Pennsylvania Avenue Landfill
Brooklyn, New York
NYSDEC Site No. 224002

Post-Closure Operation, Maintenance and Monitoring Program

2018 Annual Summary Report

and

Second Five-Year Review Report, Third Periodic Review Report

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Section 1 - Introduction

The Pennsylvania Avenue Landfill (PAL) completed its tenth annual post-closure reporting period on December 31, 2018. This Report has been prepared by the New York City Department of Environmental Protection (DEP) to fulfill the reporting requirements contained in the PAL Operation and Maintenance (O&M) Manual, the PAL Monitoring Plan (as modified), and 6NYCRR Parts 363 and 375.

The remainder of this Report is organized into the following Sections:

- Section 2: Site Background – This Section provides a description of the site, a summary of the pertinent PAL site history, and significant site remediation events from the initial Remedial Investigation Report in 1994 through the 2018 Agreement between DEP and the New York State Office of Parks, Recreation, and Historic Preservation (NYS Parks) for development of the site into a State Park.

- Section 3: 2018 Annual Summary Report – This Section summarizes the operation, maintenance and monitoring (OM&M) activities conducted during the 2018 annual post-closure reporting period from January 1 through December 31, 2018.

- Section 4: Second Five-Year Review and Third Periodic Review Report – This Section provides an overall summary and review of the post-closure OM&M activities during the second five post-closure years as required by 6NYCRR Part 363, including a summary of the status and condition of the PAL Institutional Controls (ICs) and Engineering Controls (ECs) during the third periodic review period (January 1, 2014 through December 31, 2018) as required by 6NYCRR Part 375. The executed Institutional and Engineering Controls Certification Form for the third periodic review period accompanies this Report.

- Section 5: Conclusions and Recommendations – This Section provides the conclusions and recommendations related to the Site remedial systems and post-closure OM&M activities based on the second five years of post-closure work.

The combined purpose of this Report has been accepted by the New York State Department of Environmental Conservation (NYSDEC) and the DEP in order to provide an efficient reporting and review process that meets the requirements of 6NYCRR Parts 363 and 375. Unless otherwise directed by the NYSDEC, the current schedule calls for the fourth Periodic Review Report to be submitted at the end of the third five-year post-closure review period which will cover the period from January 1, 2019 through December 31, 2023. That Report will follow the format of this Report and include the 2023 Annual Summary Report.

Section 2 - Site Background

The PAL inactive hazardous waste disposal site (Site) is located on 110 acres at the southern end of Pennsylvania Avenue in Brooklyn, New York. It is bounded by the Belt Parkway, Jamaica Bay, Hendrix Creek and Fresh Creek. A site location map is provided in Figure 1.

In 1956, the Site was opened to receive residential and commercial wastes, including construction and demolition (C&D) residuals and waste oil. In 1962, land-filling activities shifted to the Fountain Avenue Landfill (FAL). The PAL was reopened for disposal of C&D wastes in 1968. It is reported that, between 1974 and 1980, illegal dumping of hazardous wastes occurred at the Site. Disposal of all wastes stopped by 1980, and the Site was added to the Registry of Inactive Hazardous Waste Disposal Sites requiring surveillance. In 1983, the Site was reclassified to a Class 3, which is a site considered not to pose a significant threat, and for which action can be deferred. After an oil inventory and product recovery feasibility study conducted in 1984, the Site was reclassified to a Class 2, a site which poses a significant threat to public health or the environment.

In 1974, ownership of the lands on which the PAL is situated transferred with other parcels from the City of New York to the United States Department of the Interior, National Park Service (NPS), for the creation of the Gateway National Recreation Area with the understanding that landfill operations at PAL could continue at the Site until the end of 1985.

On December 16, 1985, and again on April 17, 1990, the NYSDEC executed Orders on Consent with the New York City Department of Sanitation (DOS) to close and remediate the Site. On April 7, 1992, the DEP entered into a Consent Order with the NYSDEC to perform a remedial program at the Site.

In response to this, DEP conducted a Remedial Investigation/Feasibility Study (RI/FS) to determine the nature and extent of contamination. The Final RI/FS, dated May 1994, revealed that certain areas and media at the Site required remediation; a summary of these results follows:

- Surface soil and sediment samples exhibited varying levels of volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), metals, pesticides and polychlorinated biphenyls (PCBs) contamination.
- It was determined that a floating product (i.e., separate-phase petroleum) plume beneath the Site contaminated the groundwater in the leachate mound and the surface water in Fresh Creek. Tests indicated that the waste oils with the capacity to migrate to the shoreline had already done so, and the remaining oils are stationary. In addition to the VOC and SVOC levels associated with residual petroleum contamination, the waste oil contained PCB levels that classify it as a hazardous waste.
- Groundwater in the leachate mound (U wells – fill aquifer) was somewhat contaminated with VOCs, SVOCs and PCBs, and it was more so in the areas where it was in contact with the floating oil plume. The shallow and deep Upper Glacial Aquifer (S & D wells) did not require remediation because they did not exhibit significant levels of contamination.

By the Order on Consent, Interim Remedial Measures (IRMs) were implemented. An interim cover was placed to prevent casual contact with exposed waste and minimize emissions. Rip-rap was installed for shoreline protection. Construction of a passive waste oil interceptor trench was completed in January 1994. The purpose of the trench is to capture waste oil before it reaches Fresh Creek; however, to date, actual oil migration to the trench has been minimal.

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 subsurface 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.

The Final Feasibility Study Report, dated September 1994, detailed the selection process and the remedial alternative chosen. The option selected included a 6NYCRR Part 360 cap, leachate collection along Fresh Creek, limited sediment excavation, active gas control, and long term monitoring of site media.

The Record of Decision (ROD), dated February 1995, presented the remedial action. In accordance with the ROD, the Site was remediated under construction Contracts Nos. LF-PAL-G2/E2 and LF-PAL-G3. The main elements of this action included:

- Remediation of approximately 30,000 cubic yards of sediment along the Fresh Creek shoreline.
- Installation of a groundwater/leachate (GW/L) management system consisting of a 750-feet-long interceptor trench, two pumping stations, a force-main and an enclosed leachate pre-treatment system with subsequent disposal to the 26th Ward Wastewater Treatment Plant (WWTP).
- Re-grading of the Site to provide proper drainage and minimize erosion.
- Installation of a stormwater collection, conveyance and outfall system.
- Installation of an actively vented impermeable final cover consisting, from top to bottom, of a vegetated top soil layer (6" minimum), a soil barrier protection layer (12"), a Type 2 cover double-sided geocomposite drainage layer or a Type 1 cover cushion geotextile, an LLPDE geomembrane liner (40 mil thick), and a sub-base grading fill layer.
- Planting of warm season grasses and approximately 13,000 shrubs and trees
- Installation of an active landfill gas (LFG) collection system and flaring station.

The ROD called for a pre-approved Post-Closure Monitoring, Sampling and Analysis Plan (the Monitoring Plan, the Plan) to commence within one month of DEP's receipt of NYSDEC's written approval of the Final Engineering Report (FER) for the Site. The FER acceptance letter was dated March 26, 2009, and the first monitoring round was initiated within a month of its receipt and performed in accordance with the Monitoring Plan requirements. Subsequently, the ground-water portion of the Monitoring Plan was revised to allow the low-flow purging and sampling method to be used to collect groundwater samples for the analysis of both the inorganic and organic

parameters. These revised Monitoring Plan requirements were utilized commencing with the second Post-Closure monitoring event. Based on the results of one year of quarterly post-closure monitoring, the frequency of ground water monitoring was reduced from quarterly to annually in rotating calendar quarters (i.e., once every five quarters), and the list of parameters required to be monitored was reduced. This monitoring schedule ensures that monitoring is performed once in each calendar quarter during each five-year review period.

Prior to approval of the FER, a preliminary groundwater sampling and analysis round was conducted in July 2007. Since their installation in May 2008, the perimeter soil gas wells are monitored as needed, and at least quarterly as mandated by the Monitoring Plan.

In July 2012, the NYSDEC changed the classification of the PAL 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.

The Gateway National Recreation Area in which the former Pennsylvania Avenue and Fountain Avenue Landfills are situated was established by the NPS, Site Owner, in order to "preserve and protect for the use and enjoyment of present and future generations an area possessing outstanding natural and recreational features". In 2017, NPS proposed, and NYCDEP and the New York State Office of Parks, Recreation and Historic Preservation (NYS Parks) agreed, that it would be to the mutual advantage of the Federal, State and City governments, and to the benefit of the public, to develop the concept of a park and restoration plan for this area.

Pursuant to said proposal, NYS Parks entered into a General Agreement with NPS, allowing the State to invest State funds for the design, construction, operation and maintenance of a New York State Park at the former Pennsylvania Avenue and Fountain Avenue Landfills. NPS, NYS Parks, and NYCDEP subsequently entered into a Cooperative Management Agreement to effectuate the development of Phase 1 of this State Park (Park), to be named in honor of Shirley Chisholm. In accordance with the requirements of the sites' Environmental Notice, in December 2017, NYS Parks received approval from NYSDEC and the New York State Department of Health to change the Site's land use from a closed landfill to a closed landfill with Department-approved passive recreational uses.

On August 24, 2018, a City-State Agreement was executed between NYS Parks and NYCDEP to allocate the activities and responsibilities necessary to: (1) develop, operate, and maintain the State Park; and (2) operate, monitor, and maintain the landfill systems, in accordance with the Consent Orders, RODs, and Environmental Notices. Per this Agreement, NYS Parks will be making capital improvements to the sites to create the Park and will be responsible for the maintenance of those improvements as well as the maintenance of portions of the capping and closure systems. NYCDEP will continue to be responsible for the operation, monitoring, and inspection tasks outlined in the O&M Manuals and maintenance of the remainder of the capping and closure systems.

Phase 1 construction operations for the Shirley Chisholm State Park are anticipated commence in spring 2019 with the Park scheduled to open to the public in the summer of 2019. Phase 2 is anticipated to open in 2020.

Section 3 – 2018 Annual Summary Report

This Section of the Report covers the tenth annual post-closure period from January 1, 2018 through December 31, 2018.

3.1 Groundwater/Leachate Management System

The groundwater/leachate (GW/L) management system represents one of the components of the selected remedy in the Site's ROD**.** The ROD stipulated the construction of an active leachate collection trench in the area of the waste oil outbreak along Fresh Creek and pumping the leachate to an on-site facility for pre-treatment prior to discharge to the 26th Ward WWTP.

The GW/L collection, pre-treatment and disposal system was designed to prevent migration of groundwater/leachate containing oil and dissolved contaminants to Fresh Creek and to produce a treated effluent acceptable for discharge. The main components of the groundwater/leachate management system consist of a stone-filled interceptor trench with two pump stations; a 3-inch diameter HDPE leachate force main carrier pipe in a 6-inch diameter HDPE casing pipe; a pre-treatment facility and a 4-inch diameter HDPE pretreated leachate force main pipe ultimately discharging to a junction manhole at the 26th Ward WWTP. The GW/L pre-treatment facility was designed to treat up to 30 gpm. The facility's components include oil-water separation with citric acid conditioning, bag filtration and carbon adsorption.

The effluent was originally regulated under DEP's Industrial Wastewater Discharge (IWD) Permit No. 07-P3145-2, effective from August 27, 2007 to August 26, 2012. Based on the historical sampling data indicating that the groundwater/leachate quality in the interceptor trench met the plant's Industrial Pre-Treatment Permit discharge limits, the DEP received approval in 2011 to install diversion piping within the PAL GW/L Pre-Treatment Plant to divert the influent directly to the plant effluent piping. The plant flow was diverted on November 1, 2011 and the new Industrial Wastewater Discharge Permit No. 11-P3145-1, was issued effective November 11, 2011-November 10, 2016. Since that time, the GW/L Pre-Treatment System is operated in Pre-Treatment Plant Diversion Mode. A new Discharge Permit No. 16-P3145-1 was issued effective October 19, 2016-October 18, 2021 and superseded Permit No. 11-P3145-1.

Prior to commencing plant diversion mode, the PLC was reprogrammed to accommodate this second mode of operation. Monthly M-1 sampling continues to be performed under the new permit and is reported quarterly in the Self-Monitoring Reports submitted to the Industrial Inspection and Permitting Section (IIPS). Figure 2 shows the current Pre-Treatment System Schematic, which includes the diversion-related modifications. The Pre-Treatment Plant equipment within the building has been, and shall continue to be properly maintained so that if the GW/L water quality degrades, the Pre-Treatment Plant can be put back into operation in accordance with the PAL O&M Manual.

During this annual reporting period, the system discharged 6,463,846 gallons of groundwater and leachate to the WWTP. The following table summarizes the flow data for the twelve-month period.

Pennsylvania Avenue Landfill						
GW/L System Operation - 2018						
	Total Flow (Gallons)	**Average Flow (GPM)**	**Average Daily Flow (GPD)**	**Maximum Daily Flow (GPD)**	**Number of Days in Service**	**Percent of Time in Service**
January	644,915	14.4	20,804	24,080	31	100%
February	824,690	20.5	29,453	39,940	28	100%
March	741,530	16.6	23,920	33,800	31	100%
April	525,350	12.2	17,512	27,010	30	100%
May	634,900	14.2	20,481	24,040	31	100%
June	436,027	10.1	14,534	17,210	30	100%
July	374,544	8.4	12,082	13,780	31	100%
August	376,360	8.4	12,141	15,210	31	100%
September	135,600	8.0	4,520	11,500	11.8	39%
October	711,280	15.9	22,945	35,230	31	100%
November	381,553	8.8	12,718	32,183	30	100%
December	677,097	15.2	21,842	32,900	31	100%
Average	538,654	**12.7**	**17,746**	NA	NA	**95%**
Maximum	824,690	**21**	NA	**39,940**	NA	NA
Total	**6,463,846**	NA	NA	NA	**346.8**	NA

Although the system is in diversion mode, the interceptor trench continues to be inspected daily for the presence of product and to verify water levels. There was no indication of product in the trench and no off-site leachate migration during this annual reporting period.

Inspection and monitoring of the GW/L pre-treatment system was conducted following the O&M Manual procedures. Daily Operations, bi-weekly (GWL-1), monthly (GWL-2), quarterly (GWL-3), and annual (GWL-5) inspections were performed. Another form, DP-1, "Description of Deficiencies and Problems," was used to highlight specific problems requiring timely attention. While some of the deficiencies caused by the impact of the Hurricane Sandy surge were addressed during the 1st Quarter of 2016, others were designated to be completed under separate contract. During the 3rd Quarter of 2017, the Order to Commence Work for Contract No. 1400-FLP was issued by DEP to address the remainder of these deficiencies, including replacement of the remaining GW/L System operational equipment components that were impacted by the Hurricane Sandy surge. The work required to replace these components commenced during the 3rd Quarter and was completed during the 4th Quarter of this annual reporting period. 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 system was taken off-line at times in September in order for the Contract No. 1400-FLP electrical component replacement work to be performed, which included installation of new dry transformers, strip heaters, AC drives, control transformers, contactors, solid state overload relays and miscellaneous fuses at the GW/L System pump stations. While the system was off-line, additional electrical work was completed, including repair of a circuit-short in the system and replacement of the pump at Pump Station #1. When the system was brought back on-line, a faulty media converter card was discovered at Pump Station #2 that was preventing the pump from

running on automatic mode. A replacement media converter card has been ordered and will be installed once received. In the interim, Pump Station #1 is running on automatic mode and Pump Station #2 is being run on manual mode when the water level in the interceptor trench rises. Additional deficiencies at the GW/L System addressed during this annual reporting period included installation of a new probe at Pump Station #1 on August 17th.

Since there has never been any product detected at the leachate pump stations, as a precautionary measure the replacement of the scavenger pumps was examined but determined not to be necessary at the time. The pump stations will continue to be inspected on a daily basis and the water quality will continue to be sampled on a monthly basis in accordance with the Discharge Permit requirements. Should product be observed, mitigation measures will be taken at that time to ensure they are appropriate to the actual conditions encountered. The replacement of the OWS influent filter casing and the petroscreen coalescer baskets has been placed on hold since the treatment system can be placed back on line without these items, thereby, allowing for their replacement when, and if, the pre-treatment system is placed back on-line. At the commencement of the diversion mode operation, the pre-treatment plant equipment and piping that was being circumvented, was power-washed and prepared in accordance with the manufacturer's recommendations to remain in a standby condition. The equipment continues to be inspected as required to ensure that they remain in good operating condition and ready to return to service if needed. Copies of the inspection reports are included in Appendix A of the 2018 Quarterly Reports.

During this reporting period, the M-1 pre-treatment system effluent was regulated by DEP IWD Permit No. 16-P3145-1 (see Appendix A). In accordance with the permit, effluent samples were collected on a monthly basis. The Self-Monitoring Reports (SMR's) were submitted to the DEP Industrial Pre-Treatment & Permit Section (IPPS) prior to the end of each Quarter. Examination of the M-1 Sampling data for the 2018 annual reporting period summarized in Table 1 indicates that there were no exceedances of any of the permit parameters during this annual reporting period. Appendix B of the 2018 Quarterly Reports contains the 2018 SMR's including the results of the laboratory analyses.

To document that operation of the interceptor trench collection system is still warranted, the M-1 sample results were compared to the NYSDEC 6NYCRR Part 703 and TOGS 1.1.1 standards and guidance values for Class SA (Saline) surface waters, summarized in Table 1. Based on that comparison, in 2018, the concentrations of chlorobenzene and total dichlorobenzene in the interceptor trench water regularly exceeded their 5-µg/L guidance values. Two other parameters that had not previously been detected, copper and mercury, also exceeded their respective standard or guidance value on one occasion in 2018. Therefore, since these parameters exceeded their respective guidance values for protection of saltwater fish propagation, operation of the interceptor trench collection system is still warranted.

3.2 Landfill Gas Management System

The landfill gas management system (LFGMS) 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 363 to limit off-site gas migration to 25% of the lower explosive limit (LEL) in structures and at the

property line (i.e., 1.25% gas in air). The LFGMS operates in accordance with an Air Facility Registration Certificate # 2-6105-00762/00001 issued by the NYSDEC.

The LFGMS features 46 gas extraction wells (EWs), a below grade polyethylene collection header piping network with isolation valves, two 375-scfm centrifugal blowers (Blowers 301 and 302), a condensate collection system, an enclosed flare system, process instrumentation and controls, a programmable logic control (PLC) management system, a fire alarm system and an emergency condition alarm autodialer phone system. A plan of the overall LFGMS is shown on Figure 3 illustrating the location of the extraction wells, header pipes and flare facility.

The four main headers that convey the landfill gas are connected to a condensate drain line at their low point located adjacent to the flare station. The condensate drain line and the drain lines from the two blower demisters (knock out pots) empty into the 2,500 gallon condensate tank located at the flare station. At the end of the 2018 annual post-closure period, the condensate tank inventory was 740 gallons.

Main piping on the vacuum side of the blowers contains an 8-inch butterfly valve with an electric actuator. This automatically adjusts the valve position according to the vacuum transmitter readings in order to control the landfill vacuum. This is followed by an 8-inch electro-pneumatic butterfly valve which operates with a compressed nitrogen cylinder. This valve automatically closes in the event of a system failure or shutdown.

The gas flare system is designed to operate with one blower in service and one as redundant standby. Although designed to collect up to 375 scfm of landfill gas, the system averaged 152.4 scfm during the 2018 annual post-closure period. Process gas temperature and pressure readings from the vacuum and discharge side are recorded daily in the LFG-1 inspection log. The monthly summary report of the LFG-1 daily inspections is included in Appendix C of the 2018 Quarterly Reports.

All 46 gas EWs were 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 are corrected at the time of the inspection, work orders are issued for other work. The LFG-3 inspection reports are included in Appendix C of the 2018 Quarterly Reports.

Landfill gas is discharged from the blowers through an 8-inch header and flame arrestor into the enclosed flare. The flare pilot is fired using natural gas from the utility company. The natural gas is also used as auxiliary fuel to supplement the recovery of landfill gas.

During the 2018 annual reporting period, 428,883 SCF of natural gas was consumed for the pilot, to help bring system to temperature after start-ups and to supplement the recovery of landfill gas. The flare support system includes a purge air blower, two manual and two automatic dampers, and temperature control with three thermocouples. The flare operation is on automatic control using the bottom thermocouple at a target temperature of 1,500 ^{o}F.

During the 1st Quarter of 2018, low methane concentrations routinely caused the flare to automatically shut down, resulting in increased use of natural gas to ignite the flare pilot and supplement methane recovery. In order to reduce natural gas consumption, the NYSDEC granted approval to operate the flare on a modified "pulse-operations" (e.g., not continuous operation) schedule. Beginning on March 12, 2018 the flare was and continues to be run on pulse-operations. In the 2nd Quarter of 2018, the flare was operated during work hours (i.e., run during the work day, shut-down at the end of the work day, and restart the next morning). In the 3rd and 4th Quarters, the flare was operated during the work-week and shut-down for the weekend (i.e., run during the week, shut-down Friday morning, remain off-line during the weekend, restart Monday morning). Landfill gas quality at the flare and the flare's operation schedule continue to be closely monitored to determine the most appropriate run-time to ensure optimum methane concentrations. The methane content at the flare has significantly improved since pulse operations commenced.

During the 2018 annual reporting period, the landfill gas flaring system processed 32,812,721 SCF of landfill gas at an average methane content of 21.6%. The system had 5,170.7 hours of down time due to pulse-operations, routine equipment inspection, calibration and maintenance, flame failure faults attributed to poor gas quality, replacement of equipment impacted by the Hurricane Sandy surge under Contract No. 1400-FLP and the FDNY annual inspection. The flare was in service for 41.0 percent of the time during this annual reporting period. Flow and process gas content data is summarized in the table that follows.

Pennsylvania Avenue Landfill			
Flare Operation - 2018			
	CH_4 (% by Volume)	**Time in Service (Hours)**	**Flow (SCF)**
January	17.3%	429.0	3,740,829
February	17.5%	295.0	2,574,725
March	20.9%	83.0	747,154
April	24.7%	233.0	2,166,753
May	23.6%	428.0	3,308,250
June	22.3%	266.5	2,717,234
July	21.9%	291.5	2,719,362
August	21.7%	300.7	2,966,599
September	21.7%	290.0	2,733,737
October	22.3%	341.8	3,159,882
November	22.6%	293.2	2,903,641
December	22.5%	337.6	3,074,555
Average	**21.6%**	NA	**2,734,393**
Total	NA	**3,589.3**	**32,812,721**

Bi-weekly (LFG-2) and quarterly (LFG-4) inspections were conducted, and copies are included in Appendix C of the 2018 Quarterly Reports. The Annual FDNY inspection of the flare station was performed on December 11th and was found to be satisfactory. The condensate monitoring system

float and probe was replaced in January 2018. The work required to replace the operational equipment components impacted by the Hurricane Sandy surge and designated for replacement was completed during the 3rd and 4th Quarters under Contract No. 1400-FLP. This included installation of new dry transformers, current monitors, circuit breakers, VFD motor starters, power supplies, strip heaters, thermostats and miscellaneous fuses. 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.

3.3 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. According to the O&M Manual, the cover is comprised of a vegetative topsoil layer with a minimum thickness of 6 inches; a 12-inch thick soil barrier protection layer; a Type 2 cover system double-sided geocomposite drainage layer (areas with less than 5% slope); a Type 1 cover system cushion geotextile layer (areas with slopes greater than 5%); a 40-mil thick LLDPE (linear low density polyethylene) geomembrane liner; and 6-inch thick Type II cover soil.

The O&M Manual requires the final cover system 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). The surface of the landfill was divided into 17 inspection zones. All 17 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 each 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 D of the 2018 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. The remaining deficiencies encountered, including erosion in inspection Zone 4 and ponding in inspection Zones 1, 2, 5, 16, and 17, are being monitored and repair details will be developed, if necessary.

Under the Agreement executed on August 24, 2018 between the DEP and NYS Parks, NYS Parks is responsible for the maintenance/repair of the following elements of the Final Cover System:

- Surface restoration and replanting of the grass cover and topsoil layer of the final cover system; and
- Landscaping, both existing and any landscaping installed by NYS Parks. At a minimum, NYS Parks shall perform all landscaping work, including maintenance and repair of existing vegetation/landscaping including those in the existing planting islands, required in the O&M Manual.

3.4 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 PAL in order to prevent stormwater ponding and erosion damage to the final cover system.

The stormwater management system consists of several components (as shown in Figure 4) 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: Geocomposite drain pipes and stormwater drainage swales,
- SWM-2: Outlets, culverts, rip-rap inlet and outlet protection and revetment area, and
- SWM-3: HDPE down chute pipes, manholes, pipe trenches and energy dissipation structures.

The O&M Manual requires that the 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 each inspection is summarized on Monthly Checklist Forms SWM-1, SWM-2, SWM-3 and DP-1 (for SWM-1, SWM-2 and SWM-3) for each system 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 2018 post-closure period do not necessarily affect the overall performance of this system. Debris was cleared when observed during inspections. The swales and culverts were mowed, and excessive vegetative growth and debris were removed. The concrete drainage channel was completely cleared of debris, sediment, and dead vegetation and excess vegetation on the slope along Hendrix Creek was cut. The DP-1 Forms identify some locations where sediment, erosion, 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. Monthly inspections showed the system is working adequately. The monthly inspection reports and DP-1 Forms can be found in Appendix D of the 2018 Quarterly Reports.

Under the Agreement executed on August 24, 2018 between the DEP and NYS Parks, NYS Parks is responsible for the maintenance/repair of the following elements of the Stormwater Management System:

- Clearing of overgrown vegetation, sediment and debris, including trash, from stormwater swales;
- Clearing of visible sediment, debris, including trash, and vegetative growth from outlets and culverts, culvert inlet/outlet rip-rap protection and energy dissipaters; and Removal of trash and debris from rip-rap in revetment areas.

3.5 Ancillary Systems

The ancillary systems (ANS) are those support systems at the PAL that are used for site access and security. The ancillary systems include five (5) access roads (A, B, C, D and E) and two (2) nature trails (East & West) as shown in 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. In anticipation of the site being developed into a State Park, DEP installed security cameras at the site entrance, GW/L Plant, and Flare Station to maintain security of DEP facilities during off-hours. The security system is monitored by DEP Central Communications personnel.

The O&M Manual requires that the ANS be inspected on a monthly basis. 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 instructions for the checklists further require inspections immediately after each major rainfall event equal to or exceeding the 2-year 24-hour precipitation event (3.5 inches in 24 hours). These are incorporated into the monthly inspection reports found in Appendix D of the 2018 Quarterly Reports.

Safety inspections are performed monthly. Damaged and missing "Confined Space" and "Hazard" signs are also replaced when necessary.

During the 4th Quarter of 2018, miscellaneous site work was performed; including removal of abandoned irrigation pipes and dead trees, and clearing and leveling within the utility area adjacent to the GW/L pre-treatment plant.

Under the Agreement executed on August 24, 2018 between the DEP and NYS Parks, the NYS Parks is responsible for the maintenance/repair of the following elements of the Ancillary Systems:

- Maintain the surface condition of all gravel paths and the perimeter stone and paved roads necessary for operation of the State Park. Such maintenance shall not include repairs required because of subsurface settlement or other subsurface conditions;
- Maintain and, when necessary, repair or replace Site perimeter fencing including gates and locks to prevent unauthorized access to the Site when the State Park is closed; and
- Install and maintain signage except that DEP shall maintain and, when necessary, repair or replace, signage relating to Landfill Infrastructure and City Property security and/or safety.

3.6 Post-Closure Environmental Monitoring

The Monitoring Plan for the PAL went into effect when the FER was approved by NYSDEC at the end of March 2009, and now incorporates modifications approved by the NYSDEC in 2011. The Plan addresses the performance evaluation of the effectiveness of the cap and/or landfill gas collection system in controlling leachate and landfill gas migration. It requires monitoring of the groundwater elevation and quality at ten wells (HP wells) located around the perimeter, outside

the limits of the closure cap, and soil gas quality in five wells (GMW wells) located outside the limits of the cap parallel to the Belt Parkway as shown in Figure 5. Groundwater monitoring is performed once every five quarters and soil gas quality monitoring is performed quarterly. Monitoring for landfill gas is also performed on a monthly basis inside the groundwater/leachate treatment facility building, as per 6NYCRR Part 363 requirements (minimum quarterly frequency). Additionally, the landfill surface is monitored semi-annually for potential landfill gas emissions, although this is not a regulatory requirement at this site.

