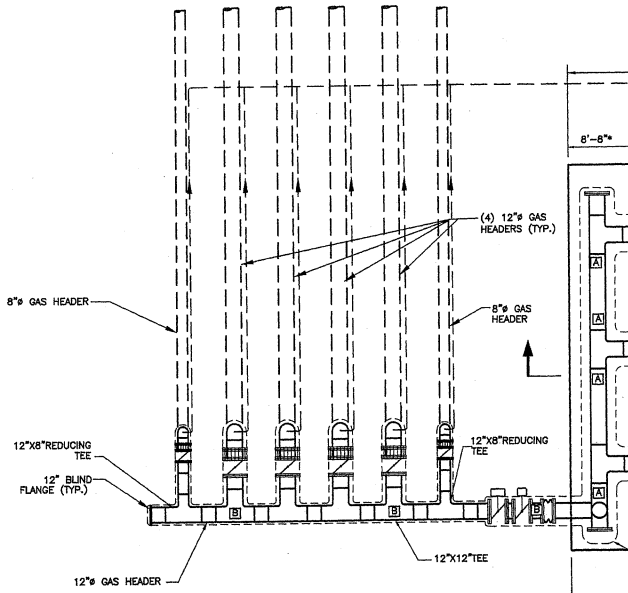


Figure 2: Fountain Avenue Landfill Gas System Schematic

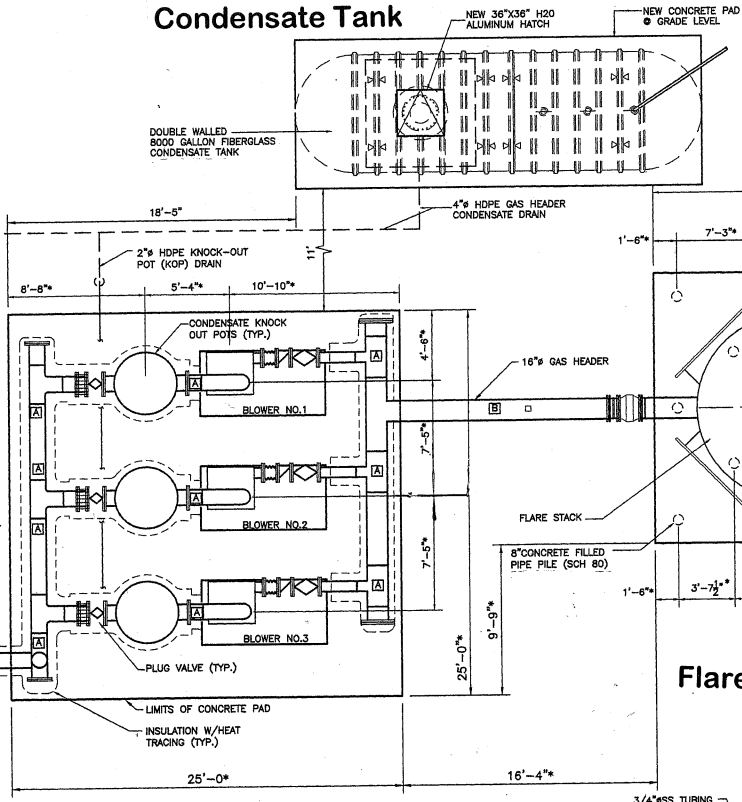
Figure 3: Fountain Avenue Landfill Flare and Blower Station