3.6.1 Gas Monitoring Program

Perimeter soil gas readings were taken at the five perimeter gas monitoring wells during quarterly monitoring rounds and after extended flare outages to confirm the absence of off-site gas migration. Figure 5 shows the locations of the perimeter gas wells, while the gas monitoring results are summarized in Table 2. There was no methane detected at GMW-1, GMW-2 and GMW-3. Methane detected at GMW-4 and GMW-5 was very low, at concentrations between 0.3% and 0.9% by volume. These results are less than 25% of the LEL (i.e., 1.25% gas in air), and are therefore acceptable per the 6NYCRR Part 363 landfill regulations. Monitoring data is included in Appendix E of the 2018 Quarterly Reports.

On May 18th and October 15th, 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. The levels encountered during these monitoring events are well below the 6NYCRR Part 208.4 requirement that landfill gas collection systems be operated so that methane concentrations are less than 500 ppm above the background at the landfill surface. Figure 6 shows the sampling locations and monitoring results are included in Appendix E of the 2018 Quarterly Reports.

Methane readings within the GW/L pre-treatment facility building were obtained on a monthly basis and were consistently 0.0% throughout the facility. These readings were taken during M1 Sampling events. These building-interior results are less than 25% of the LEL, and are therefore acceptable per the 6NYCRR Part 363 landfill regulations. The data is summarized in Table 3 of this Report.

Based on the results of the post-closure landfill-gas monitoring performed during this reporting period, methane levels measured at the property line were less than the 6NYCRR Part 363 requirements, indicating that the landfill gas being generated by the PAL 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.

3.6.2 Groundwater Monitoring Program

In the NYSDEC letter of March 2, 2011 to DEP, the NYSDEC approved the DEP's request to reduce the frequency of groundwater monitoring from quarterly to annually in rotating quarters (i.e., once every five quarters), and to reduce the frequency of monitoring for pesticides and PCBs to once every five years. This groundwater monitoring schedule allows results to be obtained

during every calendar quarter during each five-year review period. In addition, beginning in 2011, annual reporting periods were aligned to the calendar year. Accordingly, prior annual groundwater monitoring rounds were performed during the first quarter of 2011, the second quarter of 2012, the third quarter of 2013, the fourth quarter of 2014, the first quarter of 2016, and the second quarter of 2017. In accordance with the rotating calendar quarter schedule, no groundwater monitoring was required in 2015. Monitoring for pesticides and polychlorinated biphenyls (PCBs) for the second five-year review period was completed during the second quarter of 2017.

The third quarter 2018 groundwater-monitoring round served as the annual monitoring round for the period covered by this Report. The next annual groundwater-monitoring round will be performed during the fourth quarter of 2019.

The PAL groundwater monitoring well depths are designated by aquifer zone as follows:

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

The groundwater beneath the PAL is influenced by the tide cycle. However, a prior hydraulic analysis determined that while the tide cycle causes pressure fluctuations in the wells, it does not significantly influence groundwater flow beneath the site. Accordingly, monitoring rounds are conducted independently of the tide cycle. Moreover, the water-level data are used for informational purposes only, and not to determine groundwater-flow directions or gradients.

Water-levels and groundwater samples were collected from all ten monitoring wells (see Figure 5) on September 5th and 6th. Most of the wells were purged and sampled using dedicated submersible pumps. Wells HP-101S, HP-318, HP-407S and HP-603 were sampled using a peristaltic pump and dedicated tubing. This modification does not impact the results for these wells because the low-flow purging and sampling techniques were still used for these wells. Apart from an unusually high drawdown in Well HP-103D (8.41 feet vs. <0.3 feet) the samples were collected in accordance with low-flow protocols. The excessive drawdown in Well HP-103D indicates low yield. However, the screen zone of this well is far enough below the water table so potential cascading of groundwater within the well was not a concern, and the well was purged from the screen zone. Therefore, the higher drawdown in this well likely did not significantly impact the sampling results.

The samples were analyzed for the required annual parameters, specifically: volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), leachate indicator parameters and inorganic parameters. The analyses were performed by an ELAP-certified environmental laboratory. Ten percent of the results (one sample) were validated by an independent data validator. The water-level elevation data, sample collection field logs, Laboratory Final Report and data validator's Data Usability Summary Report are included in Appendix F of the 2018 3rd Quarter Report.

The results are summarized and compared to the prior year's results as well as the Part 703 Class GA standards and NYSDEC TOGS 1.1.1 guidance values in Tables 4 through 7. Note that Tables 4 and 5 only list the target VOCs and SVOCs, respectively, that were detected in at least one sample. Most of the VOCs and SVOCs analyzed for were not detected in any of the wells sampled.

Overall, the results of the 2018 annual groundwater-monitoring round are consistent with previous results, and continue to indicate that the PAL is not a significant source of releases of hazardous or toxic substances to groundwater. The results also indicate that site-related impacts are limited to the fill aquifer, which is hydraulically separated from the underlying UGA by a layer of naturally-occurring organic marsh deposits with low permeability. The results for wells screened in the UGA continue to indicate that the groundwater beneath the PAL is naturally saline, which is consistent with its shoreline location. It should be further noted that since the groundwater beneath the PAL is naturally saline it is therefore non-potable. However, the results are compared to the potable (Class GA) standards and guidance values because there are no standards or guidance values for saline groundwater. Accordingly, an exceedance of a potable-groundwater standard or guidance value does not necessarily indicate a significant concern for this site.

The results for each analyte group are summarized below. Note that five of the groundwater-monitoring wells (Wells HP-101U, HP-407U, HP-104A, HP-318 and HP-603) are screened in the fill aquifer, two wells (Wells HP-101S and HP-407S) are screened in the shallow zone of the UGA and the other three wells (Wells HP-101D, HP-407D and HP-103D) are screened in the deep zone of the UGA.

VOCs – The results of the 2018 annual groundwater-monitoring round continue to indicate that the PAL is not a significant source of VOC impacts to groundwater. Specifically, although each groundwater sample was analyzed for 46 target VOCs, as shown in Table 4, only three VOCs (acetone, chlorobenzene and 1,4-dichlorobenzene) were actually detected. Acetone was the VOC detected most frequently and at highest concentration. However, the acetone detections may be due to background and/or laboratory contamination because acetone was also detected in the field blank. Concentrations of the other two detected VOCs (chlorobenzene and 1,4-dichlorobenzene) were limited to low concentrations of chlorobenzene in five wells (HP-101U, HP-104A, HP-318, HP-407U and HP-603), and 1,4-dichlorobenzene in one well (HP-101U). All five of these wells are screened in the fill aquifer above the TMD. All of the VOC detections were lower than the Class GA standard or guidance value for these parameters.

SVOCs – The results of the 2018 annual groundwater-monitoring round also indicate that the PAL continues to not be a significant source of SVOC impacts to groundwater. Specifically, although each groundwater sample was analyzed for 63 target SVOCs, as shown in Table 5, only nine SVOCs were actually detected. Moreover, most of the detections were limited to very low, estimated concentrations in only one well. Two SVOCs (bis (2-ethylhexyl) phthalate and diethyl phthalate) were detected in nearly all of the wells, but also primarily at low, estimated concentrations and are attributed to leaching of the wells' PVC screens and casings. The only exceedances of Class GA standards or guidance values were for bis (2-ethylhexyl) phthalate in Wells HP-101S and HP-103D, and for indeno (1,2,3-CD) pyrene in Well HP-407U.

Leachate Indicators – The 2018 leachate indicator parameter results are consistent with the PAL being an old, closed and capped municipal landfill that is underlain by saline groundwater. Specifically, as shown in Table 6, most of these parameters were detected in nearly every well; except for BOD and cyanide, which typically do not occur naturally at significant concentrations in saline groundwater; and nitrate, which is metabolized by bacteria in the groundwater.

Moreover, the concentrations of the parameters known to occur naturally in seawater, such as bromide, chloride, hardness, sulfate, and total dissolved solids, are highest in the wells screened in the deep zone of the UGA, where the ground water is the most saline. Other parameters, such as alkalinity, ammonia, color and phenols, appear to be site-related because they are detected only, or at significantly higher concentrations, in wells screened in the fill aquifer.

The concentrations of a number of parameters exceeded their Class GA standard or guidance value. However, it should be noted that most of the exceedances were for parameters related to the naturally saline groundwater beneath the Site. The exceedances for the site-related parameters, such as ammonia and phenols, are not a significant concern because the groundwater is non-potable. Moreover, ammonia occurs naturally in seawater and is not persistent in the environment; and the standard for phenols is aesthetics-based rather than health-based.

Inorganic Parameters – The 2018 inorganic parameter results continue to indicate that the PAL is not a significant source of metals-related impacts to groundwater. Specifically, as shown in Table 7, most of the target analytes, including the more toxic 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, iron, magnesium, potassium and sodium, are generally higher in the wells screened in the UGA than in the wells screened in the fill aquifer. This pattern indicates that they are primarily attributed to the naturally saline groundwater beneath the Site.

The concentrations of certain metals exceeded their Class GA standards and guidance values. However, it should be noted that most of these exceedances, and the highest-magnitude exceedances, were for parameters that are related to the naturally saline groundwater beneath the Site. No exceedances for heavy metals occurred during the 2018 monitoring round.

Appendix F of the 2018 third Quarter Report contains the synoptic water-level data, the sample collection field logs, and a full copy of the Laboratory Final Report, and the data validator's Data Usability Summary Report (DUSR). Printed copies of that Report will include the Laboratory Final Report and DUSR on CD due to their page length. The next groundwater monitoring round will be performed during the fourth quarter of 2019.

Section 4 – Second Five-Year Review and Third Periodic Review Report

As previously discussed, this Section serves two purposes. First, this section represents the second five-year review of PAL post-closure OM&M activities required by 6NYCRR Part 363 for the period from January 1, 2014 through December 31, 2018. Secondly, this Section also represents the third Periodic Review Report (PRR) discussing the status and condition of the PAL Institutional Controls (ICs) and Engineering Controls (ECs) required by 6NYCRR Part 375. The executed Institutional and Engineering Controls Certification Form for the third periodic review period accompanies this Report. This third PRR and Certification covers the period from January 1, 2014 through December 31, 2018. The first and second PRRs and Certifications covered the periods from April 1, 2009 through March 31, 2010 and April 1, 2010 through December 31, 2013, respectively.

The following subsections discuss the status and conditions of the PAL site remedial systems, the results of the post-closure monitoring and the pertinent activities that occurred during the second five-year review period.

4.1 Groundwater/Leachate Management System

The effluent from the groundwater/leachate pre-treatment facility was originally regulated under NYCDEP's Industrial Wastewater Discharge (IWD) Permit No. 07-P3145-2, effective from August 27, 2007 through August 26, 2012. Based on monitoring data indicating that the influent entering the facility continuously met permit discharge limits without pre-treatment, the DEP received approval in 2011 to install diversion piping within the PAL Groundwater/Leachate Pre-Treatment Plant to divert the influent directly to the plant effluent piping. The plant flow was diverted on November 1, 2011, and the new IWD Permit No. 11-P3145-1 was issued effective from November 11, 2011 to November 10, 2016. Since that time, the Groundwater/Leachate Pre-Treatment System has been operated in Pre-Treatment Plant Diversion Mode. A new Discharge Permit # 16-P3145-1 (see Appendix A) was issued effective from October 19, 2016 to October 18, 2021 and superseded Permit # 11-P3145-1.

Prior to commencing plant diversion mode, the PLC was reprogrammed to accommodate this second mode of operation. Monthly M-1 sampling continues to be performed under the new permit and is reported quarterly in the Self-Monitoring Reports submitted to the IIPS. This information is contained in Appendix B of each Quarterly Report. To date, the results have continued to show that all discharge requirements are being met. The results also indicate that the concentrations of certain parameters (e.g., chlorobenzene and total dichlorobenze) in the influent continue to exceed the NYSDEC limits for saline surface water on a regular basis with sporadic exceedances of other parameters (e.g., zinc, copper and mercury). Therefore, operation of the interceptor trench is still warranted.

The Pre-Treatment Plant equipment within the building has been, and shall continue to be properly maintained so that if the groundwater/leachate quality degrades, the Pre-Treatment Plant can be put back into operation in accordance with the PAL O&M Manual. The interceptor trench is

monitored daily to inspect for the presence of product and to verify water levels. There was no indication of product or off-site leachate migration noted during this reporting period.

During this five-year review period, the system discharged a total of 39,302,497 gallons of groundwater and leachate to the WWTP. The table below summarizes the flow data by year.

Pennsylvania Avenue Landfill						
GW/L System Operation – Five-Year Review Period						
Post-Closure Year	**Total Flow (Gallons)**	**Average Flow (GPM)**	**Average Daily Flow (GPD)**	**Maximum Daily Flow (GPD)**	**Number of Days in Service**	**Percent of Time in Service**
6	8,100,705	16.0	23,106	42,640	365.0	100.0%
7	7,935,528	15.2	21,906	33,250	362.0	99.2%
8	8,091,313	15.9	22,976	43,660	355.1	97.0%
9	8,741,105	15.8	24,022	48,630	364.0	100.0%
10	6,463,846	12.7	17,768	39,940	346.8	71.1%
Average	NA	**15.1**	**21,956**	**41,624**	NA	**93.5%**
Total	**39,302,497**	NA	NA	NA	**1,792.9**	NA

Throughout this five-year reporting period, the groundwater/leachate management system was inspected in accordance with the O&M Manual, as summarized in the Quarterly and Annual Reports. During this period, the system was periodically taken off-line for the following reasons: a controlled shutdown in preparation for predicted blizzard conditions from January 26th – January 29th in 2015; failure and replacement of the power transformer from January 23rd – February 2nd in 2016; failure of Pump Station #1 on April 10, 2017; and replacement of electrical equipment components impacted by the Hurricane Sandy surge under Contract 1400-FLP in the 3rd Quarter of 2018. Contract 1400-FLP was procured by DEP in the 3rd Quarter of 2017 to address the remainder of the deficiencies attributed to the Hurricane Sandy surge that had not been addressed during the previous five-year reporting period. 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 Contract 1400-FLP contract work included installation of new dry transformers, strip heaters, AC drives, control transformers, contactors, solid state overload relays and miscellaneous fuses at the GW/L System pump stations. In August 2018, prior to commencement of the Contract 1400-FLP contract work, Pump Station #2 was found offline due to a low volt fault and subsequent irregular flow readings raised suspicions of a communication error within the GW/L System. While the Contract 1400-FLP contract work was underway, the on-call electrician discovered and repaired a circuit short in the pull box at Pump Station #1, which was likely the cause of the low volt fault at Pump Station #2 in August 2018. Repairing the short restored power to the control panels for both pump stations, however, Pump Station #1 would not run and Pump Station #2 would only run on manual mode. Once the Contract 1400-FLP contract work was completed, Pump Station #2 was returned to service on manual mode and, shortly thereafter, the pump for

Pump Station #1 was replaced, allowing Pump Station #1 to be run on automatic mode. Upon further troubleshooting, it was determined that the media converter card at Pump Station #2 had failed and required replacement. The replacement media converter card has been ordered and will be installed during the next quarterly reporting period. In the interim, Pump Station #1 is running on automatic mode, the water level in the interceptor trench is being monitored daily, and Pump Station #2 is being run on manual mode when the water level in the interceptor trench rises.

4.2 Landfill Gas Management System

During this five-year reporting period, the LFGMS processed 191,911,901 SCF of landfill gas, was in service for 32,651.7 hours representing an average of 74.4% time in service and the average methane quality at the flare was 18.8%. System flow and process gas content data are summarized in the following table for each of the second five annual post-closure reporting periods.

Pennsylvania Avenue Landfill					
Flare Operation – Five-Year Review Period					
Post-Closure Year	**Avg. CH_4 (% by Volume)**	**Time in Service (Hours)**	**Percent Time in Service**	**Avg. Blower Flow (SCFM)**	**Flow (SCF)**
6	20.7%	8,193.0	93.3%	66.3	35,461,531
7	17.1%	7,245.9	82.5%	83.1	36,113,480
8	17.1%	7,826.3	89.1%	94.7	44,450,063
9	17.4%	5,797.0	66.2%	123.4	42,933,640
10	21.6%	3,589.5	41.0%	153.0	32,953,187
Average	**18.8%**	NA	**74.4%**	**104.1**	NA
Total	NA	**32,651.7**	NA	NA	**191,911,901**

The LFGMS was in service for 74.4% of the time during the five-year reporting period. The system was out of service for various reasons including shut-downs for routine inspection, calibration, maintenance, repair and/or replacement of equipment; controlled shut-downs to protect equipment from anticipated severe weather conditions; flame failures caused by poor LFG quality; low flow faults attributed to condensate blockage; system evaluations by the manufacturer's representative; FDNY inspections; occasional power failures associated with poor weather, etc.

Towards the end of this five-year post-closure period, recurrent flame failures attributed to poor gas quality resulted in increased use of natural gas to ignite the flare pilot and supplement methane recovery. To reduce natural gas consumption, the NYSDEC granted approval to operate the flare on a modified "pulse-operations" schedule. Beginning in the 1st Quarter and continuing into the 2nd Quarter of 2018, the flare was operated during work hours (i.e., run during the work day, shut-down at the end of the work day, and restart the next morning). In the 3rd and 4th Quarters of 2018, the flare was operated during the work-week and shut-down for the weekend (i.e., run during the week, shut-down Friday morning, remain off-line during the weekend, restart Monday morning).

LFG quality at the flare and the flare's operational schedule continue to be closely monitored to determine the most appropriate run-time to ensure optimum methane concentrations for flare operation. The data provided in the above table confirms that the modified pulse operations schedule has resulted in increased methane concentrations in excess of 20% which had not be achieved since the 6th post-closure year. Further adjustments to the flare's operational schedule may be warranted in the future as LFG quality continues to decline as the landfill ages.

The landfill gas flare system is designed to operate with one blower in service and one as redundant standby. Although designed to collect up to 375 scfm of landfill gas, the system averaged 104.1 scfm during the five-year review period. The average Methane quality at the flare during the five-year review period was 18.8% based on the average values reported for each of the post-closure years. The lowest average monthly methane concentration at the flare during this reporting period was 15.0% in September 2015 with a high of 24.6% for April 2018. The modified pulse operations schedule resulted in an increase in the average yearly methane concentration of 4.2% between 2017 and 2018. Overall, the average monthly methane concentration at the flare during this reporting period was between 20% and 25% for 21% of the reporting period.

The flare pilot is fired using natural gas from the utility company. The natural gas is also used as auxiliary fuel to supplement the recovery of landfill gas. During this five-year reporting period 2,261,884 SCF was used for the pilot, to help bring system to temperature during start-ups and to improve landfill gas quality to the flare.

Throughout this five-year reporting period, the LFGMS was inspected in accordance with the O&M Manual, as summarized in the Quarterly and Annual Reports. Deficiencies encountered at the flare and blower station addressed during this five-year reporting period include the following: replacement of a defective breaker that had been preventing the Control Panel GFI outlet from resetting; periodic servicing of the vacuum transmitter; replacement of a bent louver arm bracket; replacement of unresponsive thermocouples (bottom and top, on separate occasions); replacement of the gas flow meter; replacement of the missing condensate sentinel float and probe; and servicing of the main header isolation valves.

Additionally, the operational equipment components impacted by the Hurricane Sandy surge that were designated for replacement were replaced under DEP Contract No. 1400-FLP during the 3rd and 4th quarters of 2018. This included installation of new dry transformers, current monitors, circuit breakers, VFD motor starters, power supplies, strip heaters, thermostats and miscellaneous fuses. Other equipment components exposed to the Hurricane Sandy surge that are currently operational but were not designated for replacement under Contract No. 1400-FLP will continue to be monitored and assessed over time and may be replaced in the future, if necessary.

4.3 Final Cover System

During the five-year reporting period, the final cover system was inspected, maintained and repaired in accordance with the requirements of the O&M Manual, as summarized in the Quarterly and Annual Reports. Overall, the final cover system is in good condition. Erosion resulting from the Hurricane Sandy surge on the water-side perimeter of Zone 9 was repaired under the priority repair work order and erosion in Zone 4 has been stabilized by vegetative cover. Additionally,

invasive species mowing of approximately 7 acres was conducted under the direction of DEP BEPA in 2015. The remaining deficiencies encountered, including erosion in inspection Zone 4 and ponding in inspection Zones 1, 2, 5, 16, and 17, are being monitored and repair details will be developed, if necessary.

In accordance with the Agreement between DEP and NYS Parks, as of August 24, 2018, NYS Parks is responsible for the maintenance/repair of the certain components of the final cover system identified in Section 3.3 of this Report. DEP will continue to be responsible for inspection and reporting for all final cover system components, as well as maintenance of the remaining components of the final cover system not under NYS Parks' responsibility.

4.4 Stormwater Management System

During the five-year reporting period, the stormwater management system was inspected in accordance with the O&M Manual, as summarized in the Quarterly and Annual Reports. The system remained operational throughout the reporting period. Minor deficiencies were repaired on an ongoing basis and did not necessarily affect the overall performance of this system. Routine maintenance generally included removal of excessive vegetative growth, sediment, and debris from swales and culverts.

In accordance with the Agreement between DEP and NYS Parks, as of August 24, 2018, NYS Parks is responsible for the maintenance/repair of the certain components of the stormwater management system identified in Section 3.4 of this Report. DEP will continue to be responsible for inspection and reporting for all stormwater management system components, as well as maintenance of the remaining components of the stormwater management system not under NYS Parks' responsibility.

4.5 Ancillary Systems

During the five-year reporting period, the ancillary systems were inspected in accordance with the O&M Manual, as summarized in the Quarterly and Annual Reports. Overall, the majority of the systems remained in good condition throughout the reporting period. The majority of deficiencies noted throughout this reporting period generally consisted of rutting and potholes in roadways and damage to the perimeter fence/gates which were repaired on an ongoing basis. Additionally, in anticipation of the site being developed into a State Park, DEP installed security cameras at the site entrance, GW/L Plant, and Flare Station to maintain security of DEP facilities during off-hours. The security system is monitored by DEP Central Communications personnel.

In accordance with the Agreement between DEP and NYS Parks, as of August 24, 2018, NYS Parks is responsible for the maintenance/repair of the certain components of the ancillary systems identified in Section 3.5 of this Report. DEP will continue to be responsible for inspection and reporting for all ancillary system components, as well as maintenance of the remaining components of the ancillary systems not under NYS Parks' responsibility.

4.6 Post-Closure Environmental Monitoring

The Post-Closure Monitoring Plan for PAL went into effect when the FER was approved by NYSDEC at the end of March 2009, and now incorporates modifications approved by the NYSDEC in 2011. It entailed quarterly monitoring for groundwater conditions in ten wells located around the perimeter of the Site, outside the limits of the landfill cap; and quarterly monitoring for the presence of methane in five gas monitoring wells located along the north boundary of the Site, adjacent to the Belt Parkway. Additionally, monitoring for the presence of methane is performed on a monthly basis inside the groundwater/leachate Pre-Treatment Facility building to ensure compliance with the NYSDEC Solid Waste Management Facility regulations.

During the PAL post-closure monitoring period, the PAL Post-Closure Monitoring Plan requirements have been modified as approved by the NYSDEC and the NYSDEC Solid Waste Management Facility regulations have been revised. The following sections address these modifications.

4.6.1 Gas Monitoring Program

During this five-year reporting period, effective November 4, 2017, NYSDEC updated the 6NYCRR Solid Waste Management Facility regulations, shifting the landfill post-closure management requirements from 6NYCRR Part 360 to 6NYCRR Part 363. The new 6NYCRR Part 363 requirements, reduced the limit for methane concentrations at the property line from the LEL (i.e., 5% gas in air) to 25% of the LEL (i.e., 1.25% gas in air), while the requirements for methane in structures remained the same (i.e., 1.25% gas in air). The quarterly perimeter gas monitoring events at the site were performed in accordance with 6NYCRR Part 360 from 2014 through 2017, with the 2018 monitoring events being performed in accordance with the 6NYCRR Part 363 requirements. Figure 5 shows the locations of the five perimeter Gas Monitoring Wells GMW-01 to GMW-05.

During this five-year reporting period, based on the results of the quarterly perimeter gas monitoring rounds shown in Table 8, methane concentrations in all wells did not exceed the more stringent 6NYCRR Part 363 requirement of limiting methane concentrations to 1.25% at the property line. In fact, during the twenty quarterly monitoring events, methane readings of 0.0% were encountered in all wells with the following exceptions:

GMW-01 – three detections between 0.1% to 0.3%
GMW-02 – one detection of 0.3%
GMW-03 – two detections of 0.3% and 0.4%
GMW-04 – fourteen detections between 0.1% to 1.2%
GMW-05 – ten detections between 0.1% to 0.5%

Methane readings within the groundwater/leachate Pre-Treatment Facility building were obtained on a monthly basis and were consistently 0.0% throughout the facility during the five-year reporting period. The methane monitoring results indicate that methane levels within the building were less than 25% of the LEL (i.e., 1.25% gas in air) and met the 6NYCRR Part 363 requirements.

The Pre-Treatment Facility building methane monitoring results are summarized in tables in the Quarterly Reports.

Landfill surface gas readings were taken semi-annually during the five-year reporting period, with no detections observed throughout the landfill. Sample locations are shown in Figure 6, and results are provided in the Appendices of the Quarterly Reports.

4.6.2 Groundwater Monitoring Program

The first round of post-closure groundwater monitoring was performed during the second quarter of 2009. During the first two years of post-closure monitoring, groundwater was monitored on a quarterly basis, for all required Monitoring Plan parameters. After the first monitoring round, the field procedures in the Monitoring Plan were updated to allow the use of the low-flow purging and sampling procedure to collect samples for all parameters (instead of switching to bailers for VOCs). Analyses are performed by a State-certified environmental laboratory, and ten percent of the results are independently verified. The groundwater beneath the PAL is influenced by the tide cycle. However, hydraulic analysis determined that while tide cycle causes pressure fluctuations in the wells, it does not significantly influence groundwater flow beneath the site. Accordingly, monitoring rounds are conducted independently of the tide cycle, and water-level data are used for informational purposes only, not to determine groundwater flow directions or gradients.

Based on the results from the first year of monitoring, which indicated that the remediated PAL is not a significant source of contaminant releases to groundwater, DEP requested justifiable reductions in the frequency and scope of groundwater monitoring. NYSDEC approved that request in a letter dated March 2, 2011, and reduced 1) the frequency of groundwater monitoring from quarterly to annually, in rotating quarters (i.e., once every five quarters), and 2) the frequency of monitoring for pesticides and PCBs to once during each five-year review period. In addition, the post-closure reporting periods were revised to coincide with the calendar year. Accordingly, during the second five-year review period, the annual monitoring round for 2014 was performed during the fourth quarter; monitoring was not required in 2015, and the annual monitoring rounds for 2016, 2017 and 2018 were performed during the first, second and third quarters, respectively. Monitoring for pesticides and PCBs was performed during the 2017 monitoring round and will continue to be performed once during each subsequent five-year review period, unless DEP receives approval from NYSDEC to discontinue monitoring for these parameters in the future.

Overall, the results for this review period indicate that the PAL is not a significant source of releases of hazardous or toxic substances to groundwater, and that concentrations of the few site-related parameters detected are stable or decreasing over time. The results for the detected VOCs, SVOCs, leachate indicator parameters, and metals during the second five-year review period are summarized and compared to the NYSDEC Class GA standards and guidance values in Tables 9 through 12, respectively. These tables are also used to compare the results from this five-year review period to the 1993 remedial investigation (RI) results and the average concentrations from the first five-year review period (2009-2013). Pesticides and PCBs were not been detected during the 2017 monitoring round, so summary tables for these analyte groups are not included.

As previously noted, the groundwater beneath the PAL is naturally saline and therefore non-potable. The results were compared to the Class GA potable water standards and guidance values because there are no standards or guidance values for saline ground water. However, exceedances of these standards and guidance values do not necessarily indicate a significant concern. The specific results for each analyte group are summarized on the following pages.

VOCs – Only ten VOCs have been detected at least once during the past ten years of post-closure groundwater monitoring. Moreover, most of these detections have been sporadic and limited to low concentrations in one to a few wells. During the 2018 monitoring round, only three VOCs were detected – acetone, chlorobenzene and 1,4-dichlorobenzene. The results for these three VOCs are summarized in Table 9.

As shown in Table 9, only one VOC (chlorobenzene) has been detected on a fairly regular basis and with the exception of the 1993 RI samples from Well HP-103D, it has only been detected in wells screened in the fill aquifer, above the tidal marsh deposit. Moreover, chlorobenzene concentrations in groundwater have been decreasing over time, particularly when compared to the pre-remediation RI results. The only exceedances of the Class GA standards for VOCs during this reporting period were low-magnitude exceedances for chlorobenzene, in the 2014 sample from Well HP-603, and the 2017 sample from Well HP-104A. Both of these wells are screened in the fill aquifer, above the tidal marsh deposit.

Except for chlorobenzene in the 1993 RI samples from Well HP-103D, significant concentrations of VOCs have not been detected in the five wells screened in the Upper Glacial Aquifer. This finding indicates that the tidal marsh deposit is continuing to serve as a hydraulic barrier to vertical migration of groundwater from the fill aquifer into the underlying Upper Glacial Formation.

SVOCs – Similar to VOCs, only nine of the SVOCs analyzed for have been detected at least once during the past ten years of post-closure groundwater monitoring. Nearly all of these detections have also been limited to sporadic, low concentrations in wells screened in the fill aquifer above the tidal marsh deposit. Moreover, as shown in Table 10, over time, the number and concentrations of SVOC detections has generally been decreasing. For example, in 2018, most of the SVOC detections occurred in just one well (HP-407U), and most were limited to low, estimated concentrations. SVOC detections in the five wells screened in the underlying Upper Glacial Aquifer were mainly limited to bis (2-ethylhexyl) phthalate in two wells. This SVOC is a plasticizing agent used in the production of PVC. As such, its detection is most likely attributable to leaching from the wells' PVC screens and casings.

Site-related exceedances of the Class GA standards and guidance values during this reporting period were limited to indeno (1,2,3-cd) pyrene in the 2018 sample from Well HP-407U. The bis (2-ethylhexyl) phthalate concentrations in the 2018 samples from Wells HP-101S and HP-103D, and in the 2017 sample from HP-103D exceeded its Class GA standard but, as noted above, these detections do not appear to be site-related. Accordingly, taken as a whole, the SVOC results for this reporting period still indicate that the PAL is not a significant source of SVOC releases to groundwater, and that the tidal marsh deposit is continuing to serve as a hydraulic barrier to vertical migration of groundwater.

Pesticides – Pesticides were not detected during the 2017 monitoring round, or in any of the groundwater samples collected during the first five years of post-closure monitoring. Pesticides were also generally not detected during the RI. This finding indicates that the PAL continues to not be a source of pesticide impacts to groundwater.

PCBs – PCBs were also not detected during the 2017 monitoring round or in any of the groundwater samples collected during the first five years of post-closure monitoring, and were only detected sporadically during the RI. This finding also indicates that the PAL continues to not be a source of PCB impacts to groundwater.

Leachate Indicators – The leachate indicator parameter results for this reporting period continue to be consistent with the PAL being an old, closed and capped municipal landfill that is underlain by saline groundwater. Specifically, as shown in Table 11, most of these parameters were detected in nearly every well; except for BOD and cyanide, which typically do not occur at elevated concentrations in uncontaminated saline ground water; and nitrate, which is metabolized by the naturally-occurring bacteria in the ground water. However, the concentrations of the parameters known to occur naturally in seawater, such as bromide, chloride, hardness, sulfate and total dissolved solids, are highest in the wells screened in the Upper Glacial Aquifer where the groundwater is most saline. Other parameters, such as alkalinity, ammonia and phenols, appear to be site-related because they are often detected at higher concentrations in wells screened in the fill aquifer above the tidal marsh deposit.

The concentrations of a number of parameters exceed the Class GA standards and guidance values. However, it should be noted that most of the exceedances are for parameters that are related to the saline ground water beneath the PAL. The exceedances for the site-related parameters, such as ammonia, are not a significant concern because the groundwater is non-potable, as noted above. Moreover, ammonia occurs naturally in seawater and is not persistent in the environment, and the standard for phenols is aesthetics-based rather than health-based.

Metals – The metals results for this reporting period continue to indicate that the PAL is not a significant source of metals-related impacts to groundwater. Specifically, as shown in Table 12, most of the target analytes, including the more toxic heavy metals, were either not detected or were only detected sporadically and/or at low concentrations. Moreover, the concentrations of the frequently-detected parameters, such as boron, magnesium, potassium and sodium, are generally much higher in the wells screened in the Upper Glacial Aquifer than in the wells screened in the fill aquifer above the tidal marsh deposits. This pattern indicates that they are primarily attributable to the saline groundwater.

The concentrations of certain metals exceed the Class GA standards and guidance values. However, it should be noted nearly all of the exceedances, and the highest-magnitude exceedances, are for parameters attributable to the saline groundwater. During this reporting period, no significant exceedances for heavy metals occurred, and overall, metal concentrations in the groundwater are similar to, or lower than, previous results.

In summary, taken as a whole, the results for this reporting period indicate that the PAL continues to not be a significant source of toxic or hazardous substance releases to groundwater, and that groundwater quality conditions beneath the Site are stable or improving over time in response to the remediation. The results also confirm that the reductions in the scope and frequency of post-closure groundwater monitoring were justified, and that further reductions may be warranted.

4.7 Record of Decision (ROD) Land Use Restriction Requirement

The ROD for the PAL required that a deed restriction be in place for the Site to prevent the extraction of ground water for consumptive use, and to ensure that any future Site use or other invasive activity is approved by NYSDEC and NYSDOH. In a letter dated March 29, 2009, NYSDEC indicated that it would accept either a deed restriction, per 6 NYCRR Part 360, or an environmental easement, per 6 NYCRR Part 375, in satisfaction of this requirement. The land upon which the PAL is located is owned by the National Parks Service (NPS) and DEP was informed by the NPS that it does not allow deed restrictions or environmental easements to be placed on its lands. Therefore, NYSDEC utilized an Environmental Notice, dated May 16, 2012, to satisfy this regulatory requirement. The Environmental Notice was recorded in New York City's ACRIS database on July 16, 2012. Therefore, the land use restriction requirement of the ROD has been fulfilled.

In anticipation of the site being converted to a State Park, NYS Parks obtained waivers from both the NYSDEC and the New York State Department of Health (NYSDOH), as required by the Site's Environmental Notice, to change the Site's land use from a "landfill" to a "closed landfill with Department-approved passive recreational uses". These waivers were provided in letters from the NYSDEC and NYSDOH dated December 13, 2017.

4.8 Periodic Review Report (PRR) Requirement

6NYCRR Part 375 requires that PRRs contain a certification that the Institutional and Engineering Controls are in effect and the certification be submitted on an appropriate Site-specific schedule. The information in subsections 4.1 through 4.7 above satisfies the requirements of the third PRR for the PAL, covering the period from January 1, 2014 through December 31, 2018. The executed Institutional and Engineering Controls Certification Form for the third periodic review period accompanies this Report.

Section 5 – Conclusions and Recommendations

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

During this five-year reporting period, the remaining Hurricane Sandy repairs and replacement of equipment were performed under Contract 1400-FLP. Routine system maintenance and repair of each of the remediation systems should continue in compliance with the requirements of the PAL O&M Manual.

Per the Agreement executed on August 24, 2018 between DEP and NYS Parks, NYS Parks will be making capital improvements to the sites to create the Shirley Chisholm State Park and will be responsible for the maintenance of those improvements, as well as the maintenance of portions of the Final Cover System, Stormwater Management System and Ancillary Systems identified under Section 3 of this Report. All work performed by NYS Parks will be done in accordance with the sites' RODs, Consent Orders, Environmental Notices and O&M Manuals. DEP will continue to be responsible for inspection and reporting of the condition of all components of these systems. DEP and NYS Parks will work together to coordinate these efforts.

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

5.1 Groundwater/Leachate Management System

The groundwater/leachate management system continued to be operational and prevent off-site leachate migration during the Site's second five-year review period. Since November 1, 2011, the groundwater/leachate management system has been operating in plant diversion mode. In this mode, the treatment system processes are being circumvented since the quality of the interceptor trench water being collected meets the permit discharge limits without pre-treatment. During this reporting period, the untreated discharge continued to meet the required permit limits. The interceptor trench discharge monthly monitoring for permit-required parameters will be continued in accordance with the permit requirements. Should it be necessary in the future for the treatment processes to be brought back online, it would be recommended that monthly influent/effluent water quality sampling be reinstated.

Based on a review of the Monthly M-1 sample results, the concentrations of certain parameters in the influent continue to exceed the NYSDEC limits for saline surface water. Therefore, operation of the interceptor trench is still warranted.

As previously recommended in prior Post-Closure Reports, since no product has ever been detected at the leachate pump stations, the replacement of the scavenger pumps was examined and

determined not to be necessary. The pump stations should continue to be inspected on a daily basis and the water quality should continue to be sampled on a monthly basis in accordance with the discharge permit requirements. Should product be observed, mitigation measures should be taken at that time to ensure they are appropriate to the actual conditions encountered. Based on the results of the monitoring and inspection activities performed during this five-year reporting period, this recommendation remains in effect.

Operational equipment components exposed to the Hurricane Sandy surge that are currently operational but were not designated for replacement under Contract No. 1400-FLP should continue to be monitored and assessed over time and may be replaced in the future, if necessary.

In general, it is recommended that individual pieces of equipment that are not in use be maintained in good working condition and ready to be placed back on-line, if necessary. The interceptor trench pump stations and related equipment will continue to be operated and maintained. If deficiencies are noted they will be repaired and/or replaced in a timely manner to minimize system down time. Specifically, the recommended corrective actions listed in Form DP-1, Leachate Pre-Treatment System, Descriptions of Deficiencies and Problems, in Appendix A of the Quarterly Reports should be implemented.

5.2 Landfill Gas Management System

The LFGMS continued to be operational and prevent off-site gas migration during the Site's second five-year review period. As the landfill ages, the methane quality and quantity of gas generated by the landfill will continue to decline. The methane content at the flare has significantly improved under the pulse-operation schedule implemented in March 2018 with the approval of the NYSDEC. The LFGMS should continue to be operated under pulse operations to maximize methane quality at the flare in order to minimize the use of supplemental gas. The recommendations made by the DEP oversight consultant to improve system performance should continue to be implemented. The LFGMS performance should continue to be monitored to determine if additional adjustments and/or modifications to the system are necessary as the landfill gas quality and quantity diminishes further in the future.

Operational equipment components exposed to the Hurricane Sandy surge that are currently operational but were not designated for replacement under Contract No. 1400-FLP should continue to be monitored and assessed over time and may be replaced in the future, if necessary. In addition, the recommended corrective actions listed in Form DP-1, Landfill Gas System, Descriptions of Deficiencies and Problems, in Appendix C of the Quarterly Reports should be implemented.

5.3 Final Cover System

Overall, the landfill final cover system continued to be protective of the landfill cap beneath it during the Site's second five-year review period. Conditions found were typical of those encountered during the landfill post-closure period, with only a few deficiencies noted. In general, it is recommended that routine maintenance continue to be performed to prevent problem areas from expanding and worsening. In addition, the recommended corrective actions listed in Form

DP-1, FCS-1, Descriptions of Deficiencies and Problems, in Appendix D of the Quarterly Reports should be implemented.

In accordance with the Agreement between DEP and NYS Parks, as of August 24, 2018, NYS Parks is responsible for the maintenance/repair of the certain components of the final cover system identified in Section 3.3 of this Report. DEP will continue to be responsible for inspection and reporting for all final cover system components, as well as maintenance of the remaining components of the final cover system not under NYS Parks' responsibility. DEP and NYS Parks will work together to coordinate these efforts.

5.4 Stormwater Management System

The stormwater management system continued to convey stormwater runoff to its outfall locations during the Site's second five-year review period. Conditions found were 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. The recommended corrective actions listed in Form DP-1 (SWM-1, SWM-2 SWM-3), Descriptions of Deficiencies and Problems, in Appendix D of the Quarterly Reports should be implemented as deemed appropriate.

In accordance with the Agreement between DEP and NYS Parks, as of August 24, 2018, NYS Parks is responsible for the maintenance/repair of the certain components of the stormwater management system identified in Section 3.4 of this Report. DEP will continue to be responsible for inspection and reporting for all stormwater management system components, as well as maintenance of the remaining components of the stormwater management system not under NYS Parks' responsibility. DEP and NYS Parks will work together to coordinate these efforts.

5.5 Ancillary Systems

The roads and nature trails of the ancillary systems continued to provide access throughout the Site while the fencing and gates continued to allow for controlled site access during the Site's second five-year review period. Conditions found were typical of those encountered during the landfill post-closure period, with a few deficiencies noted. In general, it is recommended that routine maintenance continue to be performed to prevent problem areas from expanding and worsening. . In addition, the recommended corrective actions listed in Form DP-1, ANS-1, Descriptions of Deficiencies and Problems, in Appendix D of the Quarterly Reports should be implemented.

In accordance with the Agreement between DEP and NYS Parks, as of August 24, 2018, NYS Parks is responsible for the maintenance/repair of the certain components of the ancillary systems identified in Section 3.5 of this Report. DEP will continue to be responsible for inspection and reporting for all ancillary system components, as well as maintenance of the remaining components of the ancillary systems not under NYS Parks' responsibility. DEP and NYS Parks will work together to coordinate these efforts.

5.6 Post-Closure Environmental Monitoring

Based on the results of the post-closure environmental monitoring performed to date, the PAL remedy continues to be protective of public health and the environment and is compliant with the PAL ROD.

The results of the post-closure landfill-gas monitoring performed during this five-year reporting period document that methane levels measured were less than the 6NYCRR Part 363 requirements indicating that the landfill gas being generated by the PAL 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.

In summary, the groundwater monitoring results from this reporting period continue to indicate that the PAL is not a significant source of toxic or hazardous substance releases to groundwater, and that groundwater-quality conditions beneath the Site are stable or improving over time in response to the remediation. The results also confirm that the reductions in the scope and frequency of post-closure groundwater monitoring were justified, and that further reductions may be warranted.

Recommendations for post-closure groundwater monitoring are to continue to perform the environmental monitoring in accordance with the modified Monitoring Plan (approved by the NYSDEC in March 2011) reflecting the reduction in the frequency of groundwater monitoring to annually, in rotating quarters (i.e., once every five quarters) and the reduction in the frequency of monitoring for pesticides and PCBs to once during each five-year review periods. It is also recommended that further reductions in the scope and/or frequency of monitoring be evaluated, and if warranted that a request be submitted to the NYSDEC. In the meantime, the next groundwater monitoring round will be performed during the fourth quarter of 2019.

Figures

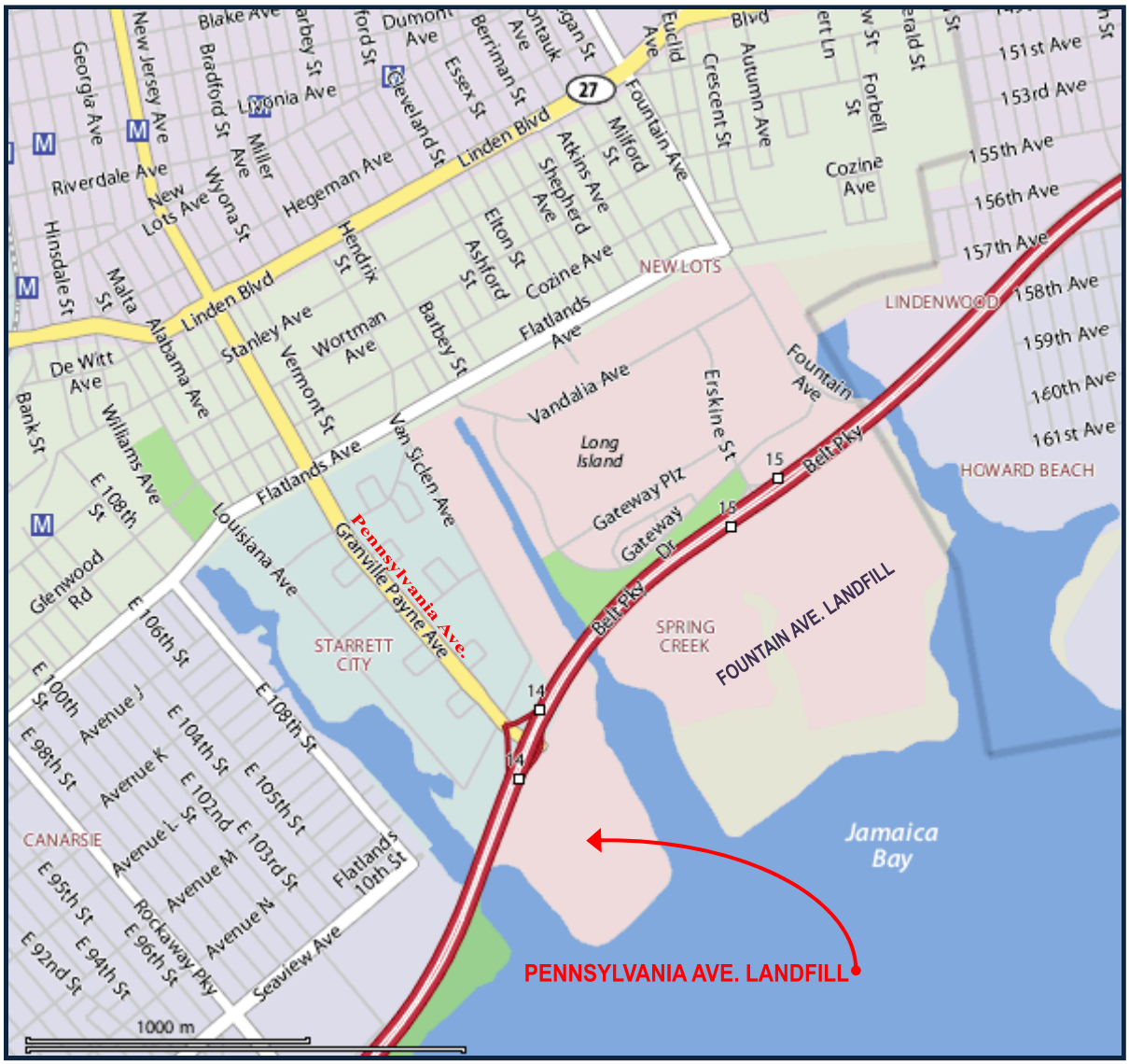


FIGURE 1
SITE LOCATION MAP

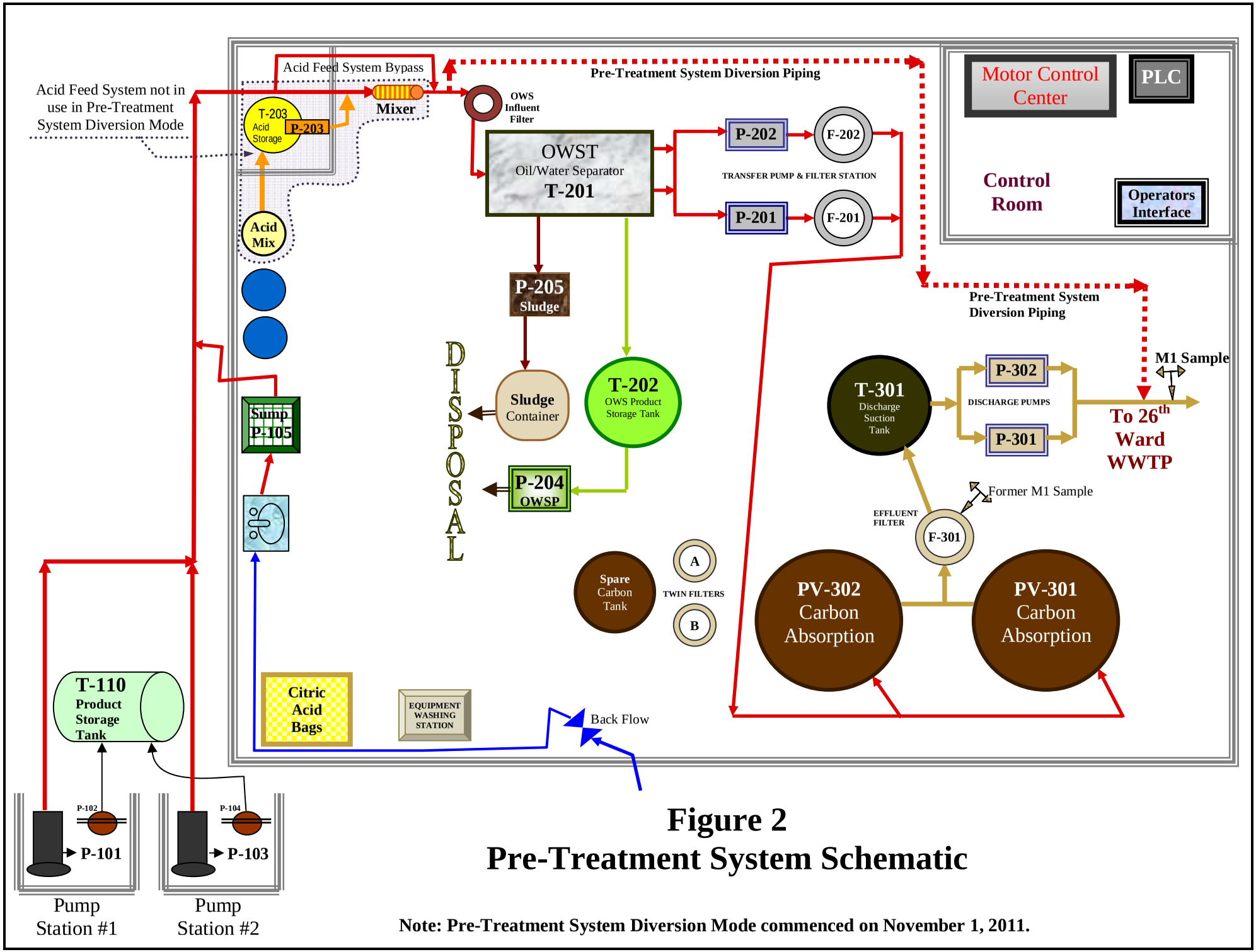


Figure 2
Pre-Treatment System Schematic

Note: Pre-Treatment System Diversion Mode commenced on November 1, 2011.