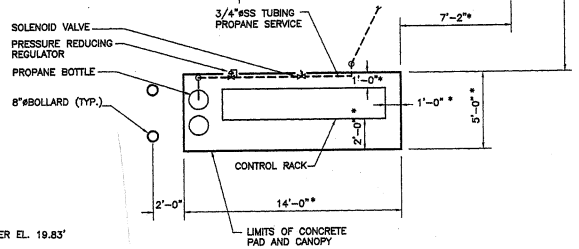


Flare and Blower Station Plan



LFG Headers





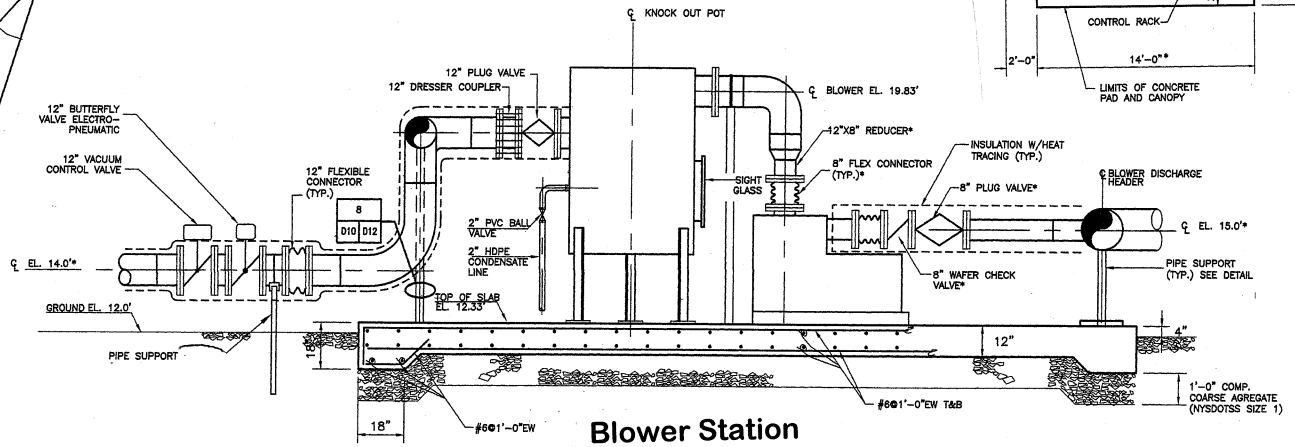


Figure 4: Fountain Avenue Landfill Stormwater Management, Final Cover Zones and Roads