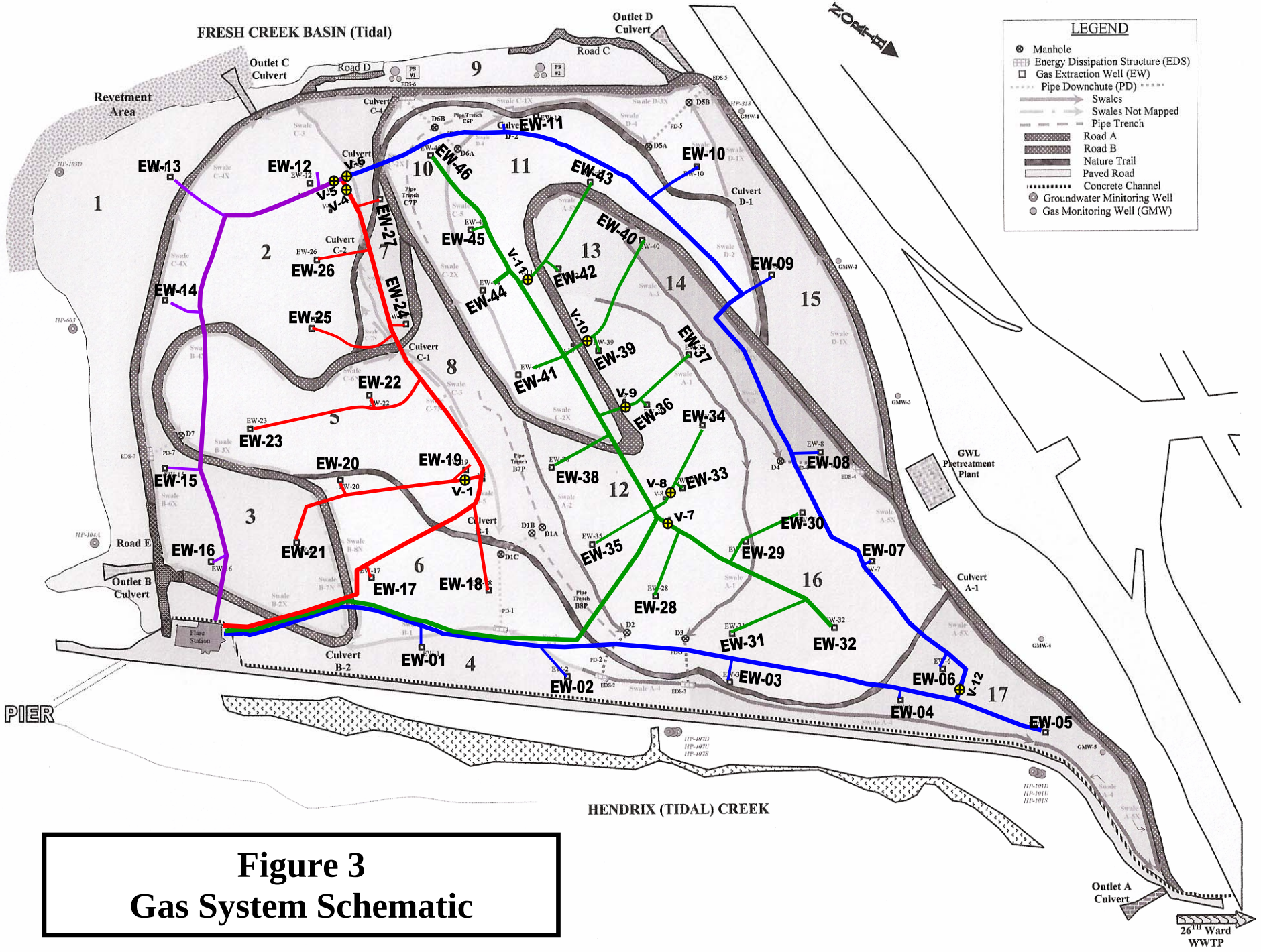


Figure 3
Gas System Schematic

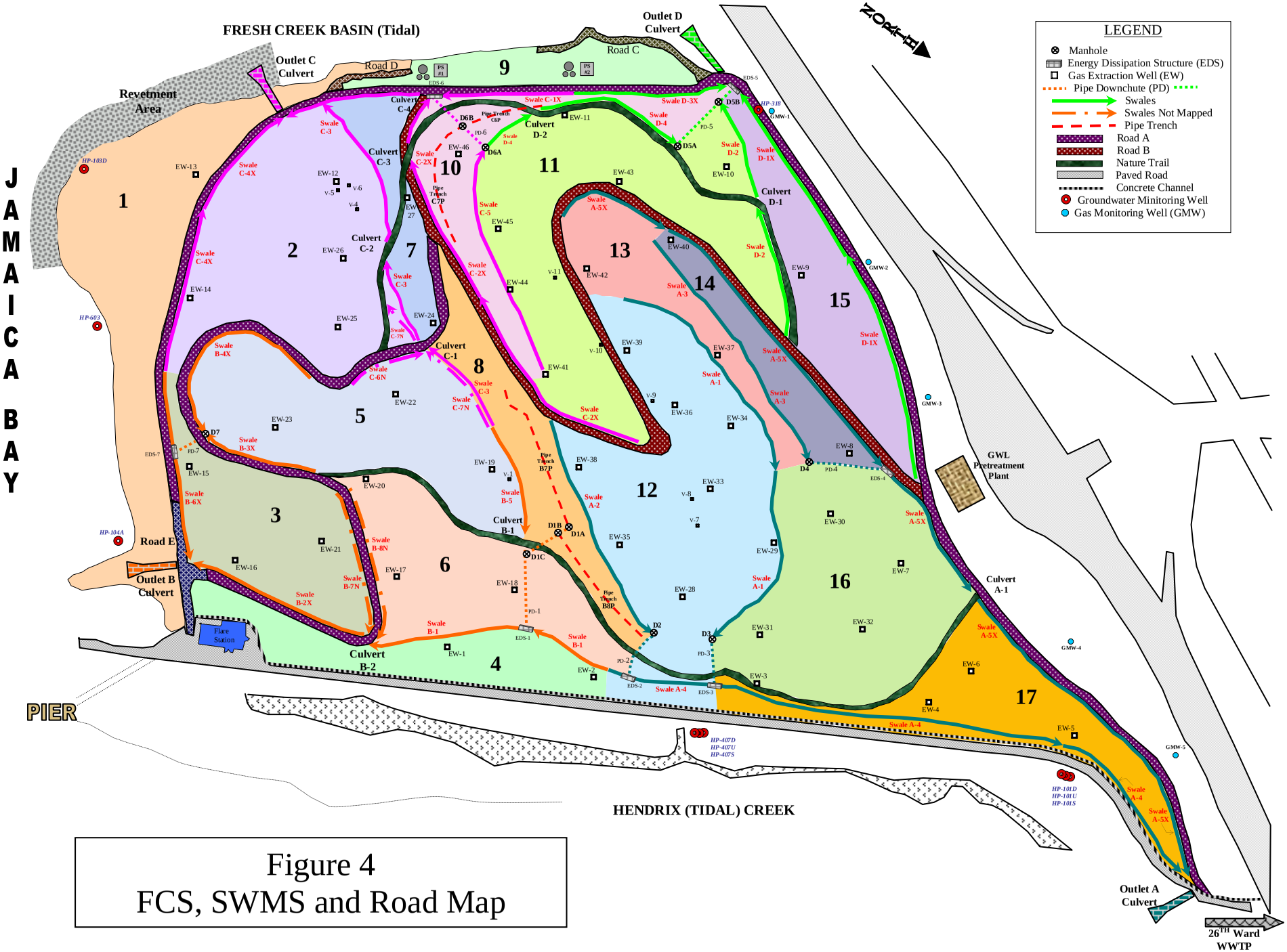


Figure 4
FCS, SWMS and Road Map

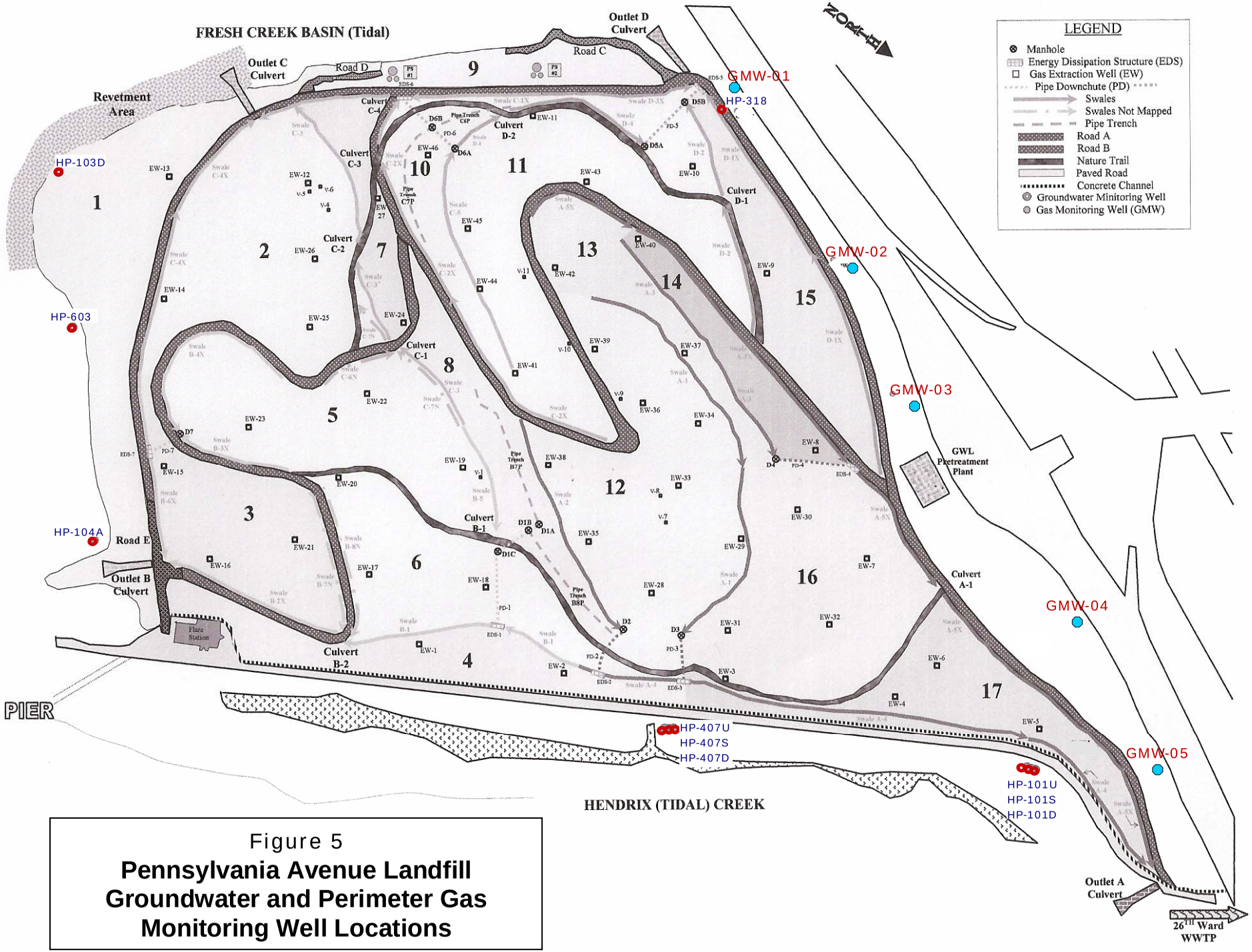


Figure 5

Pennsylvania Avenue Landfill Groundwater and Perimeter Gas Monitoring Well Locations

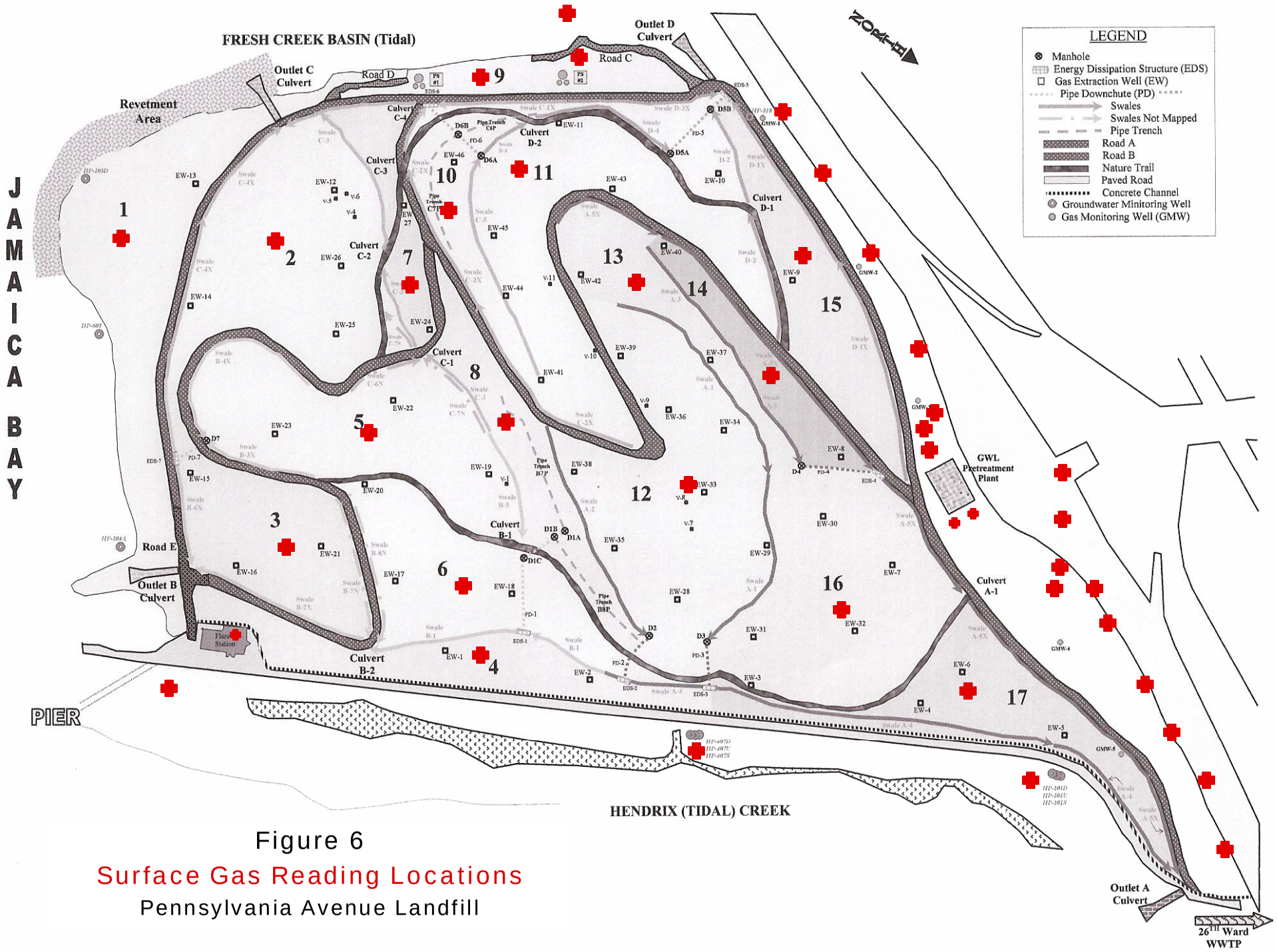


Figure 6

Surface Gas Reading Locations

Pennsylvania Avenue Landfill

Tables

Table 1

Parameters Detected in the Groundwater Leachate Pre-Treatment System Discharge

Pennsylvania Avenue Landfill, Brooklyn, NY

Parameters Detected in at least one of the Samples Analyzed to Date	Units	IWD Permit Discharge Limit(s)	NYSDEC Saline SW Standard(s)	Saline SW Standard Basis Code(s)	M1 Discharge Sample Results											
					01/18/18	02/15/18	03/26/18	04/10/18	05/14/18	06/05/18	07/12/18	08/16/18	09/25/18	10/19/18	11/19/18	12/20/18
Copper**	ug/L	5000	3.4 / 4.8	A(C) / A(A)	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	**39.0**	<25.0	<25.0	<25.0
Mercury**	ug/L	50	7×10^{-4} / 0.0026	H(FC) / W	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	**0.22**	<0.20	<0.20	<0.20
Zinc	mg/L	5.0	0.066 / 5(GV)	A(C) / E	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	**29.5**	<10.0	<10.0	<10.0
BOD	mg/L	--	--		5.1	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Chloride	mg/L	--	--		3230	717	946	741	1410	1440	1830	655	66.5	1290	150	116
Nitrate	mg/L	--	--		0.12	1.1	0.16	0.064	<0.050	0.15	0.13	0.21	0.085	<0.050	0.12	0.15
Nitrogen, Kjeldahl, Total	mg/L	--	--		49.0	48.5	19.8	25.8	59.2	42.8	52.6	20.7	7.1	43.9	7.7	12.7
Nitrogen, Total	mg/L	--	--		49.1	49.5	20.00	25.9	59.2	43.0	52.7	21	7.2	43.9	7.8	12.9
Suspended Solids	mg/L	350	--		6.0	3.0	<10.0	<10.0	2.5	<10.0	15.25	3.5	46	21.5	<5.0	7
pH	SU	5.0 - 11.0	--		7.0	7.1	7.2	7.0	7.0	6.9	6.9	6.8	6.9	7.0	7.0	6.9
VOCs																
1,2 Dichlorobenzene	ug/L	--	--		1.0	1.5	1.9	2.4	3.9	2.0	1.7	<1.0	<1.0	1.8	<1.0	<1.0
1,3 Dichlorobenzene	ug/L	--	--		<1.0	<1.0	<1.0	<1.0	1.2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,4 Dichlorobenzene	ug/L	--	--		2.0	2.6	2.8	3.2	5.5	3.2	3.6	1.7	<1.0	3.6	1.5	2.2
Total Dichlorobenzene	ug/L	--	5		3.0	4.1	4.7	**5.6**	**10.6**	**5.2**	**5.3**	1.7	<1.0	**5.4**	1.5	2.2
2-Butanone**	ug/L	--	--		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	7.1	<5.0	<5.0	<5.0	<5.0	<5.0
Benzene	ug/L	134 or 57*	10 / 190 / 670	H(FC) / A(C) / A(A)	1.1	<1.0	<1.0	<1.0	1.6	<1.0	<1.0	<1.0	<1.0	1.1	<1.0	<1.0
Chlorobenzene	ug/L	--	5(GV) / 400	A(C) /H(FC)	**21.4**	**12.3**	2.0	3.5	**26.6**	3.0	8.6	3.1	<1.0	14.9	<1.0	1.3
m,p-Xylene**	ug/L	--	--		<1.0	<1.0	<1.0	<1.0	1.2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Xylene (total)	ug/L	74 or 28*	19(GV) / 170(GV)	A(C) / A(A)	<1.0	<1.0	<1.0	<1.0	1.2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
SVOCs																
Acenaphthene	ug/L	--	--		<1.0	<1.0	<1.0	<1.0	1.8	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
bis(2-Ethylhexyl)phthalate	ug/L	--	--		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	4.4	<1.0
Dimethyl phthalate**	ug/L	--	--		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	0.328 J	<1.0	<1.0	<1.0	<1.0
Di-n-butyl phthalate	ug/L	--	--		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2.1	<1.0	7.5	<1.0
N-Nitrosodiphenylamine	ug/L	--	--		4.3	4.0	3.0	2.8	9.3	4.3	5.5	1.6 J	1.6	3.2	2.9	3.0

Footnotes:

mg/L = milligrams per Liter.
ug/L = micrograms per Liter.
SU = Standard Units.
A(A) = Fish survival.
A(C) = Fish propagation.
E = Aesthetic.
H(FC) = Human Consumption of Fish.
W = Wildlife Protection.
(GV) = Guidance Value only, not a standard.

* Daily and monthly limits, respectively.
** Not detected in earlier reporting periods.
-- No standard available.
Bold values exceed saline surface-water standard or guidance value.
J = Estimated value.

Table 2

Summary of Perimeter Gas Monitoring Well Results

Pennsylvania Avenue Landfill, Brooklyn, NY

Quarterly Monitoring Round	Date	Methane (% by volume)					Carbon Dioxide (% by volume)					Oxygen (% by volume)				
		GMW-1	GMW-2	GMW-3	GMW-4	GMW-5	GMW-1	GMW-2	GMW-3	GMW-4	GMW-5	GMW-1	GMW-2	GMW-3	GMW-4	GMW-5
1Q18	23-Jan	0.0	0.0	0.0	0.4	0.4	11.0	13.1	8.8	16.1	20.7	15.4	12.5	11.8	6.6	7.1
	9-Feb	0.0	0.0	0.0	0.3	0.3	12.6	14.7	10.4	17.7	22.3	15.3	12.4	11.7	6.5	7.0
	21-Feb	0.0	0.0	0.0	0.4	0.4	12.3	14.4	10.1	17.4	22.0	15.9	13.0	12.3	7.1	7.6
	5-Mar	0.0	0.0	0.0	0.4	0.3	14.3	16.4	12.1	19.4	24.0	15.0	12.1	11.4	6.2	6.7
	12-Mar	0.0	0.0	0.0	0.3	0.4	13.3	15.4	11.1	18.4	23.0	16.0	13.1	12.4	7.2	7.7
	19-Mar	0.0	0.0	0.0	0.4	0.4	13.8	15.9	11.6	18.9	23.5	15.7	12.8	12.1	6.9	7.4
2Q18	21-May	0.0	0.0	0.0	0.5	0.5	13.0	12.6	9.2	16.3	20.4	15.2	11.9	12.3	6.4	7.9
	18-Jun	0.0	0.0	0.0	0.4	0.4	12.3	12.7	9.4	16.0	19.6	15.8	12.0	12.7	6.5	7.6
3Q18	23-Jul	0.0	0.0	0.0	0.3	0.3	12.0	12.3	10.2	16.0	18.7	16.3	12.2	12.5	6.7	7.1
	12-Sep	0.0	0.0	0.0	0.3	0.3	11.8	12.0	10.3	17.0	18.7	16.5	12.4	12.2	6.6	6.9
4Q18	4-Oct	0.0	0.0	0.0	0.3	0.3	13.0	13.2	11.5	18.2	19.9	15.1	11.0	10.8	5.2	5.5
	9-Nov	0.0	0.0	0.0	0.3	0.3	11.7	11.9	10.2	16.9	18.6	16.3	12.2	12.0	6.4	6.7
	4-Dec	0.0	0.0	0.0	0.5	0.9	6.4	9.4	2.1	11.8	14.7	17.9	14.2	17.6	8.9	9.3
	26-Dec	0.0	0.0	0.0	0.6	0.7	6.2	9.0	3.2	12.3	14.7	18.1	14.5	16.5	8.5	9.4
	31-Dec	0.0	0.0	0.0	0.5	0.6	8.5	11.3	5.5	14.6	17.0	19.5	15.9	17.9	9.9	10.8

Footnotes:

- The quarterly rounds were conducted on March 19th, May 21st, July 23rd, and December 4th.
- Monitoring was performed to confirm the absence of off-site gas migration after intermittent extended flare outages on all other dates.

Table 3

Summary of Gas Monitoring Results within the Groundwater/Leachate Pre-Treatment Building

Pennsylvania Avenue Landfill, Brooklyn, NY

Quarterly Monitoring Round	Date	Leachate Treatment Building Methane (% by Volume)
1Q18	1/18/18	0.0
	2/15/18	0.0
	3/26/18	0.0
2Q18	4/10/18	0.0
	5/14/18	0.0
	6/5/18	0.0
3Q18	7/12/18	0.0
	8/16/18	0.0
	9/25/18	0.0
4Q18	10/18/19	0.0
	11/19/18	0.0
	12/20/18	0.0

Table 4

Summary of Target Volatile Organic Compounds (VOCs) Detected in Groundwater Samples

Pennsylvania Avenue Landfill, Brooklyn, NY

VOCs Detected In Ground-Water Samples	Class GA Standard	Well Number and Result, in ug/L									
		HP-101U	HP-101S	HP-101D	HP-103D	HP-104A	HP-318	HP-407U	HP-407S	HP-407D	HP-603
Acetone	50[GV]	2.4 J	2.1 J	<5.0	<5.0	1.9 J	1.6 J	14.2	5.9	<5.0	1.7 J
Chlorobenzene	5	1.1	<1.0	<1.0	<1.0	2.4	1.1	1.6	<1.0	<1.0	1.1
1,4-Dichlorobenzene	3	1.6	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Footnotes: ug/L = Micrograms per Liter.
J = Estimated concentration.
Class GA standards are from 6NYCRR Part 703.
GV = Guidance value from NYSDEC TOGS 1.1.1 (No Class GA standard for this parameter).
There are no exceedances of Class GA standards or TOGS 1.1.1 guidance values for VOCs.
The acetone detections in the above table may be attributable to background contamination because acetone was also detected in the field blank.
1,4-dichlorobenzene was analyzed for as both a VOC and SVOC. The SVOC results are provide in Table 5.

Table 5

Summary of Target Semi-Volatile Organic Compounds (SVOCs) Detected in Groundwater Samples

Pennsylvania Avenue Landfill, Brooklyn, NY

SVOCs Detected In Ground-Water Samples	Class GA Standard	Well Number and Result, in ug/L									
		HP-101U	HP-101S	HP-101D	HP-103D	HP-104A	HP-318	HP-407U	HP-407S	HP-407D	HP-603
Anthracene	50[GV]	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	0.57 J	<1.0	<1.0	<1.0
Benzo (g,h,i) perylene	NA	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	0.92 J	<1.0	<1.0	<1.0
Bis (2-ethylhexyl) phthalate	5	0.68 J	**123**	1.0	**39.1**	2.0	1.4	<1.0	0.62 J	0.66 J	0.61 J
Dibenz (a,h) anthracene	NA	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	0.78 J	<1.0	<1.0	<1.0
1,4-Dichlorobenzene	3	0.85 J	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Diethyl phthalate	50[GV]	1.0	<1.0	1.1	1.1	0.85 J	0.80 J	1.3	0.81 J	<1.0	0.65 J
Di-n-octylphthalate	50[GV]	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	0.73 J	<1.0	<1.0	<1.0
Indeno (1,2,3-cd) pyrene	0.002[GV]	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**0.95 J**	<1.0	<1.0	<1.0
Naphthalene	10[GV]	<1.0	0.65 J	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Footnotes:
ug/L = Micrograms per Liter.
J = Estimated concentration.
Class GA Standards are from 6NYCRR Part 703.
GV = Guidance value from NYSDEC TOGS 1.1.1 (No Class GA Standard for this parameter).
NA = Not Available (No Class GA standard or TOGS 1.1.1 guidance value for this parameter).
Bold font indicates exceedance of Class GA standard or TOGS 1.1.1 guidance value.
1,4-dichlorobenzene was analyzed for as both a VOC and SVOC. The VOC results are provide in Table 4.

Table 6

Summary of Leachate Indicator Parameters Detected in Groundwater Samples
Pennsylvania Avenue Landfill, Brooklyn, NY

Leachate Indicator Parameter	Class GA Standard	Well Number and Result, in mg/L*									
		HP-101U	**HP-101S**	**HP-101D**	**HP-103D**	**HP-104A**	**HP-318**	**HP-407U**	**HP-407S**	**HP-407D**	**HP-603**
Alkalinity	NA	586	265	585	236	425	317	1,320	1,290	189	295
Bromide	2[GV]	0.34 J	0.36 J	**37.7 J**	0.15 J	0.14 J	0.23 J	**2.1**	**30.3**	**28.6 J**	0.35 J
Chloride	250	**694**	**852**	**16,500**	**18,600**	35.5	118	246	**9,340**	**11,400**	206
Sulfate	250	36.2	158	**1,480**	**2,320**	105	152	2.8 J	**490**	**1,290**	167
BOD	NA	<2.0	<2.0	4.4	<2.0	<2.0	3.1	10.4	<2.0	<2.0	3.7
COD	NA	66.5	187	544	1,340	42.0	37.9	220	544	557	31.8
Color	15	**100**	10.0	**25.0**	<5.0	**100**	**50.0**	**100**	**125**	**100**	**50.0**
Cyanide	0.2	<0.010	<0.010	<0.010	0.109	<0.010	<0.010	<0.010	<0.010	<0.010	0.028
Hardness	NA	440	480	6,500	4,400	280	280	1,700	4,400	3,500	280
Ammonia	2	**9.4**	0.89	**5.0**	**5.4**	**2.2**	**2.1**	**72.9**	**46.7**	**3.2**	**4.6**
Nitrate	10	<0.050	2.2	<0.050	<0.050	<0.050	0.36	<0.050	<0.050	<0.050	<0.050
Phenols	0.001	**0.0054**	<0.005	<0.005	**0.0043 J**	**0.0074 J**	**0.0023 J**	**0.0172**	**0.0038 J**	**0.0028 J**	**0.0043 J**
TDS	500**	**1,530**	**1,200**	**25,500**	**30,300**	**570**	**636**	**1,370**	**12,700**	**17,200**	463
TKN	NA	12.0	13.6	8.0	6.1	3.4	4.7	76.0	44.6	3.5	7.4
TOC	NA	8.4	11.4	5.6	3.3	9.7	6.4	65.1	24.4	3.1	6.7

Footnotes:
mg/L = Milligrams per Liter.
J = Estimated concentration.
Class GA standards are from 6NYCRR Part 703.
GV = Guidance value from NYSDEC TOGS 1.1.1 (No Class GA Standard for this parameter).
NA = Not Available (No Class GA standard or TOGS 1.1.1 guidance value for this parameter).
Bold font indicates exceedance of Class GA standard or TOGS 1.1.1 guidance value.
* = Except for Color, which is in Color Units.
** = Standard is the more stringent Federal SMCL (The Class GA TDS standard is <1,000 mg/L).

Table 7

Summary of Metals Detected in Groundwater Samples

Pennsylvania Avenue Landfill, Brooklyn, NY

Metals	Class GA Standard	Well Number and Result, in ug/L									
		HP-101U	**HP-101S**	**HP-101D**	**HP-103D**	**HP-104A**	**HP-318**	**HP-407U**	**HP-407S**	**HP-407D**	**HP-603**
Aluminum	NA	<200	<200	<200	82.1 J	<200	<200	<200	<200	<200	<200
Antimony	3	<60.0	<60.0	<60.0	<60.0	<60.0	<60.0	<60.0	<60.0	<60.0	<60.0
Arsenic*	10**	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Barium*	1,000	70.1 J	105 J	116 J	85.6 J	182 J	21.5 J	566	197 J	58.4 J	41.9 J
Beryllium	3[GV]	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Boron	1,000	328	**1,130**	**2,730**	**3,240**	239	186 J	**1,750**	**1,880**	**1,680**	185
Cadmium*	5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Calcium	NA	132,000	77,100	310,000	368,000	152,000	113,000 J	104,000	226,000	285,000	108,000
Chromium, Total*	50	<10.0	6.0 J	13.0	4.1 J	1.8 J	<10.0	8.9 J	4.5 J	3.4 J	<10.0
Cobalt	NA	<50.0	1.9 J	7.7 J	8.4 J	<50.0	1.6 J	8.9 J	9.7 J	3.5 J	<50.0
Copper	200	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0
Iron	300	**15,300**	**1,140**	**2,660**	**1,310**	**32,000**	**3,300**	**2,290**	**12,300**	**14,600**	**6,080**
Iron and Manganese	500	**15,516**	**1,222**	**3,009**	**2,260**	**32,397**	**3,453**	**2,606**	**12,607**	**15,253**	**6,636**
Lead*	25	<5.0	<5.0	2.0 J	1.8 J	<5.0	<5.0	<5.0	2.3 J	<5.0	<5.0
Magnesium	35,000[GV]	25,400	**107,000**	**911,000**	**1,020,000**	33,900	31,000	**82,200**	**521,000**	**676,000**	31,200
Manganese	300	216	82.2	**349**	**950**	**397**	153	**316**	**307**	**653**	**556**
Mercury*	0.7	0.14 J	0.15 J	0.16 J	0.15 J	0.14 J	<0.20	0.16 J	0.16 J	0.14 J	0.14 J
Nickel	100	<40.0	<40.0	2.4 J	<40.0	<40.0	1.0 J	1.0 J	<40.0	<40.0	<40.0
Potassium	NA	12,700	68,200	283,000	349,000	6,600	7,220 J	46,300	192,000	180,000	6,000
Selenium*	10	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0 J	<10.0	<10.0	<10.0	<10.0
Silver*	50	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Sodium	20,000	**435,000**	**2,500,000**	**7,640,000**	**7,560,000**	**28,700**	**67,200 J**	**253,000**	**3,800,000**	**4,740,000**	**33,300**
Thallium	0.5[GV]	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Vanadium	NA	1.2 J	13.1 J	1.1 J	1.9 J	<50.0	3.0 J	10.9 J	5.3 J	1.6 J	1.8 J
Zinc	2,000[GV]	17.5 J	3.1 J	<200	<20.0	<20.0	6.5 J	13.3 J	<20.0	<20.0	1.3 J

Footnotes: ug/L = Micrograms per Liter.
J = Estimated concentration.
Class GA standards are from 6NYCRR Part 703.
GV = Guidance value from NYSDEC TOGS 1.1.1 (No Class GA Standard for this parameter).
NA = Not Available (No Class GA standard or TOGS 1.1.1 guidance value for this parameter).
Bold font indicates exceedance of Class GA standard or TOGS 1.1.1 guidance value.
* = RCRA metal.
** = Standard is the more stringent Federal MCL (The NYSDEC Class GA standard is 25 ug/L).

Table 8

Summary of Perimeter Gas Monitoring Well Methane Results During the Second Five-Year Review Period

Pennsylvania Avenue Landfill, Brooklyn, NY

Post- Closure Year	Quarterly Monitoring Round	Methane (% by Volume)				
		GMW-01	GMW-02	GMW-03	GMW-04	GMW-05
6	1Q14	0.0	0.0	0.4	1.2	0.0
	2Q14	0.1	0.0	0.0	0.1	0.0
	3Q14	0.0	0.0	0.0	0.1	0.1
	4Q14	0.0	0.0	0.0	0.0	0.0
7	1Q15	0.0	0.0	0.0	0.5	0.0
	2Q15	0.0	0.0	0.0	0.2	0.0
	3Q15	0.1	0.0	0.0	0.0	0.0
	4Q15	0.0	0.0	0.0	0.0	0.0
8	1Q16	0.0	0.0	0.0	0.0	0.0
	2Q16	0.0	0.0	0.0	0.0	0.0
	3Q16	0.0	0.0	0.0	0.0	0.0
	4Q16	0.3	0.3	0.3	0.2	0.2
9	1Q17	0.0	0.0	0.0	0.3	0.5
	2Q17	0.0	0.0	0.0	0.5	0.5
	3Q17	0.0	0.0	0.0	0.4	0.3
	4Q17	0.0	0.0	0.0	0.2	0.3
10	1Q18	0.0	0.0	0.0	0.4	0.4
	2Q18	0.0	0.0	0.0	0.5	0.5
	3Q18	0.0	0.0	0.0	0.4	0.4
	4Q18	0.0	0.0	0.0	0.3	0.3

Table 9

Comparison of Results for Target Volatile Organic Compounds (VOCs) Detected in Groundwater Samples

Pennsylvania Avenue Landfill, Brooklyn, NY

VOCs Detected In Ground-Water Samples	Units	Class GA Standard	Wells Screened in the Saturated Zone Above the Tidal Marsh Deposit								
			HP-101U								
			Remedial Investigation		1st 5 Yr. Review Period Average	2014	2016	2017	2018	2nd 5 Yr. Review Period Average
			8/3/93	12/12/93						
Acetone	ug/L	50^{GV}	R	R	ND	<5	<5	6.1	2.4 J	2.1 J
Chlorobenzene	ug/L	5	**27**	ND	**6.1 J**	1 J	<5	<1	1.1	0.53 J
1,4-Dichlorobenzene	ug/L	3	**4 J**	ND	1.1 J	<5	<5	<1	1.6	ND

VOCs Detected In Ground-Water Samples	Units	Class GA Standard	Wells Screened in the Saturated Zone Above the Tidal Marsh Deposit							
			HP-407U							
			Remedial Investigation		1st 5 Yr. Review Period Average	2014	2016	2017	2018	2nd 5 Yr. Review Period Average
			8/4/93	12/12/93						
Acetone	ug/L	50^{GV}	R	R	ND	2 J	21	9.5	14.2	12 J
Chlorobenzene	ug/L	5	**21**	**11**	4.0 J	2 J	1 J	2.1	1.6	1.7 J
1,4-Dichlorobenzene	ug/L	3	**4 J**	**3 J**	0.1 J	<5	<5	<1	<1	ND

VOCs Detected In Ground-Water Samples	Units	Class GA Standard	Wells Screened in the Saturated Zone Above the Tidal Marsh Deposit							
			HP-104A							
			Remedial Investigation		1st 5 Yr. Review Period Average	2014	2016	2017	2018	2nd 5 Yr. Review Period Average
			8/7/93	12/16/93						
Acetone	ug/L	50^{GV}	6 J	9 J	ND	<5	<5	2.9 J	1.9 J	1.2 J
Chlorobenzene	ug/L	5	**30**	**18**	3.9 J	<5	3 J	**6.9**	2.4	3.1 J
1,4-Dichlorobenzene	ug/L	3	**5 J**	**4 J**	ND	<5	<5	1.2	<1	0.30 J

VOCs Detected In Ground-Water Samples	Units	Class GA Standard	Wells Screened in the Saturated Zone Above the Tidal Marsh Deposit							
			HP-318							
			Remedial Investigation		1st 5 Yr. Review Period Average	2014	2016	2017	2018	2nd 5 Yr. Review Period Average
			8/11/93	12/13/93						
Acetone	ug/L	50^{GV}	ND	R	ND	<5	<5	5.3 J	1.6 J	1.7 J
Chlorobenzene	ug/L	5	**85**	**45**	**9.2**	1 J	4 J	3.9	1.1	2.5 J
1,4-Dichlorobenzene	ug/L	3	<1	**4 J**	0.3 J	<5	<5	<1	<1	ND

VOCs Detected In Ground-Water Samples	Units	Class GA Standard	Wells Screened in the Saturated Zone Above the Tidal Marsh Deposit							
			HP-603							
			Remedial Investigation		1st 5 Yr. Review Period Average	2014	2016	2017	2018	2nd 5 Yr. Review Period Average
			8/7/93	12/12/93						
Acetone	ug/L	50^{GV}	4 J	NS	ND	<5	<6	2.8 J	1.7 J	1.1 J
Chlorobenzene	ug/L	5	**48**	NS	3.3	**6**	2 J	<1	1.1	2.3 J
1,4-Dichlorobenzene	ug/L	3	<5	NS	0.1 J	<5	<5	<1	<1	ND

VOCs Detected In Ground-Water Samples	Units	Class GA Standard	Wells Screened in the Upper Portion of the Upper Glacial Aquifer							
			HP-101S							
			Remedial Investigation		1st 5 Yr. Review Period Average	2014	2016	2017	2018	2nd 5 Yr. Review Period Average
			8/3/93	12/12/93						
Acetone	ug/L	50^{GV}	ND	ND	ND	<5	<5	3.6 J	2.1 J	1.4 J
Chlorobenzene	ug/L	5	ND	ND	ND	<5	<5	<1	<1	ND
1,4-Dichlorobenzene	ug/L	3	ND	ND	ND	<5	<5	<1	<1	ND

VOCs Detected In Ground-Water Samples	Units	Class GA Standard	Wells Screened in the Upper Portion of the Upper Glacial Aquifer							
			HP-407S							
			Remedial Investigation		1st 5 Yr. Review Period Average	2014	2016	2017	2018	2nd 5 Yr. Review Period Average
			8/4/93	12/12/93						
Acetone	ug/L	50^{GV}	R	R	ND	<5	<7	4.2 J	5.9	2.5 J
Chlorobenzene	ug/L	5	ND	ND	ND	<5	<7	<1	<1	ND
1,4-Dichlorobenzene	ug/L	3	ND	ND	ND	<5	<7	<1	<1	ND

VOCs Detected In Ground-Water Samples	Units	Class GA Standard	Wells Screened in the Lower Portion of the Upper Glacial Aquifer							
			HP-101D							
			Remedial Investigation		1st 5 Yr. Review Period Average	2014	2016	2017	2018	2nd 5 Yr. Review Period Average
			8/3/93	12/93						
Acetone	ug/L	50^{GV}	ND	NS	ND	<5	<5	2.5 J	<5	0.63 J
Chlorobenzene	ug/L	5	ND	NS	ND	<5	<5	<1	<1	ND
1,4-Dichlorobenzene	ug/L	3	ND	NS	ND	<5	<5	<1	<1	ND

VOCs Detected In Ground-Water Samples	Units	Class GA Standard	Wells Screened in the Lower Portion of the Upper Glacial Aquifer							
			HP-103D							
			Remedial Investigation		1st 5 Yr. Review Period Average	2014	2016	2017	2018	2nd 5 Yr. Review Period Average
			8/8/93	12/15/93						
Acetone	ug/L	50^{GV}	12 B	R	ND	<5	<5	2.5 J	<5	0.63 J
Chlorobenzene	ug/L	5	**16**	**12**	ND	<5	<5	<1	<1	ND
1,4-Dichlorobenzene	ug/L	3	**3 J**	ND	ND	<5	<5	<1	<1	ND

VOCs Detected In Ground-Water Samples	Units	Class GA Standard	Wells Screened in the Lower Portion of the Upper Glacial Aquifer							
			HP-407D							
			Remedial Investigation		1st 5 Yr. Review Period Average	2014	2016	2017	2018	2nd 5 Yr. Review Period Average
			8/3/93	12/13/93						
Acetone	ug/L	50^{GV}	ND	ND	ND	<5	<5	5.1	<5	1.3
Chlorobenzene	ug/L	5	ND	ND	ND	<5	<5	<1	<1	ND
1,4-Dichlorobenzene	ug/L	3	ND	ND	ND	<5	<5	<1	<1	ND

Footnotes: Only the target VOCs detected in at least in one post-closure groundwater sample are listed.
All other target VOCs analyzed for were not detected.
Only detected results are reported for the Remedial Investigation events.
The NYSDEC Class GA Standards are for potable groundwater.
The groundwater at the site is naturally saline; therefore, non-potable.
There are no VOC standards for saline groundwater.
Standards with the (GV) notation are guidance values only.
ND = Not detected. NS = Not sampled.
R = Compound rejected due to contamination in associated method blank.
J = Estimated value.

Table 10

Comparison of Results for Target Semi-Volatile Organic Compounds (SVOCs) Detected in Groundwater Samples

Pennsylvania Avenue Landfill, Brooklyn, NY

Wells Screened in the Saturated Zone Above the Tidal Marsh Deposit

SVOCs Detected In Ground-Water Samples	Units	Class GA Standard	HP-101U Remedial Investigation 8/3/93	HP-101U Remedial Investigation 12/12/93	HP-101U 1st 5 Yr. Review Period Average	HP-101U 2014	HP-101U 2016	HP-101U 2017	HP-101U 2018	HP-101U 2nd 5 Yr. Review Period Average	HP-407U Remedial Investigation 8/4/93	HP-407U Remedial Investigation 12/12/93	HP-407U 1st 5 Yr. Review Period Average	HP-407U 2014	HP-407U 2016	HP-407U 2017	HP-407U 2018	HP-407U 2nd 5 Yr. Review Period Average
Acenaphthene	ug/L	20^{GV}	0.6 J	ND	ND	<1	<1	<1	<1	ND	1 J	2 J	0.23	<1	<1	<1	<1	ND
Anthracene	ug/L	50^{GV}	ND	ND	ND	<1	<1	<1	<1	ND	ND	ND	ND	<1	<1	<1	0.57J	0.14 J
Benzo (g,h,I) perylene	ug/L	No Std.	ND	NA	ND	<1	<1	<1	<1	ND	ND	NA	ND	<1	<1	<1	0.92 J	0.23 J
Bis (2-ethylhexyl) phthalate	ug/L	5	R	R	2.67	2	<1	<1	0.68 J	0.17 J	R	R	2.20	4	<1	2.1	<1	1.5
Dibenz (a,h) anthracene	ug/L	5	NA	NA	ND	<1	<1	<1	<1	ND	NA	NA	ND	<1	<1	<1	0.78 J	0.11 J
Diethyl phthalate	ug/L	50^{GV}	0.6 J	R	ND	<1	<1	<1	1.0	ND	ND	ND	ND	<1	<1	<1	1.3	0.33
Di-n-Octyl Phthalate	ug/L	50^{GV}	0.1 J	ND	ND	<1	<1	<1	<1	ND	ND	ND	ND	<1	<1	<1	0.73 J	0.18 J
Ideno (1,2,3-cd) pyrene	ug/L	0.002^{GV}	ND	NA	ND	<1	<1	<1	<1	ND	ND	NA	ND	<1	<1	<1	**0.95 J**	**0.24 J**
Naphthalene	ug/L	10^{GV}	0.1 J	ND	ND	<1	<1	<1	<1	ND	4 J	3 J	ND	<1	<1	<1	<1	ND

SVOCs Detected In Ground-Water Samples	HP-104A Remedial Investigation 8/7/93	HP-104A Remedial Investigation 12/16/93	HP-104A 1st 5 Yr. Review Period Average	HP-104A 2014	HP-104A 2016	HP-104A 2017	HP-104A 2018	HP-104A 2nd 5 Yr. Review Period Average	HP-318 Remedial Investigation 8/11/93	HP-318 Remedial Investigation 12/13/93	HP-318 1st 5 Yr. Review Period Average	HP-318 2014	HP-318 2016	HP-318 2017	HP-318 2018	HP-318 2nd 5 Yr. Review Period Average	HP-603 Remedial Investigation 8/7/93	HP-603 Remedial Investigation 12/12/93	HP-603 1st 5 Yr. Review Period Average	HP-603 2014	HP-603 2016	HP-603 2017	HP-603 2018	HP-603 2nd 5 Yr. Review Period Average
Acenaphthene	2 J	ND	0.16 J	<1	<1	<1	<1	ND	ND	14	4.52	<1	1	1.7 J	<1	0.68 J	14	NS	1.61	1	<1	<1	<1	ND
Anthracene	ND	ND	ND	<1	<1	<1	<1	ND	ND	ND	ND	<1	<1	<1	<1	ND	ND	NS	ND	<1	<1	<1	<1	ND
Benzo (g,h,I) perylene	ND	NA	ND	<1	<1	<1	<1	ND	ND	NA	ND	<1	<1	<1	<1	ND	ND	NS	ND	<1	<1	<1	<1	ND
Bis (2-ethylhexyl) phthalate	R	R	2.55	<1	<1	<1	2.0	0.50	R	R	2.13	<1	<1	<1	1.4	0.35	R	NS	2.26	<1	<1	<1	0.61 J	0.15 J
Dibenz (a,h) anthracene	NA	NA	ND	<1	<1	<1	<1	ND	NA	NA	ND	<1	<1	<1	<1	ND	NA	NS	ND	<1	<1	<1	<1	ND
Diethyl phthalate	1 J	R	ND	<1	<1	<1	0.85 J	0.21 J	ND	ND	ND	<1	<1	<1	0.80 J	0.21 J	ND	NS	ND	<1	<1	<1	0.65 J	0.16 J
Di-n-Octyl Phthalate	ND	1 J	ND	<1	<1	<1	<1	ND	ND	ND	0.20	<1	<1	<1	<1	ND	ND	NS	0.30	<1	<1	<1	<1	ND
Ideno (1,2,3-cd) pyrene	ND	NA	ND	<1	<1	<1	<1	ND	ND	NA	ND	<1	<1	<1	<1	ND	ND	NS	ND	<1	<1	<1	<1	ND
Naphthalene	1 J	0.60 J	ND	<1	<1	<1	<1	ND	ND	0.5 J	ND	<1	<1	<1	<1	ND	0.8 J	NS	ND	<1	<1	<1	<1	ND

Wells Screened in the Upper Portion of the Upper Glacial Aquifer

SVOCs Detected In Ground-Water Samples	Units	Class GA Standard	HP-101S Remedial Investigation 8/3/93	HP-101S Remedial Investigation 12/12/93	HP-101S 1st 5 Yr. Review Period Average	HP-101S 2014	HP-101S 2016	HP-101S 2017	HP-101S 2018	HP-101S 2nd 5 Yr. Review Period Average	HP-407S Remedial Investigation 8/4/93	HP-407S Remedial Investigation 12/12/93	HP-407S 1st 5 Yr. Review Period Average	HP-407S 2014	HP-407S 2016	HP-407S 2017	HP-407S 2018	HP-407S 2nd 5 Yr. Review Period Average
Acenaphthene	ug/L	20^{GV}	ND	NS	ND	<1	<1	<1	<1	ND	ND	NS	ND	<1	<1	<1	<1	ND
Anthracene	ug/L	50^{GV}	ND	NS	ND	<1	<1	<1	<1	ND	ND	NS	ND	<1	<1	<1	<1	ND
Benzo (g,h,I) perylene	ug/L	No Std.	ND	NS	ND	<1	<1	<1	<1	ND	ND	NS	ND	<1	<1	<1	<1	ND
Bis (2-ethylhexyl) phthalate	ug/L	5	R	NS	2.50	<1	<1	<1	**123**	**31**	R	NS	2.12	<1	<1	<1	0.62 J	0.23 J
Dibenz (a,h) anthracene	ug/L	5	NA	NS	ND	<1	<1	<1	<1	ND	NA	NS	ND	<1	<1	<1	<1	ND
Diethyl phthalate	ug/L	50^{GV}	0.3 J	NS	ND	<1	<1	<1	<1	ND	0.9 J	NS	ND	<1	<1	<1	0.81 J	0.20 J
Di-n-Octyl Phthalate	ug/L	50^{GV}	0.1 J	NS	ND	<1	<1	<1	<1	ND	ND	NS	0.01 J	<1	<1	<1	<1	ND
Ideno (1,2,3-cd) pyrene	ug/L	0.002^{GV}	ND	NS	ND	<1	<1	<1	<1	ND	ND	NS	ND	<1	<1	<1	<1	ND
Naphthalene	ug/L	10^{GV}	ND	NS	ND	<1	<1	<1	0.65 J	0.16 J	ND	NS	ND	<1	<1	<1	<1	ND

Wells Screened in the Lower Portion of the Upper Glacial Aquifer

SVOCs Detected In Ground-Water Samples	HP-101D Remedial Investigation 8/3/93	HP-101D Remedial Investigation 12/93	HP-101D 1st 5 Yr. Review Period Average	HP-101D 2014	HP-101D 2016	HP-101D 2017	HP-101D 2018	HP-101D 2nd 5 Yr. Review Period Average	HP-103D Remedial Investigation 8/8/93	HP-103D Remedial Investigation 12/15/93	HP-103D 1st 5 Yr. Review Period Average	HP-103D 2014	HP-103D 2016	HP-103D 2017	HP-103D 2018	HP-103D 2nd 5 Yr. Review Period Average	HP-407D Remedial Investigation 8/3/93	HP-407D Remedial Investigation 12/13/93	HP-407D 1st 5 Yr. Review Period Average	HP-407D 2014	HP-407D 2016	HP-407D 2017	HP-407D 2018	HP-407D 2nd 5 Yr. Review Period Average
Acenaphthene	ND	NS	ND	<1	<1	<1	<1	ND	ND	NS	ND	<1	<1 J	<1	<1	ND	ND	NS	ND	<1	<1	<1	<1	ND
Anthracene	ND	NS	ND	<1	<1	<1	<1	ND	ND	NS	ND	<1	<1	<1	<1	ND	ND	NS	ND	<1	<1	<1	<1	ND
Benzo (g,h,I) perylene	ND	NS	ND	<1	<1	<1	<1	ND	ND	NS	ND	<1	<1	<1	<1	ND	ND	NS	ND	<1	<1	<1	<1	ND
Bis (2-ethylhexyl) phthalate	R	NS	2.70	<1	<1	1.5	1	0.63	R	NS	4.06	1	<1	7	**39.1**	**11.8**	R	NS	2.26	<1	<1	2.6	0.66 J	0.82 J
Dibenz (a,h) anthracene	NA	NS	ND	<1	<1	<1	<1	ND	NA	NS	ND	<1	<1	<1	<1	ND	NA	NS	ND	<1	<1	<1	<1	ND
Diethyl phthalate	0.3 J	NS	ND	<1	<1	<1	1.1	0.28	1 J	NS	ND	<1	<1	<1	1.1	0.28	0.3 J	NS	ND	<1	<1	<1	<1	ND
Di-n-Octyl Phthalate	<1	NS	ND	<1	<1	<1	<1	ND	1	NS	ND	<1	<1	<1	<1	ND	<1	NS	ND	<1	<1	<1	<1	ND
Ideno (1,2,3-cd) pyrene	ND	NS	ND	<1	<1	<1	<1	ND	ND	NS	ND	<1	<1	<1	<1	ND	ND	NS	ND	<1	<1	<1	<1	ND
Naphthalene	ND	NS	ND	<1	<1	<1	<1	ND	1 J	NS	ND	<1	<1	<1	<1	ND	ND	NS	ND	<1	<1	<1	<1	ND

Footnotes: Only the target SVOCs detected in at least in one post-closure groundwater sample are listed.
All other target SVOCs analyzed for were not detected.
Only detected results are reported for the Remedial Investigation events.
The NYSDEC Class GA Standards are for potable groundwater.
The groundwater at the site is naturally saline; therefore, non-potable.
There are no SVOC standards for saline groundwater.
Standards with the (GV) notation are guidance values only.
ND = Not detected. NS = Not sampled. NA = Not analyzed.
R = Compound rejected due to contamination in associated method blank.
J = Estimated value.

Table 11

Comparison of Results for Leachate Indicator Parameters Detected in Groundwater Samples

Pennsylvania Avenue Landfill, Brooklyn, NY

Wells Screened in the Saturated Zone Above the Tidal Marsh Deposit

Leachate Indicator Parameter	Units	Class GA Standard	HP-101U								HP-407U								HP-104A							
			Remedial Investigation		1st 5 Yr. Review Period Average	2014	2016	2017	2018	2nd 5 Yr. Review Period Average	Remedial Investigation		1st 5 Yr. Review Period Average	2014	2016	2017	2018	2nd 5 Yr. Review Period Average	Remedial Investigation		1st 5 Yr. Review Period Average	2014	2016	2017	2018	2nd 5 Yr. Review Period Average
			8/3/93	12/12/93							8/4/93	12/12/93							8/7/93	12/16/93						
Alkalinity	mg/L	No Std.	715	217	500	486	395	489	586	489	2,640	2,250	1561	1,280	1,430	963	1,320	1,248	1,360	1,540	745	576	467	418	425	472
Ammonia	mg/L	2	**10.3**	0.26	**7.3**	**2.26**	**7.53**	**4.0**	**9.4**	**5.8**	**244**	**168**	**99.6**	**101**	**91.7**	**68.8**	**72.9**	**83.6**	**94.2**	**116**	**5.7**	**8.03**	**5.9**	**3.3**	**2.2**	**4.9**
BOD_5	mg/L	No Std.	NA	NA	1.3	<4	<7	<4	<2	ND	NA	NA	14.3	18	10	8.2	10.4	11.7	NA	NA	3.0	<4	<7	<4	<2	ND
Bromide	mg/L	2^{GV}	NA	NA	0.38	<0.5	<0.5	0.22 J	0.34 J	0.14 J	NA	NA	1.56	**2.25**	**2.28**	1.5	**2.1**	2.0	NA	NA	0.45	<0.50	<0.50	0.10 J	0.14 J	0.06 J
Chloride	mg/L	250	**875**	53.4	**894.4**	**470**	**530**	**542**	**694**	**559**	**564**	**518**	**415.7**	224	243	164	246	219	152	168	97.1	88	66.1	45.1	35.5	58.7
COD	mg/L	No Std.	NA	NA	18.4	30.5	21.5	48.4	66.5	41.7	NA	NA	144.9	196	217	190	220	205.8	NA	NA	33.3	33.7	35.9	33.8	42	36.4
Color	olor un	15	NA	NA	**54**	**35**	**300**	10	**100**	**111.3**	NA	NA	**174**	**55**	**200**	**25**	**100**	**95**	NA	NA	**22**	**90**	**750**	15	**100**	**239**
Cyanide	mg/L	0.2	ND	ND	NA	<0.01	<0.01	<0.01	<0.01	ND	**45.7**	ND	NA	<0.01	<0.01	<0.01	<0.01	ND	ND	ND	NA	<0.01	<0.01	<0.01	<0.01	ND
Hardness	mg/L	No Std.	542	349	457	460	450	600	440	488	880	860	774	600	620	540	1,700	865	1,090	965	820	1,300	580	600	280	690
Nitrate	mg/L	10	ND	0.28	0.47	0.49	0.41	0.24	<0.05	0.29	ND	0.1	ND	<0.1	<0.1	<0.05	<0.05	ND	ND	0.21	0.05	<0.1	<0.1	0.038 J	<0.05	0.01 J
Sulfate	mg/L	250	ND	98	126.2	192 J	85.2	97.2	36.2	103 J	ND	85.2	21.4	13.3	6.36	9.1	2.8 J	9.6	19.8	54.7	65.4	110	144	183	105	136
Phenols	mg/L	0.001	**0.035**	**0.013 N**	NA	<0.005	**0.0143**	**0.0012 J**	**0.0054**	**0.0052 J**	**0.022**	**0.031 N**	NA	<0.005	**0.0184**	**0.008**	**0.0172**	**0.011**	**0.033**	ND	NA	<0.005	**0.0108**	**0.0025 J**	**0.0074 J**	**0.0052 J**
Tot Dissolved Solids	mg/L	1,000	**1,750**	563	**1,957**	**1,450**	**5,280**	**1,310**	**1,530**	3,365	**2,940**	**2,670**	**1,999**	**1,360**	**1,500**	**1,220**	**1,370**	1,363	**1,330**	R	**2,611**	**4,240**	732	744	570	2,486
Tot Organic Carbon	mg/L	No Std.	NA	NA	8.6	125	7.2	6.4	8.4	46.6 J	NA	NA	29.3	305	91	58.6	65.1	129.9	NA	NA	7.7	12.1	8.4	9	9.7	10.3
Tot. Kjeldahl N.	mg/L	No Std.	44.3	1.02	8.19	3.05	7.16	4.1	12	6.6	741	275	103.03	92.1	88.4	58.2	76	78.7	240	117	6.67	7.4	6.29	3.7	3.4	5.2

Leachate Indicator Parameter	Units	Class GA Standard	HP-318								HP-603							
			Remedial Investigation		1st 5 Yr. Review Period Average	2014	2016	2017	2018	2nd 5 Yr. Review Period Average	Remedial Investigation		1st 5 Yr. Review Period Average	2014	2016	2017	2018	2nd 5 Yr. Review Period Average
			8/11/93	12/13/93							8/7/93	12/12/93						
Alkalinity	mg/L	No Std.	R	NS	365	143	302	309	317	268	1,450	NS	395	760	559	186	295	450
Ammonia	mg/L	2	**110**	NS	**19.7**	1.18	**11.1**	**9.9**	**2.1**	**6.1**	**80.8**	NS	**11.0**	**9.53**	**10.6**	**2.9**	**4.6**	**6.9**
BOD_5	mg/L	No Std.	NA	NS	14.8	3.0	<7	<4.0	3.1	1.53 J	NA	NS	ND	<4	<7	4.3	3.7	2.00 J
Bromide	mg/L	2^{GV}	NA	NS	0.52	<0.50	0.53	0.28 J	0.23 J	0.27 J	NA	NS	0.36	1.17	0.61	<0.5	0.35 J	0.533 J
Chloride	mg/L	250	**574**	NS	**596.2**	89.8	**576**	**418**	118	**300**	164	NS	190.5	226	128	17.4	206	144
COD	mg/L	No Std.	NA	NS	254.3	12.1	27.1	48.4	37.9	31.4	NA	NS	8.3	67.4	57.8	17.2	31.8	43.6
Color	olor un	15	NA	NS	**36**	**25**	**50**	**20**	**50**	**36**	NA	NS	**24**	**65**	**150**	**15**	**50**	**70**
Cyanide	mg/L	0.2	ND	**12.6**	NA	<0.01	<0.01	<0.01	<0.01	ND	**60**	NS	NA	<0.01	<0.01	<0.01	0.028	0.007
Hardness	mg/L	No Std.	1,410	NS	512	500	640	560	280	495	652	NS	681	1,100	1,000	260	280	660
Nitrate	mg/L	10	NA	NS	1.56	3.08	4.26	1.1	0.36	2.2	ND	NS	0.02	5.14	1.33	0.13	<0.05	1.65
Sulfate	mg/L	250	28.0	NS	92.5	229	247	249	152	219	11.5	NS	**338.7**	134	117	105	167	131
Phenols	mg/L	0.001	**0.024**	NS	NA	**0.0066**	**0.0151**	<0.005	**0.0023 J**	**0.006 J**	**0.026**	NS	NA	<0.005	**0.0135**	**0.0016 J**	**0.0043 J**	**0.0049 J**
Tot Dissolved Solids	mg/L	1,000	**2,750**	NS	**1,491**	558	**1,240**	**1,330**	636	899	**1,230**	NS	**1,156**	**1,330**	954	384	463	1,142
Tot Organic Carbon	mg/L	No Std.	NA	NS	6.9	42.7	10.9	<10.0	6.4	21.4 J	NA	NS	7.7	199	17.2	5.8	6.7	70.5
Tot. Kjeldahl N.	mg/L	No Std.	128	NS	21.27	1.24	11.4	9.1	4.7	6.6	230	NS	12.13	9.87	11.3	3	7.4	7.9