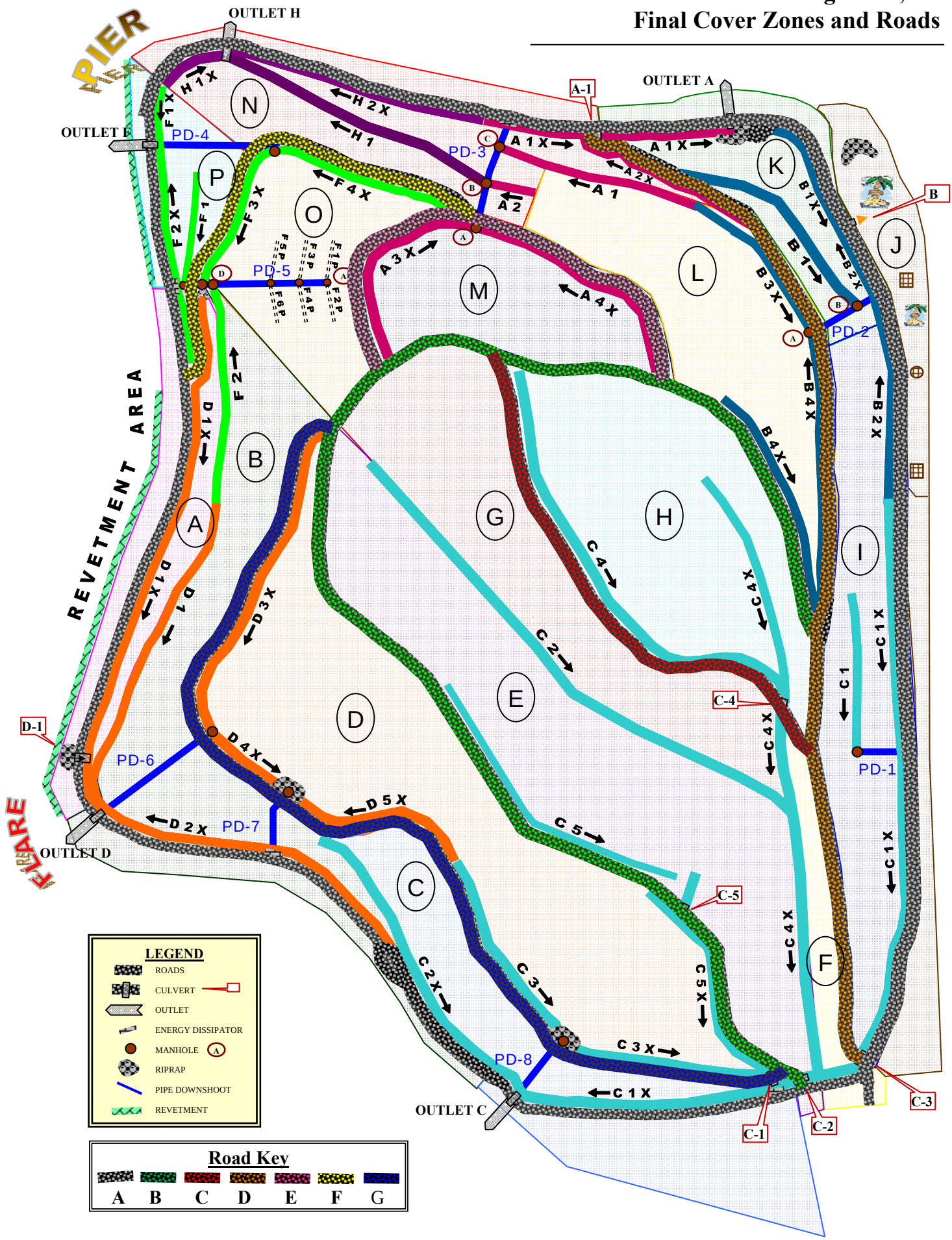
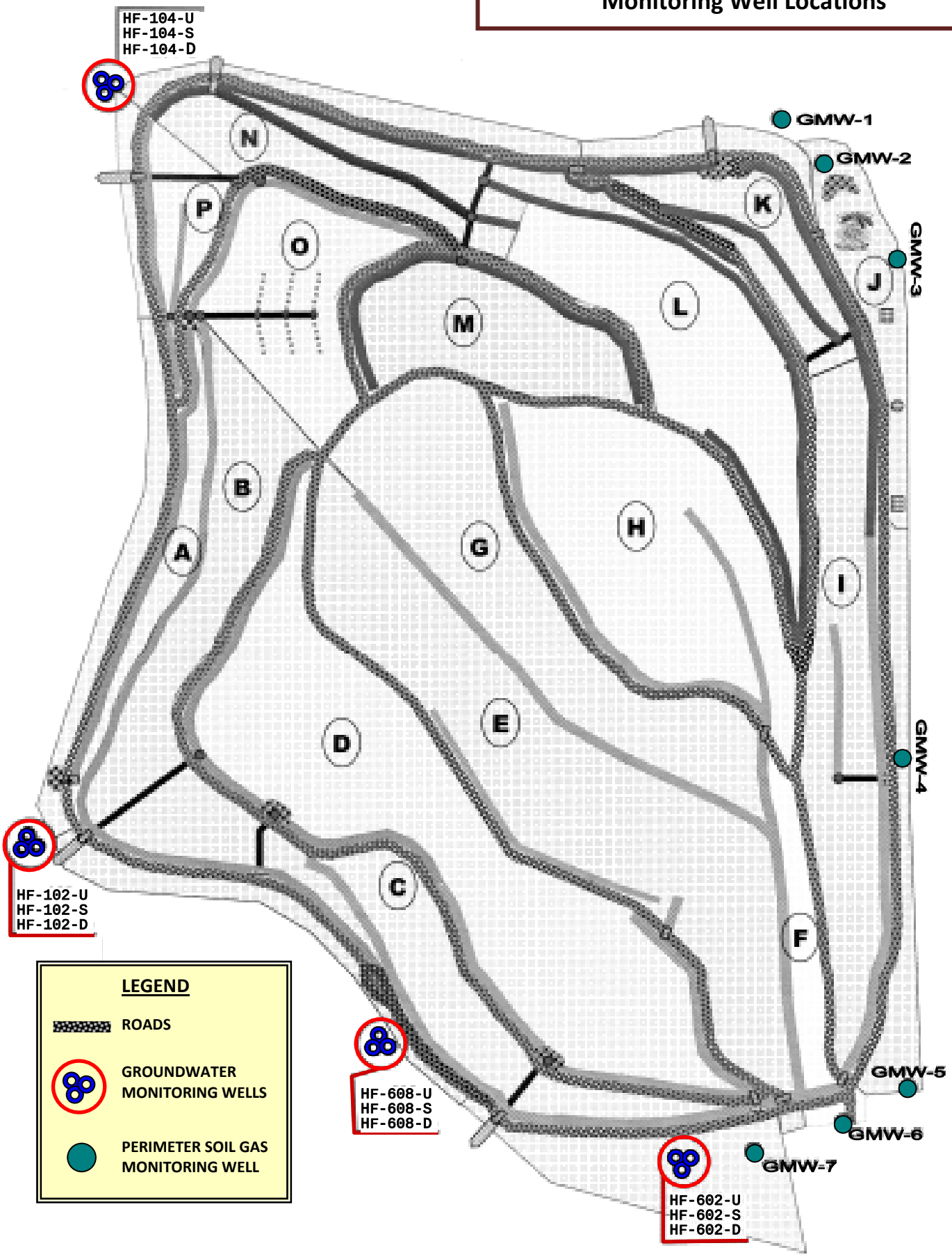