Wells Screened in the Upper Portion of the Upper Glacial Aquifer

Leachate Indicator Parameter	Units	Class GA Standard	HP-101S								HP-407S							
			Remedial Investigation		1st 5 Yr. Review Period Average	2014	2016	2017	2018	2nd 5 Yr. Review Period Average	Remedial Investigation		1st 5 Yr. Review Period Average	2014	2016	2017	2018	2nd 5 Yr. Review Period Average
			8/3/93	12/12/93							8/4/93	12/12/93						
Alkalinity	mg/L	No Std.	885	225	906	374	873	873	265	596	399	1,050	578	472	563	658	1,290	746
Ammonia	mg/L	2	**7.2**	0.2	**4.4**	**9.25**	**6.64**	**7.2**	0.89	**6.0**	1.4	**4**	**12.5**	**28**	**31.2**	**26.7**	**46.7**	**33.2**
BOD_5	mg/L	No Std.	NA	NA	6.0	<4	<7	<4	<2	ND	NA	NA	ND	5	<4	<4	<2	1.3
Bromide	mg/L	2^{GV}	NA	NA	**2.42**	<0.50	**2.11**	**2.3**	0.36 J	0.95 J	NA	NA	**27.50**	**25.6**	**21.1**	**23.8**	**30.3**	**25.2**
Chloride	mg/L	250	**5,400**	116	**2,514**	28.2	**3,620 J**	**2,090**	**852**	**1,913 J**	**5,120**	**6,700**	**7,475**	**9,570**	**6,870**	**7,310**	**9,340**	**8,273**
COD	mg/L	No Std.	NA	NA	67.7	94	41.9	144	187	117	NA	NA	249.7	135	131	458	544	317
Color	olor un	15	NA	NA	**66**	**25**	**50**	**40**	10	**31**	NA	NA	**65**	**90**	**250**	**30**	**125**	**124**
Cyanide	mg/L	0.2	ND	ND	NA	<0.01	<0.01	<0.01	<0.01	ND	ND	ND	NA	<0.01	<0.01	<0.01	<0.01	ND
Hardness	mg/L	No Std.	852	347	603	600	500 J	750	480	583 J	1,680	2,200	2,496	3,400	2,650	2,600	4,400	3,263
Nitrate	mg/L	10	ND	0.21	ND	2.63	<0.1	<0.05	2.2	1.2	ND	ND	0.14	<0.1	<0.1	0.011 J	<0.05	0.003 J
Sulfate	mg/L	250	**375**	104	8.8	49.7	<5	0.70 J	158	69.4 J	**478**	**442**	**754.1**	**935**	**594**	**713**	**490**	**683**
Phenols	mg/L	0.001	**0.011**	ND	NA	<0.005	**0.0101**	**0.0016 J**	<0.005	**0.003 J**	**0.009**	ND	NA	<0.005	**0.0151**	<0.005	**0.0038 J**	**0.0047 J**
Tot Dissolved Solids	mg/L	1,000	**10,000**	611	**4,169**	**1,410**	**5,050**	**4,550**	**1,200**	**3,230**	**8,510**	**11,900**	**14,080**	**13,200**	**12,000**	**13,400**	**12,700**	**12,600**
Tot Organic Carbon	mg/L	No Std.	NA	NA	8.1	84.4	9.2	12	11.4	35.9	NA	NA	5.5	51.2	5.7	6.5	24.4	22.0
Tot. Kjeldahl N.	mg/L	No Std.	10	0.86	5.11	8.08	6.98	11.1	13.6	9.9	0.8	2.56	13.53	24.9	29.8	23.9	44.6	30.8

Wells Screened in the Lower Portion of the Upper Glacial Aquifer

Leachate Indicator Parameter	Units	Class GA Standard	HP-101D								HP-103D							
			Remedial Investigation		1st 5 Yr. Review Period Average	2014	2016	2017	2018	2nd 5 Yr. Review Period Average	Remedial Investigation		1st 5 Yr. Review Period Average	2014	2016	2017	2018	2nd 5 Yr. Review Period Average
			8/3/93	12/93							8/8/93	12/15/93						
Alkalinity	mg/L	No Std.	461	NS	806	462	428	437	585	478	935.0	NS	355	270	219	193	236	230
Ammonia	mg/L	2	**7.4**	NS	**13.5**	**7.19**	**6.46**	**4.1**	**5**	**5.7**	**37**	NS	**11.7**	**7.29**	**6.82**	**5.7**	**5.4**	**6.3**
BOD_5	mg/L	No Std.	NA	NS	ND	<4	<7	<4	4.4	1.1	NA	NS	2.5	<4	<7	<4	<2	ND
Bromide	mg/L	2^{GV}	NA	NS	**36.80**	**32**	**36.7 J**	**35.2**	**37.7 J**	**35.4 J**	NA	NS	**52.60**	**48.7**	**44.1**	**42.2**	0.15 J	**33.8 J**
Chloride	mg/L	250	**15,900**	NS	**24,000**	**15,900**	**14,300**	**11,800**	**16,500**	**14,625**	148	NS	**14,986**	**14,400**	**19,200**	**13,700**	**18,600**	**16,475**
COD	mg/L	No Std.	NA	NS	740.0	165	205 J	643	544	389 J	NA	NS	154.1	180	156	843	1,340	630
Color	olor un	15	NA	NS	**62**	**90**	**100**	15	**25**	**58**	NA	NS	**30**	**55**	**200**	15	<5	**68**
Cyanide	mg/L	0.2	ND	NS	NA	<0.01	<0.01	<0.01	<0.01	ND	**33.8**	NS	NA	<0.01	<0.01	<0.01	0.109	0.027
Hardness	mg/L	No Std.	1,000	NS	2,670	4,500	3,700	4,200	6,500	4,725	700	NS	4,310	5,300	4,500	5,100	4,400	4,825
Nitrate	mg/L	10	**18.5**	NS	ND	<0.1	<0.1	0.019 J	<0.050	0.005 J	**14.7**	NS	1.60	<0.1 J	<0.10	0.0059 J	<0.05	0.001 J
Sulfate	mg/L	250	**361**	NS	1105.0	**1,370**	**1,400**	**1,610**	**1,480**	**1,465**	10.3	NS	**1,467**	**1,390**	**1,620**	**1,930**	**2,320**	**1,815**
Phenols	mg/L	0.001	**0.009**	NS	NA	<0.005	**0.0062**	<0.005	<0.005	**0.0016**	**0.014**	NS	NA	<0.005	**0.0095**	<0.005	**0.0043 J**	**0.0035 J**
Tot Dissolved Solids	mg/L	1,000	**24,600**	NS	**38,270**	**23,100**	**25,100**	**24,100**	**25,500**	**24,100**	**1,140**	NS	**24,610**	**24,900**	**31,100**	**29,400**	**30,300**	**28,000**
Tot Organic Carbon	mg/L	No Std.	NA	NS	6.7	111	2.8	2.4	5.6	39.7	NA	NS	7.3	79.4	1.6	<10	3.3	27.6
Tot. Kjeldahl N.	mg/L	No Std.	15.5	NS	16.58	6.25	6	3.7	8	6	93.6	NS	12.33	7.02	5.98	4.8	6.1	6

Leachate Indicator Parameter	Units	Class GA Standard	HP-407D							
			Remedial Investigation		1st 5 Yr. Review Period Average	2014	2016	2017	2018	2nd 5 Yr. Review Period Average
			8/3/93	12/12/93						
Alkalinity	mg/L	No Std.	73.6	NS	259	166	183	154	189	173
Ammonia	mg/L	2	1.9	NS	**16.3**	**2.14**	**1.79**	1.8	**3.2**	**2.2**
BOD_5	mg/L	No Std.	NA	NS	ND	<4	<4	<4	<2	ND
Bromide	mg/L	2^{GV}	NA	NS	**31.00**	**30.8**	**26.8**	**26.8**	**28.6 J**	**28.1 J**
Chloride	mg/L	250	**2,090**	NS	**9,685**	**11,200**	**8,540**	**7,180**	**11,400**	**9,580**
COD	mg/L	No Std.	NA	NS	622.0	147	114	562	557	345
Color	olor un	15	NA	NS	**37**	**35**	**150**	15	**100**	**75**
Cyanide	mg/L	0.2	ND	NS	NA	<0.01	<0.01	<0.01	<0.01	ND
Hardness	mg/L	No Std.	602	NS	3,485	3,600	2,450	3,260	3,500	3,203
Nitrate	mg/L	10	0.2	NS	ND	<0.1	<0.1	0.017 J	<0.05	0.004 J
Sulfate	mg/L	250	208	NS	**1,269**	**1,380**	**1,120**	**1,050**	**1,290**	**1,210**
Phenols	mg/L	0.001	ND	NS	NA	<0.005	**0.0112**	**0.0030 J**	**0.0028 J**	**0.0043 J**
Tot Dissolved Solids	mg/L	1,000	**3,060.0**	NS	**16,986**	**16,300**	**15,600**	**16,500**	**17,200**	**15,950**
Tot Organic Carbon	mg/L	No Std.	NA	NS	0.4	49.5	4.6	<10	3.1	14.3
Tot. Kjeldahl N.	mg/L	No Std.	0.75	NS	2.82	1.86	1.55	1.5	3.5	2.1

Footnotes: Only the leachate indicator parameters detected in at least in one post-closure groundwater sample are listed.
All other leachate indicator parameters analyzed for were not detected.
Only detected results are reported for the Remedial Investigation events.
The NYSDEC Class GA Standards are for potable groundwater.
The groundwater at the site is naturally saline; therefore, non-potable.
There are no leachate indicator parameter standards for saline groundwater.
Standards with the (GV) notation are guidance values only.
ND = Not detected. NS = Not sampled. NA = Not analyzed.
R = Compound rejected due to contamination in associated method blank.
J = Estimated value.

Table 12

Comparison of Results for Metals Detected in Groundwater Samples
Pennsylvania Avenue Landfill, Brooklyn, NY

Wells Screened in the Saturated Zone Above the Tidal Marsh Deposit

Metals	Units	Class GA Standard	HP-101U								HP-407U								HP-104A							
			Remedial Investigation		1st 5 Yr. Review Period Average	2014	2016	2017	2018	2nd 5 Yr. Review Period Average	Remedial Investigation		1st 5 Yr. Review Period Average	2014	2016	2017	2018	2nd 5 Yr. Review Period Average	Remedial Investigation		1st 5 Yr. Review Period Average	2014	2016	2017	2018	2nd 5 Yr. Review Period Average
			8/3/93	12/12/93							8/4/93	12/12/93							8/7/93	12/16/93						
Aluminum	ug/L	No Std.	1,740	1,430	13	<34.6	<200	16.3 J	<200	4.1 J	2,470	619	34	<29.9	<200	16.9 J	<200	4.2 J	3,550	2,320	106	<21.1	<200	<200	<200	ND
Antimony	ug/L	3	ND	ND	ND	<1.6	**4.5 J**	<60	<60	1.1 J	ND	ND	0.6	<1.6	<60	<60	<60	ND	ND	**36.9 B**	0.2 J	<3	**5.4 J**	<60	<60	1.4 J
Barium	ug/L	1000	111 B	121 B	90 J	103 J	72.3 J	61.4 J	70.1 J	77.5 J	364	630	917	557	647	535	566	590	360	371 E	211	214	276	148 J	182 J	208 J
Beryllium	ug/L	3.0[GV]	ND	ND	NA	<0.2	<5	<5	<5	ND	ND	ND	NA	<0.2	<5	<5	<5	ND	ND	ND	NA	<0.1	<5	<5	<5	ND
Boron	ug/L	1000	NA	NA	294 J	326	285	261	328	313	NA	NA	**2,568 J**	**1,790**	**2,280**	**1,530**	**1,750**	**1,838**	NA	NA	438 J	271	262	220	239	257
Cadmium	ug/L	5	**7.8**	**11.2 ***	NA	1.3 J	0.2 J	1 J	<2.5	0.63 J	2.1 B	ND	NA	<0.2	<2.5	<2.5	<2.5	0.63 J	ND	2.8 B	NA	2.1 J	<2.5	0.27 J	<2.5	0.59 J
Calcium	ug/L	No Std.	156,000	132,000	137,500	125,000	147,000 J	172,000	132,000	144,000 J	99,700	122,000	107,600	81,800	118,000 J	86,600	104,000	97,600 J	145,000	155,000	200,400	199,000	187,000 J	178,000	152,000	179,000 J
Chromium, Total	ug/L	50	5 B*	ND	ND	<6.1	3.3 J	5.4 J	<10	2.18 J	25.2 *	16.4 *	4.3 J	14.9	11	10.1	8.9 J	11.6 J	24.6 *	18.5	0.8	6.7 J	8.2 J	6.8 J	1.8 J	5.9 J
Cobalt	ug/L	No Std.	5.2 B	ND	0.10 J	1.2 J	<50	1.9 J	<50	0.78 J	17.4 B	14.4 B	2.92	6.8 J	<50	8 J	8.9 J	5.93 J	8.8 B	9 B	0.04 J	<0.6	<50	<50	<50	ND
Copper	ug/L	200	65.5	168	40.0	<21.2	<25	5 J	<25	1.3 J	16.5 B	3.6 B	31.0	<1.3	<25	<25	<25	ND	27.7	15.5 B	1.0	<17.6	<25	<25	<25	ND
Iron	ug/L	300	**38,400**	**5,030**	**19,650 J**	**592**	**12,700 J**	**8,240**	**15,300**	**9,208 J**	**15,100**	**17,400**	**1,297**	**1,270**	<1,740	**2,190**	**2,290**	**1,438**	**38,300**	**29,700 E**	**5,870**	**12,700**	**36,000 J**	**32,000**	**32,000**	**28,175 J**
Iron and Manganese	ug/L	500	**38,749**	**5,069**	**20,109 J**	**643**	**12,953 J**	**8,416**	**15,516**	**9,382 J**	**15,302**	**17,868**	**1,700**	**1,566**	335	**2,438**	**2,606**	**1,736**	**38,691**	**29,997 EJ**	**6,663**	**13,424**	**36,521 J**	**32,463**	**32,397**	**28,701 J**
Lead	ug/L	25	**173 N**	**138 N**	1.3	24.9	1.4 J	1.3 J	<5	6.9 J	11.7 N	3.8 N	0.7 J	**35.4**	0.99 J	<5	<5	9.1 J	**96.8 N**	**55.7 NS***	2.1 J	4.7 J	<5	<5	<5	1.18 J
Magnesium	ug/L	35,000[GV]	20,600	887	**23,350**	23,100	27,200	30,300	25,400	26,500	**143,000**	14,100	**122,600**	**76,800**	**105,000**	**76,100**	**82,200**	**85,025**	**126,000**	**131,000**	**75,860**	**40,200**	**41,400**	**37,600**	33,900	**38,275**
Manganese	ug/L	300	**349**	38.8	**459**	51.3	253	176	216	173	202	**468**	**403**	296	**335**	248	**316**	**316**	**391**	297 E	**793**	**724**	**521**	**463**	**397**	**547**
Mercury	ug/L	0.7	ND	ND	ND	<0.1	<0.2	0.095 J	0.14 J	0.27 J	ND	ND	ND	<0.1	<0.2	0.093 J	0.16 J	0.063 J	ND	ND	ND	0.12 J	0.18 J	0.092 J	0.14 J	0.13 J
Nickel	ug/L	100	28.8 B	26.6 B	0.6 J	13.3 J	7.4 J	9.5 J	<40	7.6 J	18.2 B	ND	1.0 J	7.1 J	7.9 J	5.4 J	1 J	5.4 J	10.7 B	17.5 B	1.0 J	<3.3	3.3 J	4.8 J	<40	2. J
Potassium	ug/L	No Std.	16,700	3,470 B	15,700 J	12,400	12,900 J	9,380	12,700	11,845 J	126,000	124,000	77,160	55,100	64,300 J	41,200	46,300	51,725 J	46,300	57,000	32,660	15,700	13,600 J	8,860	6,600	11,190 J
Selenium	ug/L	10	NA	ND	NA	<1.7	<10 J	<10	<10	ND	NA	ND	NA	<1.7	<10 J	<10	<10	ND	NA	1.5 BNW	NA	<3.8	<10 J	<10	<10	ND
Silver	ug/L	50	ND	ND	NA	<3.4 J	3.2 J	<10	<10	0.8 J	ND	ND	NA	<3.4 J	<10	<10	<10	ND	ND	ND	NA	<2.2 J	4.7 J	<10	<10	1.2 J
Sodium	ug/L	20,000	**466,000**	**85,100**	**510,800**	**503,000**	**383,000 J**	**373,000**	**435,000**	**423,500 J**	**562,000**	**600,000**	**357,300**	**459,000**	**368,000 J**	**218,000**	**253,000**	**324,500 J**	**100,000**	**151,000**	**329,030**	**71,600**	<48,800 J	**31,400**	**28,700**	**32,925**
Thallium	ug/L	0.5	ND	NA	NA	<2.7	<10	<10	<10	ND	ND	NA	NA	<4.4	<10	<10	<10	ND	ND	NA	NA	<3.8 J	**2.1 J**	<10	<10	**0.53 J**
Vanadium	ug/L	No Std.	21.8 B	13.5 B	0.13 J	<2.8	<50	1.3 J	1.2 J	0.63 J	45.4 B	23.2 B	4.42 J	8.8 J	10.6 J	11.0 J	10.9 J	9.8 J	24.2 B	26.4 B	0.09 J	<0.9	<50	<50	<50	ND
Zinc	ug/L	2,000[GV]	464 E	734	107	<142	<67	111	17.5 J	5.8 J	37.5 E	15.4 B	29	<12.5	<20	1.6 J	13.3 J	3.7 J	106 E	97	18	<76.3	<20	<20	<20	ND

Metals	Units	Class GA Standard	HP-318								HP-603							
			Remedial Investigation		1st 5 Yr. Review Period Average	2014	2016	2017	2018	2nd 5 Yr. Review Period Average	Remedial Investigation		1st 5 Yr. Review Period Average	2014	2016	2017	2018	2nd 5 Yr. Review Period Average
			8/11/93	12/13/93							8/7/93	12/93						
Aluminum	ug/L	No Std.	155 B	1,210	151	<92.4	<221	<200	<200	ND	1,740	NS	103	<26.2	<200	161 J	<200	40.3 J
Antimony	ug/L	3	ND	ND	0.5	<1.6	<60	<60	<60	ND	ND	NS	ND	<1.6	<60	<60	<60	ND
Barium	ug/L	1000	304	191 BE	47 J	21.7 J	41.8 J	42.1 J	21.5 J	33.3 J	227	NS	89	76.3 J	76.5 J	17.8 J	41.9 J	53.1 J
Beryllium	ug/L	3.0[GV]	ND	ND	NA	<0.2	<5	<5	<5	ND	ND	NS	NA	<0.2	<5	<5	<5	ND
Boron	ug/L	1000	NA	NA	553 J	104	249	201	186	180	NA	NS	417 J	934	607	129	185	575
Cadmium	ug/L	5	ND	ND	NA	<0.2	<2.5	<2.5	<2.5	ND	ND	NS	NA	2.1 J	<2.5	<2.5	<2.5	0.53 J
Calcium	ug/L	No Std.	209,000	302000 E	142,500	111,000	184,000 J	150,000	113,000	139,500 J	159,000	NS	205,600	247,000	211,000 J	69,000	108,000	158,750 J
Chromium, Total	ug/L	50	6.1 B	ND	2.3	<7.2	2.4 J	<10	<10	0.60 J	9.5 B*	NS	3.1	10.1	2.9 J	<10	<10	3.3 J
Cobalt	ug/L	No Std.	7 B	5.1 B	0.11 J	0.4 J	<50	<50	1.6 J	0.50 J	8.6 B	NS	0.27 J	2.9 J	<50	<50	<50	0.73 J
Copper	ug/L	200	ND	9.7 B	4.6 J	<6.5	<25	<25	<25	ND	12.5 B	NS	ND	<4	<25	<25	<25	ND
Iron	ug/L	300	**16,300**	**30,100 E**	**7,907**	**539**	<2,230	**2,520 J**	**3,300**	**1,590 J**	**26,000**	NS	**9,053**	**6,960**	**7,300 J**	**1,170**	**6,080**	**5,378 J**
Iron and Manganese	ug/L	500	**16,522**	**30,578 E**	**8,208**	**609**	258	**2,656 J**	**3,453**	**1,744 J**	**26,329**	NS	**9,653**	**7,519**	**8,400 J**	**1,402**	**6,636**	**5,989 J**
Lead	ug/L	25	4.3	5.9 W	1.1 J	**27.2**	<5	<5	<5	6.8	7.2 N	NS	0.6 J	**25.3**	1.2 J	<5	<5	6.6 J
Magnesium	ug/L	35,000[GV]	**192,000**	**58,800 E**	**36,970**	30,700	**49,200**	**42,400**	31,000	**38,325**	**55,500**	NS	**37,640**	**72,000**	**56,500**	23,900	31,200	**45,900**
Manganese	ug/L	300	222	**478**	**301**	69.9	258	136	153	160	**329**	NS	**600**	**559**	**1,100**	232	**556**	**738**
Mercury	ug/L	0.7	ND	ND	ND	<0.1	<0.2	<0.2	0.14 J	0.035 J	ND	NS	ND	<0.1	<0.2	0.12 J	0.14 J	0.07 J
Nickel	ug/L	100	ND	ND	2.1 J	<4.2	2.8 J	2.3 J	1.0 J	1.53 J	9.5 B	NS	2.8 J	5.8 J	10.0 J	5.5 J	<40	5.3 J
Potassium	ug/L	No Std.	100,000	30,300	29,370 J	8,840	17,600 J	14,800 J	7,220	12,115 J	59,100	NS	17,540 J	14,300	12,100 J	3,980 J	6,000	10,800 J
Selenium	ug/L	10	NA	ND	NA	<1.7	<10 J	<10	<10	ND	NA	NS	NA	<1.7	<10 J	<10	<10	ND
Silver	ug/L	50	ND	ND	NA	<3.4 J	<10	<10 J	<10	ND	NA	NS	NA	<3.4 J	<10	<10	<10	ND
Sodium	ug/L	20,000	**393,000**	**77,800**	**685,300**	**53,000**	**297,000 J**	**281,000**	**67,200**	**174,550 J**	**142,000**	NS	**106,000**	**154,000**	**121,000 J**	**25,200**	**33,300**	**83,375 J**
Thallium	ug/L	0.5	ND	NA	NA	<4.1	**2.4 J**	<10	<10	**0.60 J**	ND	NS	NA	<6.6	<10	<10	<10	ND
Vanadium	ug/L	No Std.	11.1 B	ND	0.38 J	<2.8	4.2 J	<50	3.0 J	1.8 J	24.6 B	NS	0.26 J	<2.8	<50	1.7 J	1.8 J	0.88 J
Zinc	ug/L	2,000[GV]	23.7*	40	23	<19.4	<20.6	<20	6.5 J	1.63 J	31.5 E	NS	10	<13.5	<20	4.7 J	1.3 J	1.5 J

Wells Screened in the Upper Portion of the Upper Glacial Aquifer

Metals	Units	Class GA Standard	HP-101S								HP-407S							
			Remedial Investigation		1st 5 Yr. Review Period Average	2014	2016	2017	2018	2nd 5 Yr. Review Period Average	Remedial Investigation		1st 5 Yr. Review Period Average	2014	2016	2017	2018	2nd 5 Yr. Review Period Average
			8/3/93	12/12/93							8/4/93	12/12/93						
Aluminum	ug/L	No Std.	60.8 B	68.1 B	1	<97.7	<200	20.9 J	<200	5.23 J	462	52.3 B	37	<21.8	<200	138 J	<200	34.5 J
Antimony	ug/L	3	ND	ND	ND	<1.6	<60	<60	<60	ND	ND	**28 B**	1.0	<1.6	6.0 J	<600	<60	1.5 J
Barium	ug/L	1000	285	408	51 J	93.8 J	42.8 J	49.4 J	105 J	72.8 J	104 B	153 B	241	189 J	205	157 J	197 J	193 J
Beryllium	ug/L	3.0[GV]	ND	ND	NA	<0.2	<5	<5	<5	ND	ND	1.4 B	NA	<0.2	<5	<50	<5	ND
Boron	ug/L	1000	NA	NA	**1,128 J**	248	**1,060**	**1,090**	**1,130**	882	NA	NA	**2,160 J**	**1,610**	**1,640**	**1,410**	**1,880**	**1,635**
Cadmium	ug/L	5	2.3 B	4.2 B*	NA	1.6 J	<2.5	<2.5	<2.5	0.40 J	ND	ND	NA	**6.5**	<2.5	<25	<2.5	1.6
Calcium	ug/L	No Std.	75,600	128,000	49,850	91,000	56,000 J	59,500	77,100	70,900 J	176,000	193,000	210,900	216,000	218,000 J	184,000	226,000	211,000 J
Chromium, Total	ug/L	50	7.3 B*	ND	1.5 J	<6.6	5.9 J	6.6 J	6.0 J	4.6 J	ND	ND	19.0	11.9	18	<100	4.5 J	8.6 J
Cobalt	ug/L	No Std.	3.5 B	5.4 B	ND	<0.2	<50	1.9 J	1.9 J	0.95 J	ND	ND	4.17 J	2.6 J	<50	<500	9.7 J	3.2 J
Copper	ug/L	200	13 B	23.4 B	40.1 J	<18.2	<25	<25	<25	ND	10.6 B	3.6 B	ND	<6.9	<25	<250	<25	ND
Iron	ug/L	300	**32,300**	**60,600**	**906**	**541**	<980	**1,570**	**1,140**	**813 J**	**3,270**	**7,870**	**13,380**	**16,900**	**10,700 J**	**10,000**	**12,300**	**12,475 J**
Iron and Manganese	ug/L	500	**33,530**	**62,950**	**947**	**563**	58	**1,636**	**1,222**	**870**	**3,566**	**8,324**	**13,890**	**17,513**	**11,061 J**	**10,459**	**12,607**	**12,910 J**
Lead	ug/L	25	24 NS	18 N	0.9 J	**27.9**	2.3 J	<5	<5	7.6 J	ND	1.6 BNW	0.9 J	**42.3**	3.5 J	<50	2.3 J	12 J
Magnesium	ug/L	35,000[GV]	**140,000**	9,700	**116,400**	22,000	**122,000**	**151,000**	**107,000**	**100,500**	**310,000**	**394,000**	**463,000**	**495,000**	**508,000**	**419,000**	**521,000**	**485,750**
Manganese	ug/L	300	**1,230**	**2,350**	41.5	21.5	57.7	65.6	82.2	53.8	296	**454**	**510**	**613**	**361**	**459**	**307**	**427**
Mercury	ug/L	0.7	ND	ND	ND	<0.1	<0.2	0.1 J	0.15 J	0.063 J	ND	ND	ND	<0.1	<0.2	0.09 J	0.16 J	0.063 J
Nickel	ug/L	100	ND	34.5 B	ND	21 J	<40	<40	<40	5.25 J	ND	ND	20.0	78.2 J	69	<400	<40	36.8 J
Potassium	ug/L	No Std.	84,200	3,260	89,010 J	8,760	77,700 J	80,900	68,200	58,890 J	90,200	126,000	255,700 J	221,000	208,000 J	129,000	192,000	187,500 J
Selenium	ug/L	10	NA	1 BN	NA	<1.7	<10 J	<10	<10	ND	NA	ND	NA	7.5	<10 J	<100	<10	1.9
Silver	ug/L	50	ND	ND	NA	<3.4 J	<10	<10	<10	ND	ND	ND	NA	<3.4 J	3.1 J	<100	<10	0.78 J
Sodium	ug/L	20,000	**3,980,000**	**41,200**	**1,259,000**	**193,000**	**392,000 J**	**1,320,000**	**2,500,000**	**1,101,250 J**	**2,740,000**	**3,280,000**	**3,649,000**	**5,460,000**	**477,000 J**	**3,240,000**	**3,800,000**	**3,244,250 J**
Thallium	ug/L	0.5	ND	NA	NA	<4.1	**2.2 J**	<10	<10	**0.55 J**	ND	NA	NA	<9.8	**1.9 J**	<100	<10	0.48 J
Vanadium	ug/L	No Std.	49.1 B	71.5	2.89 J	<2.8	10.4 J	9.9 J	13.1 J	8.4 J	49.8 B	27.8 B	0.48 J	<2.8	4.4 J	<500	5.3 J	2.4 J
Zinc	ug/L	2,000[GV]	315 E	1,870	9	202 J	<20	4.7 J	3.1 J	52.5 J	ND	ND	13	<11.4	<20	<200	<20	ND