Figure 5: Fountain Avenue Landfill Groundwater and Perimeter Gas Monitoring Well Locations



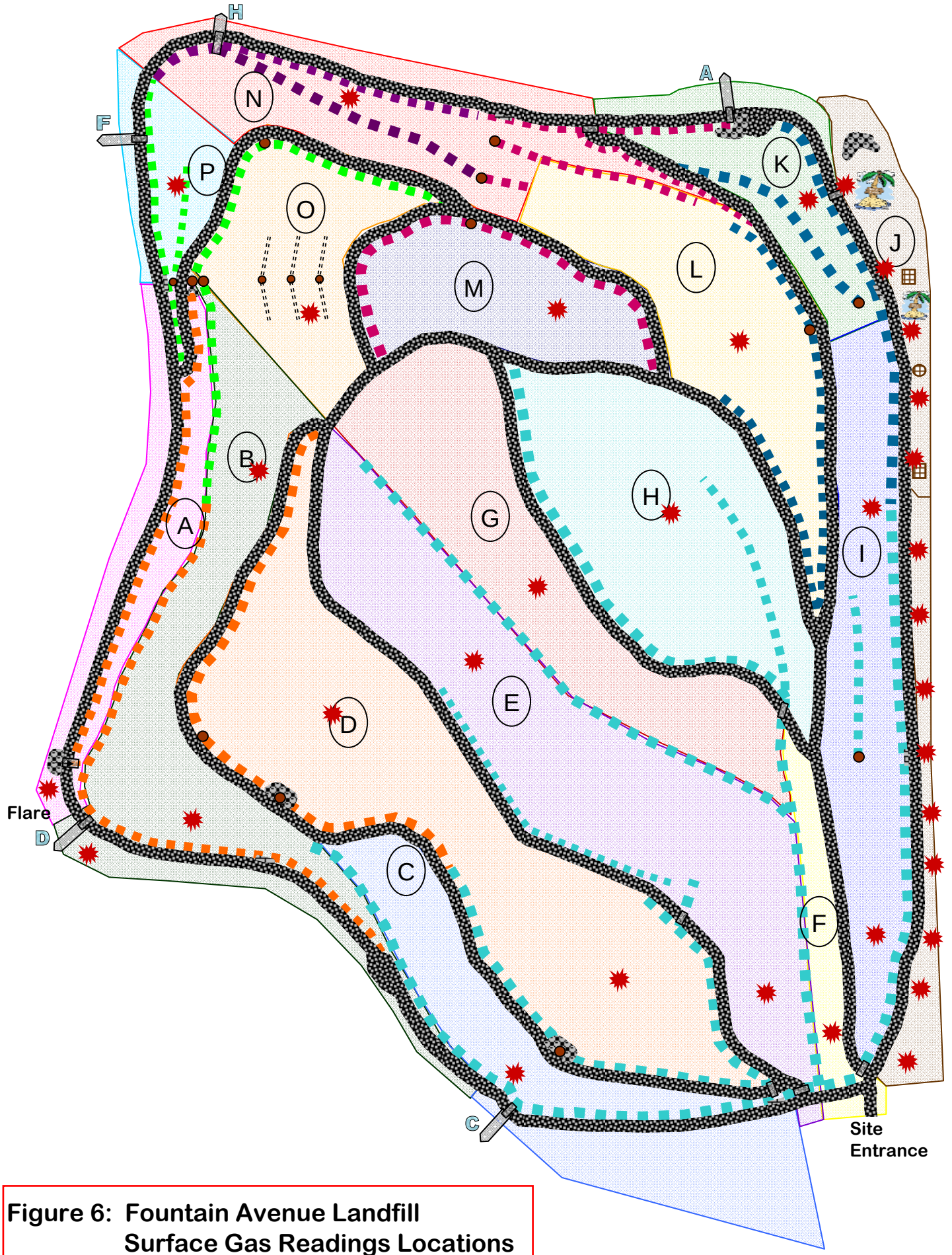


Figure 6: Fountain Avenue Landfill
Surface Gas Readings Locations

TABLES

Table 1
Summary of Perimeter Gas Monitoring Well Results
Fountain Avenue Landfill, Brooklyn, NY

	Methane % by volume				**Carbon Dioxide** % by volume				**Oxygen** % by volume			
Quarterly Monitoring Round	**1Q17**	**2Q17**	**3Q17**	**4Q17**	**1Q17**	**2Q17**	**3Q17**	**4Q17**	**1Q17**	**2Q17**	**3Q17**	**4Q17**
DATE:	**22-Feb**	**8-May**	**7-Aug**	**30-Oct**	**22-Feb**	**8-May**	**7-Aug**	**30-Oct**	**22-Feb**	**8-May**	**7-Aug**	**30-Oct**
GMW-1	0.3	0.2	0.3	0.5	1.5	1.5	1.7	1.2	18.1	18.0	18.1	18.2
GMW-2	0.5	0.4	0.5	0.6	0.9	0.9	0.8	0.7	20.6	20.5	20.6	20.6
GMW-3	0.2	0.3	0.3	0.4	0.2	0.2	0.3	0.5	20.7	20.5	20.6	19.6
GMW-4	0.2	0.3	0.3	0.4	0.3	0.3	0.2	0.2	20.7	20.6	20.4	19.8
GMW-5	0.3	0.2	0.2	0.3	0.3	0.3	0.5	0.6	20.4	20.1	20.0	20.0
GMW-6	2.6	2.9	3.1	3.3	2.4	2.4	2.6	3.2	18.0	18.2	17.6	17.6
GMW-7	45.7	46.1	45.1	42.3	9.3	9.3	8.7	8.9	1.1	1.3	2.3	3.3

BAR HOLE READINGS

In the Vicinity of:	**GWM-7**								
Date:	22-Feb		8-May		7-Aug		30-Oct		
Bar Hole Location, 5 feet:	North	South	North	South	North	South	North	South	
Bar Hole Depth (inches):	18	18	18	18	18	18	18	18	Bar hole readings taken to confirm that there was no off-site gas migration.
% Methane:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
% Carbon Dioxide:	0.0	0.0	0.0	0.0	1.0	1.0	1.0	1.0	
% Oxygen:	20.8	20.6	20.6	20.6	20.6	20.6	20.5	20.5	

Table 2 - Volatile Organic Compounds Detected in Fountain Avenue Landfill Monitoring Wells During 2017 Monitoring Round

VOCs Detected In Ground-Water Samples	Class GA Standard	Well Number and Result, in ug/L										
		HF-102S	HF-102D	102D Dup.	HF-104S	HF-104D	HF-602U	HF-602S	HF-602D	HF-608U	HF-608S	HF-608D
Acetone	50[GV]	4.5 J	11.2	3.0 J	10.2	2.7 J	5.7	4.5 J	5.7	10.6	3.3 J	3.7 J
Benzene	1	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**3.6 J**	<5.0	<5.0
Bromomethane	5	<5.0	2.0 J	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Chlorobenzene	5	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**14.9**	<5.0	<5.0
1,4-Dichlorobenzene	3*	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	2.6 J	<5.0	<5.0
1,1-Dichloroethane	5	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	2.7 J	<5.0
Ethylbenzene	5	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	4.2 J	<5.0	<5.0
Iodomethane	5	<5.0	1.4 J	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0

Notes: J = Estimated concentration.
GV = Guidance Value.
Bold font indicates exceedance of Class GA standard or guidance value.
* = Standard is per-isomer.
Wells HF-102U and HF-104U could not be sampled because they were almost dry and dry, respectively.
The acetone detections in the above table are all attributed to laboratory and/or background contamination because acetone was detected at similar concentrations in the associated trip blanks and field blank.