Wells Screened in the Lower Portion of the Upper Glacial Aquifer

Metals	Units	Class GA Standard	HP-101D								HP-103D							
			Remedial Investigation		1st 5 Yr. Review Period Average	2014	2016	2017	2018	2nd 5 Yr. Review Period Average	Remedial Investigation		1st 5 Yr. Review Period Average	2014	2016	2017	2018	2nd 5 Yr. Review Period Average
			8/3/93	12/3/93							8/3/93	12/12/93						
Aluminum	ug/L	No Std.	26.8 B	NS	22	<10.4	<200	<2,000	<200	ND	466	NS	151	<150	<200	366 J	82.1 J	112 J
Antimony	ug/L	3	ND	NS	0.2 J	<1.6	**7.0 J**	<600	<60	1.8 J	ND	NS	**3.3 J**	<3	**4.5 J**	<600	<60.0	1.1 J
Barium	ug/L	1000	446	NS	153 J	108 J	106 J	117 J	116 J	112 J	822	NS	63 J	101 J	94.7 J	85.1 J	85.6 J	91.6 J
Beryllium	ug/L	3.0[GV]	ND	NS	NA	<0.2	<5	<50	<5	ND	ND	NS	NA	<0.1	<5	<50	<5	ND
Boron	ug/L	1000	NA	NS	**2,007 J**	**2,580**	**2,560**	**3,010**	**2,730**	**2,720**	NA	NS	**2,190 J**	**3,260**	**3,180**	**3,140**	**3,240**	**3,205**
Cadmium	ug/L	5	4.1 B	NS	NA	**8**	1.6 J	<25	<2.5	2.4 J	2.3 B	NS	NA	1.8 J	<2.5	<25	<2.5	0.45 J
Calcium	ug/L	No Std.	147,000	NS	249,000	264,000	282,000 J	336,000	310,000	298,000 J	201,000	NS	275,800	378,000	351,000 J	336,000	368,000	358,250 J
Chromium, Total	ug/L	50	ND	NS	19.4 J	12	21.9	<100	13	11.7 J	ND	NS	0.6	15.2	4.0 J	<100	4.1 J	5.8 J
Cobalt	ug/L	No Std.	ND	NS	ND	2.1 J	<50	8.6 J	7.7 J	4.6 J	6.9 B	NS	ND	<0.6	<50	<500	8.4 J	2.1 J
Copper	ug/L	200	58.0	NS	<7.4	<25	<250	<25	ND	12.4 B	NS	29.1 J	<15.6	<25	<250	<25	ND	10.4 B
Iron	ug/L	300	**8,830**	**19,000**	**19,700 J**	**21,000**	**2,660**	**15,590 J**	**42,100**	NS	**21,130**	**8,260**	**8,050 J**	**6,130**	**1,310**	**5,938 J**	**1,390**	NS
Iron and Manganese	ug/L	500	**9,128**	**19,457**	**20,108 J**	**22,030**	**3,009**	**16,151 J**	**47,310**	NS	**22,643**	**9,590**	**9,270 J**	**7,240**	**2,260**	**7,090 J**	**1,569**	NS
Lead	ug/L	25	0.8 J	**28.9**	<5	<50	2.0 J	7.7 J	**59.2 N**	NS	0.4 J	2.6 J	<5	<50	1.8 J	1.1 J	1.2 BN	NS
Magnesium	ug/L	35,000[GV]	**452,600**	**838,000**	**847,000**	**921,000**	**911,000**	**879,250**	**36,000**	NS	**683,500**	**1,100,000**	**1,070,000**	**942,000**	**1,020,000**	**1,033,000**	31,900	NS
Manganese	ug/L	300	298	**457**	**408**	**1,030**	**349**	**561**	**5,210**	NS	**1,513**	**1,330**	**1,220**	**1,110**	**950**	**1,153**	179	NS
Mercury	ug/L	0.7	ND	<0.1	<0.2	<0.2	0.16 J	0.04 J	ND	NS	ND	0.12 J	<0.2	0.11 J	0.15 J	0.1 J	ND	NS
Nickel	ug/L	100	8.5 J	39.6 J	32.9 J	13.0 J	2.4 J	21.7 J	10	NS	0.7 J	18.3 J	51	<400	<40	17.3 J	ND	NS
Potassium	ug/L	No Std.	281,200 J	268,000	272,000 J	276,000	283,000	274,750 J	28,300	NS	301,500 J	342,000	333,000 J	284,000	349,000	327,000 J	11,100	NS
Selenium	ug/L	10	NA	**11.5**	<10	<100	<10	2.9	NA	NS	NA	<3.8	<10 J	<100	<10	ND	NA	NS
Silver	ug/L	50	NA	<3.4 J	2.6 J	<100	<10	0.65 J	ND	NS	NA	<2.2 J	<10	<100	<10	ND	ND	NS
Sodium	ug/L	20,000	########	**8,550,000**	**292,000 J**	**6,700,000**	**7,640,000**	**6,795,500**	**104,000**	NS	**5,592,000**	**9,250,000**	**304,000 J**	**7,580,000**	**7,560,000**	**6,173,500**	**289,000**	NS
Thallium	ug/L	0.5	NA	<13.2	<10	<100	<10	ND	ND	NS	NA	**5.3 J**	**2.0 J**	<100	<10	**1.83 J**	ND	NS
Vanadium	ug/L	No Std.	0.17 J	<2.8	3.6 J	<500	1.1 J	1.18 J	28 B	NS	0.20 J	<5.1	3.6 J	<500	1.9 J	1.4 J	13.9 B	NS
Zinc	ug/L	2,000[GV]	18	<15.6	<20	41.4 J	<200	10.4 J	63.3 E	NS	28	<84.3	<20	<200	<20	ND	ND	NS

Metals	Units	Class GA Standard	HP-407D							
			Remedial Investigation		1st 5 Yr. Review Period Average	2014	2016	2017	2018	2nd 5 Yr. Review Period Average
			8/8/93	12/15/93						
Aluminum	ug/L	No Std.	720	NS	423	<17.4	<200	19.0 J	<200	4.8 J
Antimony	ug/L	3	ND	NS	**5.1 J**	<1.6	<60	<60	<60	ND
Barium	ug/L	1000	24.9 B	NS	99 J	57.9 J	55.6 J	59.2 J	58.4 J	57.8 J
Beryllium	ug/L	3.0[GV]	ND	NS	NA	<0.2	<5	0.66 J	<5	0.17 J
Boron	ug/L	1000	NA	NS	**2,442 J**	**1,770**	**1,740**	**1,790**	**1,680**	**1,745**
Cadmium	ug/L	5	3.1 B	NS	NA	**8.6**	0.60 J	0.23 J	<2.5	2.4 J
Calcium	ug/L	No Std.	24	NS	302,700	262,000	282,000 J	274,000	285,000	275,750 J
Chromium, Total	ug/L	50	3.6 J	NS	NA	<0.2	<5	<5	<5	ND
Cobalt	ug/L	No Std.	ND	NS	ND	0.8 J	<50	3 J	3.4 J	1.8 J
Copper	ug/L	200	24.0	NS	10.4 B	<8.4	<25	<25	<25	ND
Iron	ug/L	300	**8,880**	**21,700**	**20,600 J**	**20,500**	**14,600**	**19,350 J**		
Iron and Manganese	ug/L	500	**10,176**	**22,486**	**21,325 J**	**21,130**	**15,253**	**20,049**		
Lead	ug/L	25	0.8 J	**35**	<5	<5	<5	8.8 J		
Magnesium	ug/L	35,000[GV]	**806,700**	**842,000**	**672,000**	**604,000**	**676,000**	**698,500**		
Manganese	ug/L	300	**1,296**	**786**	**725**	**630**	**653**	**721**		
Mercury	ug/L	0.7	ND	NS	ND	<0.1	<0.2	0.095 J	0.14 J	0.06 J
Nickel	ug/L	100	ND	NS	ND	<3.5	38.4 J	2.6 J	<40	10.3 J
Potassium	ug/L	No Std.	318,300 J	NS	242,000	217,000 J	216,000	180,000	213,750 J	
Selenium	ug/L	10	NA	NS	**10.3**	<10 J	<10	<10	2.6 J	
Silver	ug/L	50	NA	NS	<3.4 J	2.1 J	<10	<10	0.53 J	
Sodium	ug/L	20,000	**6,774,000**	**7,030,000**	**498,000 J**	**866,000**	**4,740,000**	**8,283,500 J**		
Thallium	ug/L	0.5	NA	<13.2	<10	**4.0 J**	<10	**1.0 J**		
Vanadium	ug/L	No Std.	0.10 J	<2.8	<50	<50.0	1.6 J	0.4 J		
Zinc	ug/L	2,000[GV]	34	<14.2	<20	7.0 J	<20.0	1.8 J		

Footnotes: Only the metals detected in at least in one post-closure groundwater sample are listed.
All other metals analyzed for were not detected.
Only detected results are reported for the Remedial Investigation events.
The NYSDEC Class GA Standards are for potable groundwater.
The groundwater at the site is naturally saline; therefore, non-potable.
There are no metal standards for saline groundwater.
Standards with the (GV) notation are guidance values only.
ND = Not detected. NS = Not sampled. NA = Not analyzed.
R = Compound rejected due to contamination in associated method blank.
J = Estimated value.

B = Less than the quantitation limit but ≥ instrument detection limit.
* = Duplicate analysis not within control limits.
N = Spiked sample recovery not within control limits.
S = The reported value was determined by the Method of Standard Additions (MSA).
+ = Correlation coefficient for MSA < 0.995.
W = Post digestion spike for Furnace AA analysis is out of control limits (85-115%) while sample absorbance is <50% of spike absorbance.

Appendix A

Industrial Wastewater Discharge
Permit No. 16-P3145-1

Environmental Protection

Vincent Sapienza, P.E.
Acting Commissioner

Pamela Elardo, P.E.
Deputy Commissioner

Bureau of Wastewater Treatment
96-05 Horace Harding Expressway – 2nd Floor
Corona, NY 11368

Tel. (718) 595-6924
Fax (718) 595-4084

October 12, 2016

NEW YORK CITY DEPARTMENT OF
ENVIRONMENTAL PROTECTION,
BUREAU OF WASTEWATER TREATMENT,
PENNSYLVANIA AVENUE LANDFILL,
96-05 HORACE HARDING EXPRESSWAY,
2ND FLOOR,
CORONA, NY 11368

Re: Issuance of Industrial Wastewater Discharge Permit No. 16-P3145-1

Attention: Mr. Walter Goyzueta

Enclosed is your Industrial Wastewater Discharge Permit No. 16-P3145-1, authorizing the discharge of industrial wastewater from your facility located at 1750 PENNSYLVANIA AVENUE, BROOKLYN, NY 11239 into the New York City sewerage system. This control mechanism is effective as of October 19, 2016, and expires at midnight on October 18, 2021. In order to continue discharging after the expiration date of this Permit, an application must be filed for a new Permit at least 120 days prior to the expiration date. **This Permit shall supersede Permit No. 11-P3145-1 issued to you on November 9, 2011. Please note that your self-monitoring report due dates have not been changed in your new Permit.**

Your Permit contains applicable Federal Categorical Standards and New York City Sewer Use Limits, as well as self-monitoring, reporting and record keeping requirements. Failure to comply with all terms and conditions contained in the Permit and the New York City Sewer Use Regulations (available upon request) may result in issuance of Notices of Violation currently carrying civil penalties of up to $10,000 per violation per day and/or other enforcement proceedings.

Substantial changes have been made to the New York City Industrial Wastewater Discharge Permit. It is therefore vital that you read through your Permit carefully and become aware of the new requirements. Please make special note of the extensive changes in discharge limitations and monitoring requirements.

In order to facilitate your periodic self-monitoring and reporting, a standardized four-page Industrial Self-Monitoring Report Form and an Analytical Report Form are enclosed. Additional forms are always available upon request. When completing the forms, your Permit should be referred to for specific monitoring and reporting requirements.

The SMR must be submitted to:

Frances Leung, P.E., Chief
Industrial Inspections and Permitting Section
Bureau of Wastewater Treatment
New York City Department of Environmental Protection
96-05 Horace Harding Expressway
Corona, New York 11368

Please contact Ms. Kene Umeasor at (718) 595-4712, if you have any questions regarding this Permit.

Sincerely,

Frances Leung

Frances Leung, P.E., Chief
Industrial Inspections and Permitting Section

enc: Industrial Wastewater Discharge Permit
Industrial User Self-Monitoring Report Form
Analytical Report Form

NEW YORK CITY
DEPARTMENT OF ENVIRONMENTAL PROTECTION
INDUSTRIAL WASTEWATER DISCHARGE PERMIT

Permit No.: **16-P3145-1**

Effective Date: **October 19, 2016**

Expiration Date: **October 18, 2021**

In accordance with the provision of Title 24, Chapter 5, Section 24-523 (c) (1) of the New York City Administrative Code (NYCAC)

Industrial User Name: **NEW YORK CITY DEPARTMENT OF ENVIRONMENTAL PROTECTION, BUREAU OF WASTEWATER TREATMENT, PENNSYLVANIA AVENUE LANDFILL**

Facility Address: **1750 PENNSYLVANIA AVENUE, BROOKLYN, NEW YORK 11239**

Mailing Address: **96-05 HORACE HARDING EXPRESSWAY, 2ND FLR. CORONA, NEW YORK 11368**

is hereby authorized to discharge industrial wastewater from the above identified facility into the New York City sewerage system in accordance with the discharge limitations, monitoring requirements, and other conditions set forth in this Permit.

All discharges authorized herein shall be consistent with the terms and conditions of this Permit. The discharge of any pollutant not identified in this Permit, or any pollutant identified in this Permit more frequently than or at levels in excess of that authorized, shall constitute a violation of the Permit.

The Industrial User shall not discharge any process or regulated wastewater after the date of expiration. If the Industrial User wishes to continue to discharge after this expiration date, an application for reissuance of this Permit must be filed a minimum of 120 days prior to its expiration date.

By: _____

Leslie Lipton, Chief
Division of Pollution Control and Monitoring
Bureau of Wastewater Treatment

Issued this 12th day of October, 2016

TABLE OF CONTENTS

PART I - SPECIFIC CONDITIONS

SECTION A. DISCHARGE LIMITATIONS

1. Discharge Points

The Industrial User is authorized to discharge leachate from the Pennsylvania Avenue Landfill, subject to the conditions in this Permit, through the discharge point(s) listed below to the New York City sewerage system.

DISCHARGE POINT	DESCRIPTION
M1	A 0.25"diameter PVC pipe located 25.25" above the concrete floor of the pre-fabricated building housing the facility's pre-treatment system and 90" from the face of a steel beam facing Pennsylvania Avenue, situated 98" from the building's exterior shell facing Pennsylvania Avenue and 69" from the interior cinder block wall of the office area facing Belt Parkway.

2. Sewer Use Limits

The discharge from point **M1** shall not exceed the New York City Sewer Use Limits, including but not limited to:

SEWER USE LIMITS
(15 R.C.N.Y. ch.19)

POLLUTANT	PERMISSIBLE MAXIMUM CONCENTRATION FOR ANY GIVEN TIME (MG/L)	DAILY AVERAGE MAXIMUM CONCENTRATION (MG/L)
pH	5.0-12.0 Standard Units	---
Cadmium	2.0	0.69
Chromium (Hexavalent)	5.0	---
Copper	5.0	---
Lead	2.0	---
Mercury	0.05	---
Nickel	3.0	---
Zinc	5.0	---
Cyanide (Amenable to Chlorination)	0.2	---
Non-Polar Material	50.0	---

The discharge of leachate with temperature above 150 degrees Fahrenheit and/or closed-cup flash point below 140 degrees Fahrenheit (using the test methods specified in 40 C. F. R. 261.21) at any time is prohibited.

The following limits shall also apply:

Pollutant	Permissible Maximum Concentration for any Given Time
Total Suspended Solids (TSS)	350 ppm
Methyl-Tert-Butyl-Ether (MTBE)	50 ppb
Tetrachloroethylene (Perc)	20 ppb
Total PCB*	1 ppb

Pollutant	Daily Limit (ppb)	Monthly Limit (ppb)
Benzene	134	57
Ethylbenzene	380	142
Naphthalene	47	19
Toluene	74	28
Xylenes (Total)	74	28

* Total PCBs shall equal the sum of all concentrations of the 7 PCB compounds listed on pages I-4 and I-5 of this Permit.

SECTION B. MONITORING REQUIREMENTS

1. Sampling

The Industrial User shall monitor the specified discharge points for the pollutants listed below. All sampling shall take place on days representative of normal operations. Sampling shall be conducted in accordance with 40 C.F.R. § 403.12(g)(3) which states, in pertinent part, that grab samples must be used for pH, cyanide, total phenols, oil and grease, sulfide, and volatile organic compounds. For all other pollutants, 24-hour composite samples must be obtained through flow-proportional composite sampling techniques, unless time-proportional composite sampling or grab sampling is authorized by the [Department]. Where time-proportional composite sampling or grab sampling is authorized by the [Department], the samples must be representative of the discharge. Where the Industrial User batch discharges, the company must state how it will take representative samples.

POLLUTANT	SAMPLE LOCATION	FREQUENCY	SAMPLE TYPE
VOLATILE ORGANICS (VOC)			
Benzene	M1	Once a month	4 grab samples, taken at least 1 hour apart for 1 day. Each grab sample must be individually preserved and sent to a certified laboratory. The laboratory may then composite the grab samples.
Ethylbenzene	M1	" "	" "
Methyl-Tert-Butyl-Ether (MTBE)	M1	" "	" "
Tetrachloroethylene (Perc)	M1	" "	" "
Toluene	M1	" "	" "
Xylenes	M1	" "	" "
Carbon tetrachloride	M1	" "	" "
Chloroform	M1	" "	" "
1,1,1-trichloroethane	M1	" "	" "
SEMI-VOLATILE ORGANICS			
Naphthalene	M1	Once a month	A one-day composite sample.
1,4-dichlorobenzene	M1	" "	" "
Phenol	M1	" "	" "
1,2,4-trichlorobenzene	M1	" "	" "
PCB-1016[3] (Arochlor 1016)	M1	" "	" "
PCB-1242[3] (Arochlor 1242)	M1	" "	" "
PCB-1254[3] (Arochlor 1254)	M1	" "	" "

POLLUTANT	SAMPLE LOCATION	FREQUENCY	SAMPLE TYPE
PCB-1221[3] (Arochlor 1221)	M1	Once a month	A one-day composite sample.
PCB-1232[3] (Arochlor 1232)	M1	" "	" "
PCB-1248[3] (Arochlor 1248)	M1	" "	" "
PCB-1260[3] (Arochlor 1260)	M1	" "	" "
OTHER TOXIC ORGANICS OF CONCERN[1]			
1) Volatile Organics (VOC)	M1	Once a month	4 grab samples, taken at least 1 hour apart for 1 day. Each grab sample must be individually preserved and sent to a certified laboratory. The laboratory may then composite the grab samples. See Part II, Sect. C (1).
2) Semi-Volatile Organics	M1	" "	A one-day composite sample. See Part II, Sect. C (1).
OTHER POLLUTANTS, PH, AND FLOW			
Cadmium	M1	Once a month	A one-day composite sample.
Chromium (Total)	M1	" "	" "
Chromium (Hexavalent)[2]	M1	" "	" "
Copper	M1	" "	" "
Lead	M1	" "	" "
Mercury	M1	" "	" "
Molybdenum	M1	" "	" "
Nickel	M1	" "	" "
Silver	M1	" "	" "
Zinc	M1	" "	" "

POLLUTANT	SAMPLE LOCATION	FREQUENCY	SAMPLE TYPE
Carbonaceous Biochemical Oxygen Demand (CBOD)	M1	Once a month	A one-day composite sample.
Total Nitrogen	M1	" "	" "
Chloride	M1	" "	" "
Cyanide (Total)	M1	" "	4 grab samples, taken at least 1 hour apart for 1 day. Each grab sample must be individually preserved and sent to a certified laboratory. The laboratory should then composite the 4 grab samples.
Cyanide (Amenable)[4]	M1	" "	" "
Total Suspended Solids (TSS)	M1	" "	4 grab samples, taken at least 1 hour apart for 1 day. Each grab sample must be individually preserved and sent to a certified laboratory.
Non- Polar Material	M1	" "	" "
pH	M1	" "	Either by 4 in situ measurements or by 4 grab samples, each taken at least 1 hour apart.

FOOTNOTES TO MONITORING REQUIREMENTS

1. Monitoring for Other Toxic Organics of Concern (OTOC) may not be required. See Part II, Sect. C(1). OTOC are comprised of two subcategories, volatile organic compounds (VOCs) and semi-volatile organic compounds. There are different sampling methods for each subcategory (See Part 1, Sect. B. Monitoring Requirements).These compounds include:

	(1)	acenaphthene
VOC	(2)	acrolein
VOC	(3)	acrylonitrile
	(4)	benzidine
VOC	(5)	chlorobenzene
	(6)	hexachlorobenzene
VOC	(7)	1,2-dichloroethane
	(8)	hexachloroethane
VOC	(9)	1,1-dichloroethane
VOC	(10)	1,1,2-trichloroethane
VOC	(11)	1,1,2,2-tetrachloroethane
VOC	(12)	chloroethane

(13) bis (2-chloroethyl) ether
VOC (14) 2-chloroethylvinyl ether (mixed)
(15) 2-chloronaphthalene
(16) 2,4,6-trichlorophenol
(17) parachlorometa cresol
(18) 2-chlorophenol
(19) 1,2-dichlorobenzene
(20) 1,3-dichlorobenzene
(21) 3,3-dichlorobenzidine
VOC (22) 1,1-dichloroethylene
VOC (23) 1,2-trans-dichloroethylene
(24) 2,4-dichlorophenol
VOC (25) 1,2-dichloropropane
VOC (26) 1,3-dichloropropylene (1,3-dichloropropene)
(27) 2,4-dimethylphenol
(28) 2,4-dinitrotoluene
(29) 2,6-dinitrotoluene
(30) 1,2-diphenylhydrazine
(31) fluoranthene
(32) 4-chlorophenyl phenyl ether
(33) 4-bromophenyl phenyl ether
(34) bis (2-chloroisopropyl) ether
(35) bis (2-chloroethoxy) methane
VOC (36) methylene chloride (dichloromethane)
VOC (37) methyl chloride (chloromethane)
VOC (38) methyl bromide (bromomethane)
VOC (39) bromoform (tribromomethane)
VOC (40) dichlorobromomethane
VOC (41) chlorodibromomethane
(42) hexachlorobutadiene
(43) hexachlorocyclopentadiene
(44) isophorone
(45) nitrobenzene
(46) 2-nitrophenol
(47) 4-nitrophenol
(48) 2,4-dinitrophenol
(49) 4,6-dinitro-o-cresol
(50) n-nitrosodimethylamine
(51) n-nitrosodiphenylamine
(52) n-nitrosodi-n-propylamine
(53) pentachlorophenol
(54) bis (2-ethylhexyl) phthalate
(55) butyl benzyl phthalate
(56) di-n-butyl phthalate
(57) di-n-octyl phthalate
(58) diethyl phthalate
(59) dimethyl phthalate
(60) 1,2-benzanthracene (benzo(a)anthracene)
(61) benzo(a)pyrene (3,4-benzopyrene)
(62) 3,4-benzofluoranthene (benzo(b)fluoranthene)
(63) 11,12-benzofluoranthene (benzo(k)fluoranthene)
(64) chrysene
(65) acenaphthylene
(66) anthracene
(67) 1,12-benzoperylene (benzo(ghi)perylene)
(68) fluorene
(69) phenanthrene
(70) 1,2,5,6-dibenzanthracene (dibenzo(a,h)anthracene)
(71) indeno (1,2,3-cd) pyrene (2,3-o-phenylene pyrene)
(72) pyrene
VOC (73) trichloroethylene
VOC (74) vinyl chloride (chloroethylene)
(75) aldrin
(76) dieldrin
(77) chlordane (technical mixture and metabolites)
(78) 4,4-DDT
(79) 4,4-DDE (p,p-DDX)
(80) 4,4-DDD (p,p-TDE)
(81) alpha-endosulfan
(82) beta-endosulfan
(83) endosulfan sulfate
(84) endrin
(85) endrin aldehyde
(86) heptachlor
(87) heptachlor epoxide (BHC-hexachlorocyclohexane)
(88) alpha-BHC
(89) beta-BHC

(90) gamma-BHC
(91) delta-BHC
(PCB-polychlorinated biphenyls)
(92) toxaphene
(93) 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD)
(94) azinophos-methyl
(95) chlorpyrifos
(96) demeton
(97) halomethanes
(98) manganese (inorganic element)
(99) methoxychlor
(100) pentachlorinated ethane
(101) 2,3,4,6-tetrachlorophenol

2. If the Chromium (Total) level at discharge point **M1**, is less than or equal to 5.0 mg/L, then analyzing for Chromium (Hexavalent) at that point is not required. The Chromium (Total) level can be submitted in lieu of analyzing for Chromium (Hexavalent).

3. The analysis of PCB compounds must be done by EPA Method 608, with a method detection level less than or equal to 65 ppt.

4. If the Cyanide (Total) level at discharge point **M1**, is less than or equal to 0.2 mg/L, then analyzing for Cyanide (Amenable) at that point is not required. The Cyanide (Total) level can be submitted in lieu of analyzing for Cyanide (Amenable).

2. Additional Monitoring Requirements

See Part II, Sect. C for additional monitoring requirements.

SECTION C. REPORTING REQUIREMENTS

1. Periodic Reports Concerning Continued Compliance

The Industrial User shall implement a self-monitoring program, as required in Part I, Sect. B of this Permit. Reports are due on a quarterly basis as follows:

Monitoring Period	Report Due Date
July 1 to September 30	**October 31**
October 1 to December 31	**January 31**
January 1 to March 31	**April 30**
April 1 to June	**July 31**

Reports must be received by the Department on or before the due dates specified above.

2. Additional Reporting Requirements

See Part II, Sect. D for additional reporting requirements.

3. Submission of Reports and Notices

The self-monitoring report and all other reports and notices required by this Permit shall be submitted to the Department at the following address, unless otherwise indicated:

Frances Leung, P.E., Chief
Industrial Inspections and Permitting Section
Bureau of Wastewater Treatment
New York City Department of Environmental Protection
96-05 Horace Harding Expressway
Corona, New York 11368

It is recommended that you send all reports and notices by certified mail in the event that you are required to prove that such reports or notices were submitted in a timely manner.

4. Reporting Format

a. Periodic reports shall be submitted on the Department's Industrial User **Self-Monitoring Report Form**.

b. Analytical results submitted to the Department for any reason, including but not limited to self-monitoring reports, split sampling, and pursuant to Commissioner's Orders, shall be reported by the certified laboratory performing the analysis in a format consistent with the Department's **Analytical Report Form**. The sampling points referenced on the Analytical Report Form must be identified exactly as they are in the Industrial User's Permit.

c. Copies of the Self-Monitoring Report Form and the Analytical Report Form are enclosed with this Permit. Additional copies are also available from the Department upon request.

SECTION D. SPECIAL CONDITIONS

1. The Industrial User must maintain a logbook on daily volume of discharge (in gallons per day). **A copy of the logbook entries for the monitoring period must be submitted in each self-monitoring report.**

PART II - GENERAL CONDITIONS

SECTION A. DEFINITIONS AND STANDARD CONDITIONS

1. Definitions

a. Biochemical Oxygen Demand - The laboratory determination of the quantity of oxygen utilized in the biochemical oxidation of organic matter in a given time and at a specified temperature. It is expressed in parts per million (ppm) or (mg/L) of oxygen used in a period of five days at 20 degrees Celsius.

b. Bypass - The intentional diversion of wastes from any portion of a treatment facility.

c. Commissioner - The Commissioner of the New York City Department of Environmental Protection.

d. Composite Sample - A sample composed of two or more discrete samples. The aggregate sample will reflect the average water quality covering the compositing or sample period.

e. Cooling Water -

i. Uncontaminated - Water used only for cooling purposes that has no direct contact with any raw material, intermediate or final product and that does not contain a level of contaminants higher than that of the intake water.

ii. Contaminated - Water used only for cooling purposes that may become contaminated either through the use of water treatment chemicals used for corrosion inhibitors or biocides or by direct contact with process materials and/or wastewater.

f. Daily Maximum - The maximum allowable discharge of a pollutant during a 24-hour period. Where daily maximum limitations are expressed in units of mass, the daily discharge is the total mass of the pollutant discharged over the course of the day. Where daily maximum limitations are expressed in terms of a concentration, the daily discharge is the arithmetic average measurement of the pollutant concentration derived from all measurements taken that day.

g. Department - The New York City Department of Environmental Protection.

h. Grab Sample - A sample which is taken from a wastestream on a one-time basis with no regard to the flow of the wastestream and without consideration of time. A single grab sample should be taken over a period of time not to exceed 15 minutes.

i. Indirect Discharge - The introduction of pollutants into a POTW from any non-domestic source regulated under section 307(b), (c), or (d) of the Clean Water Act.

j. Industrial User - A source of Indirect Discharge.

k. Instantaneous Maximum Concentration - The maximum concentration allowed in any single grab sample.

l. Interference - A discharge that alone or in conjunction with a discharge or discharges from other sources both:

i. Inhibits or disrupts the POTW, its treatment processes or operations or its sludge processes, use or disposal; and

ii. Causes a violation of any requirement of the POTW's SPDES Permit (including an increase in the magnitude or duration of a violation) or prevents the use or disposal of sewage sludge in compliance with the following statutory provisions and regulations or Permits issued thereunder (or more stringent State or local regulations): Section 405 of the Clean Water Act, the Solid Waste Disposal Act (SWDA) (including Title II, more commonly referred to as the Resource Conservation and Recovery Act (RCRA) and including State regulations contained in any State sludge management plan prepared pursuant to Subtitle D of the SWDA), the Clean Air Act, the Toxic Substances Control Act and the Marine Protection, Research and Sanctuaries Act.

m. Maximum Monthly Average - The maximum allowable value for the monthly average.

n. Monthly Average - The average of all samples taken during one calendar month. Thus, if only one sample is taken during a calendar month, the monthly average for that month will be based on only that one sample.

o. Pass Through - A discharge that exits the POTW into waters of the United States in quantities or concentrations that, alone or in conjunction with a discharge or discharges from other sources, cause a violation of any requirement of the POTW's SPDES Permit (including an increase in the magnitude or duration of a violation).

p. Publicly Owned Treatment Works (POTW) - A treatment works as defined by Section 212 of the Clean Water Act that is owned by the State or municipality. This definition includes any devices and systems used in the storage, treatment, recycling and reclamation of municipal sewage or industrial wastes of a liquid nature. It also includes sewers, pipes and other conveyances only if they convey wastewater to a POTW treatment plant.

q. Resource Conservation and Recovery Act (RCRA) - A Federal statute regulating the management of hazardous waste from its generation through ultimate disposal. The Act contains requirements for waste generators, transporters and owners and operators of treatment, storage and disposal facilities.

r. Sewer Use Regulations - Rules of the City of New York relating to the "Use of the Public Sewers." 15 R.C.N.Y. ch. 19.

s. Shall - mandatory.

t. Slug Discharge - Any discharge of a non-routine, episodic nature, including but not limited to an accidental spill or a non-customary batch discharge, which has a reasonable potential to cause interference or pass through, or in any other way violate the POTW's regulations, local limits or permit conditions.

u. Toxic Organics - Either the organic compounds listed in the definition of Total Toxic Organics (TTO) in Part I, Sect. A(2), and the Other Toxic Organics of Concern (OTOC) listed in Part I, Sect. B(1); or the Toxic Organics of Concern listed in Part I, Sect. B(1).

v. Upset - An exceptional incident in which there is unintentional and temporary noncompliance with technology based Permit effluent limitations because of factors beyond the reasonable control of the Industrial User, excluding such factors as operational error, improperly designed or inadequate treatment facilities or improper operation and maintenance or lack thereof.