Table 3 - Semivolatile Organic Compounds Detected in Fountain Avenue Landfill Monitoring Wells During 2017 Monitoring Round

SVOCs Detected In Ground-Water Samples	Class GA Standard	Well Number and Result, in ug/L										
		HF-102S	HF-102D	102D Dup.	HF-104S	HF-104D	HF-602U	HF-602S	HF-602D	HF-608U	HF-608S	HF-608D
Acenaphthene	20^{GV}	<1	<1	<1	2.1	<1	<1	<1	<1	2.0	<1	<1
Anthracene	50^{GV}	<1	<1	<1	<1	<1	<1	<1	<1	2.0	<1	<1
Dibenzofuran	7×10^{-7}	<1	<1	<1	<1	<1	<1	<1	<1	**1.4**	<1	<1
Fluorene	50^{GV}	<1	<1	<1	2.3	<1	<1	<1	<1	1.9	<1	<1
2-Methylnaphthalene	No Std.	<1	<1	<1	<1	<1	<1	<1	<1	5.1	<1	<1
Naphthalene	10^{GV}	<1	<1	<1	<1	<1	<1	<1	<1	**57.0**	<1	<1
N-Nitrosodiphenylamine	50^{GV}	<1	<1	<1	<1	<1	<1	<1	<1	2.1	<1	<1
Phenanthrene	50^{GV}	<1	<1	<1	<1	<1	<1	<1	<1	1.5	<1	<1

Notes: J = Estimated concentration.
GV = Guidance Value.
Bold font indicates exceedance of Class GA standard or guidance value.
ND = Not Detectable.
Wells HF-102U and HF-104U could not be sampled because they were almost dry and dry, respectively.

Table 4 - Leachate Indicator Parameter Results for 2017 Fountain Avenue Landfill Ground-Water Samples

Leachate Indicator Parameter	Class GA Standard	Well Number and Result, in mg/L*										
		HF-102S	HF-102D	102D Dup.	HF-104S	HF-104D	HF-602U	HF-602S	HF-602D	HF-608U	HF-608S	HF-608D
Alkalinity	No Std.	426	<1.0	<1.0	912	315	523	812	963	5,060	800	313
Bromide	2[GV]	**21.3 J**	**9.6**	**9.2**	1.5	0.092 J	0.89	**7.2**	**32.8**	**15.3**	**21.2 J**	**38.0**
Chloride	250	<2.0	**2,940**	**2,840**	229	43.8	93.1	**1,210**	**10,200**	**1,320**	**6,800**	**12,600**
Sulfate	250	**1,160**	**285**	**275**	47.3	47.7	18.7	**354**	**774**	71.5	**830**	**1,410**
BOD	No Std.	<4.0	10.8	16.8	2.6 J	1.0 J	<13.3	<6.7	<4.0	22.1 J	<4.0	1.0 J
COD	No Std.	810	152	144	125	17.2	54.6	119	500	1,330	252	762
Color (Color Units)	15	**30.0**	5.0	5.0	**40.0**	10.0	**30.0**	**40.0**	**40.0**	**2,000**	**50.0**	**20.0**
Cyanide	0.2	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Hardness	No Std.	2,730	1,430	1,420	485	317	700	850	3,150	270	1,700	3,500
Ammonia	2	**9.8**	0.64	0.61	**72.6**	0.19	**30.1**	**27.6**	**5.7**	**881**	**2.4**	0.11
Nitrate	10	0.0072 J	<0.050	0.41	<0.050	4.0	<0.050	<0.050	3.1	<0.050	<0.050	1.1
Phenols	0.001	**0.0016 J**	**0.0021 J**	**0.0021 J**	**0.0098**	**0.0021 J**	**0.0065 J**	**0.0101**	**0.0016 J**	**0.108**	**0.0012 J**	**0.0034 J**
TDS	500**	**18,100**	**6,610**	**6,490**	**6,720**	464	**660**	**3,060**	**18,700**	**5,090**	**11,100**	**20,200**
TKN	No Std.	9.5	0.47	0.026 J	79.2	0.40	40.3	38.6	7.8	935	3.3	0.49
TOC	No Std.	4.8 J	<1.0	<1.0	21.8	3.7	17.0	15.2	5.4	385	11.6	3.4 J

Notes: J = Estimated concentration.
GV = Guidance Value.
Bold font indicates exceedance of Class GA standard or guidance value.
* = Except for Color, which is in Color Units.
** = Standard is the more stringent Federal SMCL (The NYSDEC standard for fresh groundwaters is TDS <1,000 mg/L).
Wells HF-102U and HF-104U could not be sampled because they were almost dry and dry, respectively.

Table 5 - Inorganic Parameter Results for 2017 Fountain Avenue Landfill Ground-Water Samples

Inorganic Parameter	Class GA Standard	Well Number and Result, in ug/L										
		HF-102S	HF-102D	102D Dup.	HF-104S	HF-104D	HF-602U	HF-602S	HF-602D	HF-608U	HF-608S	HF-608D
Aluminum	No Std.	<200	<200	<200	31.9 J	51.0 J	22.2 J	20.5 J	44.7 J	800	26.9 J	<200
Antimony	3	<60.0	<60.0	<60.0	<60.0	<60.0	<60.0	<60.0	<60.0	<60.0	<60.0	<60.0
Arsenic*	10**	<10.0	**34.6**	**35.0**	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Barium*	1,000	239	143 J	143 J	189 J	57.7 J	170 J	7.9 J	34.6 J	807	42.5 J	43.6 J
Beryllium	3[GV]	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Boron	1,000	**2,510**	182	180	893	95.0	320	**1,770**	**2,840**	**9,380**	**3,110**	**2,650**
Cadmium*	5	0.87 J	4.6	4.6	<2.5	<2.5	0.16 J	0.18 J	0.20 J	0.64 J	0.60 J	<2.5
Calcium	No Std.	274,000	306,000	305,000	143,000	101,000	130,000	66,500	198,000	54,600	121,000	242,000
Chromium, Total*	50	<10.0	**52.7**	**52.7**	5.5 J	<10.0	2.4 J	7.6 J	<10.0	**236**	5.8 J	<10.0
Cobalt	No Std.	5.1 J	2.1 J	2.5 J	2.1 J	<50.0	0.67 J	1.7 J	4.9 J	38.1 J	3.4 J	4.7 J
Copper	200	<25.0	7.9 J	8.4 J	<25.0	3.7 J	5.1 J	<25.0	3.8 J	7.0 J	<25.0	<25.0
Iron	300	**18,400**	**239,000**	**238,000**	233	40.8	262	15.0 J	57.3	**8,160**	**7,690**	47.6
Iron and Manganese	500	**19,148**	**244,110**	**243,130**	311	50.8 J	346	21.6 J	137	**8,264**	**7,921**	47.6J
Lead*	25	1.4 J	5.4	4.8 J	<5.0	<5.0	8.2	12.2	10.0	13.3	20.2	10.2
Magnesium	35,000[GV]	**646,000**	**161,000**	**160,000**	30,900	15,700	19,900	**165,000**	**622,000**	**37,200**	**346,000**	**747,000**
Manganese	300	**748**	**5,110**	**5,130**	77.8	10.0 J	83.7	6.6 J	79.6	104	231	<100
Mercury*	0.7	<0.20	0.12 J	0.11 J	0.14 J	0.12 J	0.10 J	0.096 J	0.083 J	0.10 J	0.083 J	0.088 J
Nickel	100	3.0 J	5.1 J	4.9 J	2.0 J	1.1 J	3.0 J	1.7 J	5.2 J	67.6	3.0 J	1.7 J
Potassium	No Std.	237,000	44,600	44,600	47,200	6,890	17,300	119,000	261,000	311,000	183,000	276,000
Selenium*	10	6.4 J	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Silver*	50	<10.0	19.4	19.2	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Sodium	20,000	**5,220,000**	**1,290,000**	**1,280,000**	**196,000**	**48,400**	**77,400**	**867,000**	**5,860,000**	**1,590,000**	**4,060,000**	**6,300,000**
Thallium	0.5[GV]	<10.0	**8.3 J**	**7.9 J**	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Vandium	No Std.	3.3 J	<50.0	<50.0	3.3 J	<50.0	3.1 J	25.9 J	3.0 J	287	6.6 J	1.8 J
Zinc	2,000[GV]	5.4 J	11.9 J	11.2 J	4.7 J	12.0 J	4.8 J	1.2 J	5.4 J	28.1	3.1 J	<20.0

Notes: J = Estimated concentration.
GV = Guidance Value.
Wells HF-102U and HF-104U could not be sampled because they were almost dry and dry, respectively.
* = RCRA metal.
** = Standard is the more stringent Federal MCL. (The NYSDEC Class GA standard is 25 ug/L.)
Bold font indicates exceedance of Class GA standard or guidance value.