2. Severability

The provisions of this Permit are severable, and if any provision of this Permit or the application of any provision of this Permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this Permit, shall not be affected thereby.

3. Duty to Comply

The Industrial User must comply with the provisions of the New York City Administrative Code (NYCAC) and the Sewer Use Regulations promulgated pursuant thereto, and all conditions of this Permit. Failure to comply with these requirements may be grounds for administrative action, or enforcement proceedings including civil and/or criminal penalties, injunctive relief and summary abatements.

4. Duty to Mitigate

The Industrial User shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with this Permit, including, but not limited to, such accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying discharge.

5. Permit Action

This Permit may be modified, revoked and reissued, or terminated for good cause, including, but not limited to, the following:

a. Incorporation of any new or revised Federal, State, or local pretreatment standards or requirements;

b. Material or substantial alterations or additions to the discharger's operations that were not covered in the effective Permit;

c. A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge;

d. Information indicating that the Permitted discharge poses a threat to the New York City collection and treatment systems, POTW personnel or the receiving waters;

e. Violation of any terms or conditions of this Permit;

f. Obtaining this Permit by misrepresentation or failure to disclose fully all relevant facts;

g. Upon request of the Industrial User, provided such request does not create a violation of any existing applicable requirements, standards, laws, or rules and regulations; or

h. Correction of typographical or other errors in the Permit.

The filing of a request by the Industrial User for a Permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance, does not stay any Permit condition.

6. Property Rights

The issuance of this Permit does not convey any property rights of any sort, or any exclusive privileges, nor does it authorize any injury to private or public property or any invasion of personal rights, nor any violation of Federal, State or local laws or regulations.

7. Limitation on Permit Transfer

This wastewater discharge Permit is issued to the named Industrial User for the specific operation(s) described herein. It is not assignable to any other named individual or entity or transferable to any other location without the prior written approval of the Department. Any change in the name of the Industrial User shall be considered to be such an assignment. The sale of 50% or more of the stock of the Industrial User, if the Industrial User is a corporation, or the change of any partners, general or limited, if the Industrial User is a partnership, or the change in ownership, if the Industrial User

is a sole proprietorship, shall also be considered an assignment. In the event of such a sale, the Industrial User must inform the purchaser of all responsibilities and obligations under this Permit.

8. Duty to Reapply

If the Industrial User wishes to continue an activity regulated by this Permit after the expiration date of this Permit the Industrial User must apply for and obtain a new Permit. The application must be submitted at least 120 days before the expiration date of this Permit.

9. Dilution

The Industrial User shall not increase the use of process water or, in any way, attempt to dilute a discharge as a partial or complete substitute for adequate treatment to achieve compliance with the limitations contained in this Permit.

The Industrial User shall post a Dilution Notice in a conspicuous manner. The Dilution Notice shall state that the New York City Department of Environmental Protection is to be notified of the illegal dilution of any wastewater discharges or any illegal discharges by calling 311, New York City's General Information Number. You must ask for and record your complaint number for proof of compliance with your notification requirements. The Dilution Notice shall include the following definition of illegal dilution: Illegal dilution is an increase in the use of process water, or any other attempt to dilute a discharge as a partial or complete substitute for adequate treatment to achieve compliance with a Pretreatment Standard or Requirement.

10. General Prohibitive Standards

The Industrial User shall comply with all of the general prohibitive discharge standards in the General Pretreatment Regulations, 40 C.F.R. pt. 403 and the Department's Sewer Use Regulations. Except as expressly allowed by this Permit, if the Industrial User discharges or causes to be discharged, including any run, leak, or escape into any public sewer, pipe, channel, pumping station, catch basins or any other sewer appurtenances, or waterway connecting with any public sewer, or into any private sewer connected with a public sewer any of the following described materials, substances or wastes, shall be strictly liable without regard to fault:

a. Construction materials, ashes, cinders, sand, mud, straw, shavings, metal, glass, rags, feathers, tar, plastic, wood, paunch manure, coffee grounds, fur, wax, or any solids or viscous substances capable of causing obstruction to the flow in sewers or other interference with the proper operation of the sewerage system;

b. Snow and ice at unauthorized locations;

c. Steam or wastewater above 150 degrees Fahrenheit;

d. Flammable or explosive liquids, solids or gases, including, but not limited to, gasoline, benzene and naphtha;

e. Oil sludges, waste oil, motor oil, diesel and other fuels, dielectric fluid, brake fluid, transmission fluid, hydraulic fluid, or other similar substances;

f. Non-polar material in concentrations greater than 50 mg/L for any given time;

g. Coal tar, its derivatives and waste;

h. Paints and related paint waste products from any source that tend to clog or otherwise interfere with the operation of the sewerage system;

i. Wastewater having a pH lower than 5.0 or higher than 12.0 or having any other corrosive property likely to cause damage to structures or equipment of the sewerage system or create a hazard to personnel;

j. Toxic substances in such quantities that the person knows or has reason to know may when discharged from a single source or in combination with other sources: (i) interfere with any sewage treatment process, including sludge digestion, (ii) limit the City's options for operating its sewerage system or disposing of the sewage sludge, grit or scum generated at water pollution control plants, (iii) be detrimental to the health of human beings, animals, or aquatic life, (iv) create any adverse effect in the receiving water, or (v) violate Federal or State laws or regulations or the requirements of a discharge Permit of a sewage treatment plant issued pursuant to Section 402 of the Federal Water Pollution Control Act, commonly referred to as the Clean Water Act, as amended, or any other Permit issued pursuant to Federal or State law;

k. Toxic substances in such quantities that, when discharged from a single source or in combination with other sources: (i) violate any Federal or State laws, regulations, rules or standards governing such discharge, or (ii) violate the toxic discharge limits to be set by the Commissioner contained in a list to be maintained by the Commissioner and which may be published from time to time in the City Record;

l. Any liquids or wastes containing pollutants of such quality and/or quantity that become burdensome in the operation and maintenance of a sewage treatment plant;

m. Any noxious or malodorous gas or substance capable of creating a public nuisance;

n. Any wastewater or substance, that in the opinion of the Commissioner, will result in a violation of any applicable Federal, State or local water quality standard concerning discoloration or other undesirable physical changes in the appearance of the receiving waters;

o. Radioactive material either directly or indirectly into the sewerage system, unless all restrictions, prohibitions, and requirements of Article 175 of the New York City Health Code are fully complied with;

p. Any still bottom or sludge residues resulting from dry cleaning processes, including dirt, lint, soils, perchloroethylene, tetrachloroethylene, solvents and any other deposits or residues extracted as a result of any dry cleaning processes;

q. Filters or filter media used in dry cleaning processes.

11. Compliance with Applicable Pretreatment Standards and Requirements

The Industrial User shall comply at all times with any and all applicable local, State and Federal pretreatment standards and requirements, including any such standards or requirements that may become effective during the term of this Permit.

12. Confidentiality

As provided in Section 19-09 of the Sewer Use Regulations, any information submitted to the Department, except for discharge and effluent data, may be claimed by the discharger to be confidential. Any such claim must be asserted at the time of submission of the information, and should contain a stamped legend or any other suitable form of notice on each page containing such information, employing language such as trade secret, proprietary or confidential business information. If no claim is asserted at the time of submission, the information may be made available to the public without further notice. If a claim is asserted, it will be treated in accordance with Section 19-09.

Effluent data shall be available to the public without restriction.

13. Duty to Provide Information

The Industrial User shall furnish to the Department within a reasonable time, any information that the Department may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this Permit, or to determine compliance with this Permit. The Industrial User shall also furnish to the Department, upon request, copies of records required to be kept by this Permit.

14. Annual Publication

A list of all Industrial Users who, at any time during the previous twelve (12) months, were in significant noncompliance with applicable pretreatment requirements shall be annually published by the Department in a newspaper of general circulation that provides meaningful public notice within the city of New York. The Industrial User is hereby apprised that noncompliance with the provisions of this Permit may result in an enforcement action and publication of its name in an appropriate newspaper in accordance with Section 19-10(g) of the Sewer Use Regulations.

15. Civil and Criminal Liability

Nothing in this Permit shall be construed to relieve the Industrial User from civil and/or criminal penalties for noncompliance under Section 24-524(f) of the NYCAC.

16. Penalties for Violations of Permit Conditions

Section 24-524(f) of NYCAC provides that any person who fails to comply with any of the provisions of Sections 24-504 through 24-524 of the Code, the Sewer Use Regulations, Order of the Commissioner or Environmental Control Board or a Permit condition shall be liable for a civil penalty of up to $10,000.00 for each violation. In the case of a continuing violation, each day's continuance shall be a separate and distinct offense. In addition to civil penalties, any person who knowingly violates or fails to comply with any of the above-cited provisions shall be guilty of a misdemeanor and subject to a fine of up to $10,000.00 and/or to imprisonment not exceeding thirty days. The Industrial User may also be subject to sanctions under State and/or Federal law.

SECTION B. OPERATION AND MAINTENANCE OF POLLUTION CONTROL SYSTEMS

1. Proper Operation and Maintenance

The Industrial User shall at all times properly operate and maintain all facilities and systems for treatment, monitoring and control (and related appurtenances) that are installed or used by the Industrial User to achieve compliance with the conditions of this Permit. Proper operation and maintenance includes, but is not limited to, effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of the Permit.

2. Duty to Halt or Reduce Activity

Upon reduction of efficiency of operation or loss or failure of all or part of the pretreatment facility, the Industrial User shall, to the extent necessary to maintain compliance with its Permit, control production or all discharges or both until operation of the pretreatment facility is restored or an alternative method of pretreatment is provided. This requirement applies, for example, when the primary source of power of the pretreatment facility fails or is reduced. It shall not be a defense for an Industrial User in an enforcement action to state that it would have been necessary to halt or reduce the Permitted activity in order to maintain compliance with the conditions of this Permit.

3. Bypass of Pretreatment Facilities

a. Bypass is prohibited unless

i. it is unavoidable to prevent loss of life, personal injury, or severe property damage, no feasible alternatives exist, and the Industrial User submits notification as required by subparagraph (b) of this paragraph; or

ii. it is for essential maintenance to assure efficient operation, it does not cause pretreatment standards or requirements to be violated, and the Industrial User submits notification as required by subparagraph (b) of this paragraph.

b. Notification of bypass:

i. Anticipated bypass - If the Industrial User knows in advance of the need for a bypass, it shall submit prior written notice, at least ten days before the date of the bypass, to the Department.

ii. Unanticipated bypass - The Industrial User shall immediately notify the Department by calling 311, New York City's General Information Number, and shall submit a written notice to the Department within 5 days after the bypass. This report shall specify:

(1) a description of the bypass, its cause and duration;
(2) whether the bypass has been corrected; and
(3) the steps being taken or to be taken to reduce, eliminate and prevent a recurrence of the bypass.

When calling 311, you must ask for and record your complaint number for proof of compliance with your notification requirements.

4. Disposal of Hazardous Wastes

All solids, sludges, resins or residues, filter backwash or other pollutants removed in the course of pretreatment or control of wastewater shall be handled and disposed of in accordance with all New York State hazardous wastes requirements and RCRA requirements including, but not limited to, subtitles C and D thereof.

SECTION C. MONITORING AND RECORDS

1. Toxic Organics

The Industrial User may not use the certifications provided below for any organic pollutants for which sampling is required under the Industrial User's applicable Federal Categorical Standards. The Industrial User must sample and analyze its wastewater for all such organic pollutants.

The Industrial User shall satisfy the following Toxic Organics requirements:

a. Indicate in each periodic report concerning continued compliance as required by Part I, Sect. C of this Permit which Toxic Organics, if any, were used or stored during the reporting period, and their amounts.

b. Sample and analyze its wastewater for those Toxic Organics that would reasonably be expected to be present.

c. In lieu of monitoring for Toxic Organics and upon scribed request, the Department may allow the Industrial User to make one of the following certifications in its periodic self-monitoring reports:

i. "Based upon my inquiry of the person or persons directly responsible for managing environmental affairs at my facility, I certify that, to the best of my knowledge and belief, no toxic organics were used or stored at my facility during the reporting period covered by this report. I certify that I am duly authorized by the establishment to make this statement on its behalf, and am fully aware that there are significant civil and criminal sanctions for submitting false information, including the possibility of a fine and/or imprisonment."

OR

ii. "Based upon my inquiry of the person or persons directly responsible for managing environmental affairs at my facility, I certify that, to the best of my knowledge and belief, there was no discharge to a public sewer of toxic organics during the reporting period covered by this report. I also certify that the explanations provided concerning the disposal of toxic organics from the facility are true, accurate and complete. I further certify that this facility is implementing a toxic organics management plan to protect against the release of such compounds to a public sewer. I certify that I am duly authorized by the establishment to make this statement on its behalf, and am fully aware that there are significant civil and criminal sanctions for submitting false information, including the possibility of a fine and/or imprisonment."

If certification **(ii)** is made, the facility must also submit a Toxic Organics Management Plan (TOMP) for approval by the Department. An acceptable TOMP must contain:

i. a list of all toxic organic compounds used or stored at your facility; and

ii. a description of the storage, handling and disposal practices for control of toxic compounds at your facility, including procedures for ensuring that toxic organics do not spill or leak into your wastewater.

2. <u>Sampling and Analysis</u>

a. Samples and measurements taken as required in this Permit shall be representative of the volume and nature of the monitored discharge. Samples shall be taken at the monitoring points specified in this Permit and, unless otherwise specified, before the effluent joins or is diluted by any other wastestream, body of water or substance. Monitoring points shall not be changed without prior written approval of the Department.

b. All handling and preservation of collected samples and laboratory analyses of samples shall be performed in accordance with 40 C.F.R. pt. 136. If 40 C.F.R. pt. 136 does not cover the pollutant in question, the handling, preservation, and analysis must be performed in accordance with the latest edition of "Standard Methods for the Examination of Water and

Wastewater." All analyses shall be performed using a detection limit less than the lowest applicable regulatory discharge limit.

c. All laboratory analyses must be conducted by a New York State Health Department certified wastewater laboratory. The results must be certified by the laboratory and submitted on the laboratory's letterhead. For each sample, the laboratory report must indicate the date of sampling, time sample was taken, sample location, chain of custody, sampling preservation procedures, analytical techniques used, date of analysis, units of measurement, and the laboratory's sample identification; where the analytical result reported is below the method detection level, the laboratory report must also indicate the method detection level.

3. Flow Measurements

If flow measurements are required by this Permit, the appropriate flow measurement devices and methods consistent with approved scientific practices shall be selected and used to ensure the accuracy and reliability of measurements of the volume of monitored discharge. The devices shall be installed, calibrated and maintained to ensure that the accuracy of the measurements are consistent with the accepted capability of that type of device. Devices selected shall be capable of measuring flows with a maximum deviation of less than 10% from true discharge rates throughout the range of expected discharge volumes.

4. Inspection and Entry

The Industrial User shall allow duly authorized representatives of the Department to:

a. Enter upon the Industrial User's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this Permit;

b. Have access to and copy, at reasonable times, any records that must be kept by law or regulation and/or under the conditions of this Permit;

c. Inspect, videotape, photograph or otherwise record at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Permit;

d. Sample or monitor, for the purposes of assuring Permit compliance, any substance or parameters at any location; and

e. Inspect, videotape, photograph or otherwise record any production, manufacturing, fabricating or storage area where pollutants, regulated or required under this Permit could originate, be stored or be discharged to the public sewer.

The applicant, by accepting any Permit issued, does hereby consent and agree to entry upon the premises as described herein.

5. Retention of Records

a. The Industrial User shall retain records of all monitoring information, including all calibration and maintenance records and original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this Permit, and records of all data used to complete the application for this Permit, for a period of at least three years from the date of the sample, measurement, report or application. This period may be extended by order of the Commissioner at any time.

b. All records that pertain to matters that are the subject of special orders or any other enforcement or litigation activities brought by the Department shall be retained and preserved by the Industrial User until all enforcement activities have concluded and all periods of limitations with respect to any and all appeals have expired.

6. Record Contents

Records of sampling information shall include:

a. The date, exact place, time and methods of sampling or measurement, and sample preservation techniques or procedures;

b. Who performed the sampling or measurements;

c. The date(s) analyses were performed;

d. Laboratory that performed the analyses;

e. The analytical techniques or methods used;

f. The results of each analysis;

g. The chain of custody of each sample;

h. Method detection level where analytical result reported is non-detect;

i. Units of measurement for each analytical result; and

j. Laboratory's sample identification for each sample.

7. Falsifying Information

It is unlawful to make any false statement representation or certification in any application, report, plan or other document required by this Permit or to falsify, tamper with or knowingly render any monitoring device or method inaccurate.

SECTION D. ADDITIONAL REPORTING REQUIREMENTS

1. Additional Monitoring

If the Industrial User monitors any pollutant more frequently than required by this Permit, using test procedures prescribed in 40 C.F.R. pt. 136 or otherwise approved by EPA or specified in this Permit, the results of such monitoring shall be submitted to the Department in its next self-monitoring report.

2. Automatic Resampling

If the results of the Industrial User's wastewater discharge sampling indicates a violation, the Industrial User shall:

a. notify the Department within 24 hours of becoming aware of the violation; and

b. repeat the sampling and analysis and submit the results of the second analysis to the Department within 30 days after becoming aware of the violation.

3. Split Sampling Results

If the Industrial User requests and analyzes a split sample(s) during a Department sampling event, the results of such analysis shall be submitted to the Department within 45 days of the date the Industrial User received the sample(s) from the Department.

4. Accidental Discharge Notification

In the event of an accidental discharge in violation of any provision of the Sewer Use Regulations, the Industrial User shall immediately notify the Department, at any hour, by calling 311, New York City's General Information Number. You must ask for and record your complaint number for proof of compliance with your notification requirements.

Within five days following an accidental discharge, the Industrial User shall submit to the Department a detailed written report. The report shall specify:

a. the description of the accidental discharge, the cause thereof, and the impact on the Industrial User's compliance status, including the location of discharge, type, concentration and volume of waste;

b. the duration of noncompliance, including exact dates and time of noncompliance, and if the noncompliance continues, the time by which compliance is reasonably expected to occur; and

c. all steps taken to reduce, eliminate and prevent recurrence of such an upset, slug, accidental discharge, or other conditions of noncompliance.

5. Operating Upsets

Any Industrial User that experiences an upset in operations that places the Industrial User in a temporary state of noncompliance with the provisions of either this Permit or the Sewer Use Regulations, shall inform the Department immediately after becoming aware of the upset by calling 311, New York City's General Information Number. You must ask for and record your complaint number for proof of compliance with your notification requirements.

A written follow-up report thereof shall be filed by the Industrial User with the Department within five (5) days. The report shall specify:

a. the description of the upset or slug discharge, the cause(s) thereof and the upset's or slug discharge's impact on the Industrial User's compliance status;

b. the duration of noncompliance, including exact dates and times of noncompliance, and if the noncompliance continues, the time by which compliance is reasonably expected to occur; and

c. all steps taken or to be taken to reduce, eliminate and prevent recurrence of such an upset, slug discharge or other conditions of noncompliance.

6. Planned Changes

The Industrial User shall give written notice to the Department 90 days prior to any change in the Industrial User's name or address, or any facility expansion, production increase, or process modification that results in new or substantially increased discharges or a change in the nature of the discharge. The Industrial User shall also provide written notice 90 days prior to discontinuing any regulated process. The Industrial User shall notify the Department immediately of any changes at its facility affecting its potential for a slug discharge.

7. Anticipated Noncompliance

The Industrial User shall give a minimum of ten days advance notice to the Department of any planned changes in the Permitted facility or activity that may result in noncompliance with this Permit.

8. Signatory Requirements

All applications, reports or information submitted to the Department shall contain the following certification:

> "I certify under penalty of law that I have personally examined and am familiar with the information contained in this document and all attachments therein. Furthermore, based on my inquiry of those persons immediately responsible for obtaining the information contained in this document, I believe that this information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment."

This certification shall be signed by:

a. a responsible corporate officer if the Industrial User submitting the reports is a corporation. For the purpose of this paragraph, a responsible corporate officer means:

   i. president, secretary, treasurer or vice-president of the corporation in charge of a principal business function or any other person who performs similar policy or decision making functions for the corporation, or

   ii. the manager of one or more manufacturing, production or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit duty of making major capital investment recommendations, and initiate and direct other comprehensive measures to assure long-term environmental compliance with environmental laws and regulations; can ensure that the necessary systems are established or actions taken to gather complete and accurate information for control mechanism requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

b. a general partner or proprietor if the Industrial User submitting the report is a partnership or sole proprietorship, respectively.

c. a duly authorized representative of the individual designated in paragraph (a) or (b) of this section if:

   i. The authorization is made in writing by the individual described in paragraph (a) or (b);

   ii. The authorization specifies either an individual or a position having responsibility for the overall operation of the facility from which the industrial discharge originates, such as the position of plant manager, or a position of equivalent responsibility, or a position having overall responsibility for environmental matters for the company; and

   iii. The written authorization is submitted to the Department.

   If an authorization under this paragraph is no longer accurate because a different individual or position has responsibility for the overall operation of the facility or overall responsibility for the environmental matters of the company, a new authorization satisfying the requirement of this paragraph must be submitted to the Department prior to or together with any reports to be signed by an authorized representative.

Enclosure 2

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Site Management Periodic Review Report Notice
Institutional and Engineering Controls Certification Form

Site Details **Box 1**

Site No. 224002

Site Name Pennsylvania Avenue Landfill

Site Address:Pennsylvania Avenue & Shore Parkway Zip Code: 11239
City/Town: Brooklyn
County: Kings
Site Acreage: 110.00

Reporting Period: January 1, 2014 to December 31, 2018

	YES	NO
1. Is the information above correct?	X	☐
If NO, include handwritten above or on a separate sheet.		
2. Has some or all of the site property been sold, subdivided, merged, or undergone a tax map amendment during this Reporting Period?	☐	X
3. Has there been any change of use at the site during this Reporting Period (see 6NYCRR 375-1.11(d))?	☐	X (1)
(1) Site use will be changing in 2019 in accordance with attached DEC/DOH 12/13/17 waivers.		
4. Have any federal, state, and/or local permits (e.g., building, discharge) been issued for or at the property during this Reporting Period?	X (2)	☐
(2) New DEP IWD Permit No. 16-P3145-1 issued 10/12/16 (see PRR Appendix A). NYS Parks is responisble for all Permits related to the State Park.		
If you answered YES to questions 2 thru 4, include documentation or evidence that documentation has been previously submitted with this certification form.		
5. Is the site currently undergoing development?	X (3)	☐
(3) The site is in the process of being converted into a State Park (see PRR).		

Box 2

	YES	NO
6. Is the current site use consistent with the use(s) listed below?	X (4)	☐
(4) Site is a closed landfill and future State Park consistent with attached DEC/DOH 12/13/17 waivers.		
7. Are all ICs/ECs in place and functioning as designed?	X	☐

IF THE ANSWER TO EITHER QUESTION 6 OR 7 IS NO, sign and date below and DO NOT COMPLETE THE REST OF THIS FORM. Otherwise continue.

A Corrective Measures Work Plan must be submitted along with this form to address these issues.

Not Applicable

Signature of Owner, Remedial Party or Designated Representative Date

SITE NO. 224002 **Box 3**

Description of Institutional Controls

Parcel	Owner	Institutional Control
BK-4452-002	National Park Service	Ground Water Use Restriction (5) Landuse Restriction (5) Monitoring Plan O&M (6)

The following institutional and engineering controls are in place at the site and must be maintained in accordance with the remedy in the Record of Decision issued on February 10, 1995:

- landfill capping with active gas collection;
- active waste oil and leachate collection in the oil contamination area along Fresh Creek;
- long term monitoring of site media.

Description of Engineering Controls **Box 4**

Parcel	Engineering Control
BK-4452-002	Cover System Leachate Collection

(5) NYSDEC Environmental Notice issued 5/16/12. Recorded in NYC's ACRIS database 7/16/12. Landuse Restriction modified by attached DEC/DOH 12/13/17 waivers.

(6) Part 360 (now Part 363) O&M Plan also serves as the Part 375 SMP for this site as approved by NYSDEC.

Box 5

Periodic Review Report (PRR) Certification Statements

1. I certify by checking "YES" below that:

   a) the Periodic Review report and all attachments were prepared under the direction of, and reviewed by, the party making the certification;

   b) to the best of my knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program, and generally accepted engineering practices; and the information presented is accurate and complete.

YES	NO
X	☐

2. If this site has an IC/EC Plan (or equivalent as required in the Decision Document), for each Institutional or Engineering control listed in Boxes 3 and/or 4, I certify by checking "YES" below that all of the following statements are true:

   (a) the Institutional Control and/or Engineering Control(s) employed at this site is unchanged since the date that the Control was put in-place, or was last approved by the Department;

   (b) nothing has occurred that would impair the ability of such Control, to protect public health and the environment;

   (c) access to the site will continue to be provided to the Department, to evaluate the remedy, including access to evaluate the continued maintenance of this Control;

   (d) nothing has occurred that would constitute a violation or failure to comply with the Site Management Plan for this Control; and

   (e) if a financial assurance mechanism is required by the oversight document for the site, the mechanism remains valid and sufficient for its intended purpose established in the document.

YES	NO
X	☐

IF THE ANSWER TO QUESTION 2 IS NO, sign and date below and DO NOT COMPLETE THE REST OF THIS FORM. Otherwise continue.

A Corrective Measures Work Plan must be submitted along with this form to address these issues.

Signature of Owner, Remedial Party or Designated Representative

Date

IC CERTIFICATIONS
SITE NO.

Box 6

SITE OWNER OR DESIGNATED REPRESENTATIVE SIGNATURE

I certify that all information and statements in Boxes 1,2, and 3 are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law.

I Walter Goyzueta, PE (print name) at 96-05 Horace Harding Expressway, Corona, NY 11368, (print business address)

am certifying as Remedial Party (Owner or Remedial Party)

for the Site named in the Site Details Section of this form.

Walter Goyzueta 3/29/2019

Signature of Owner, Remedial Party, or Designated Representative Date

Rendering Certification

IC/EC CERTIFICATIONS

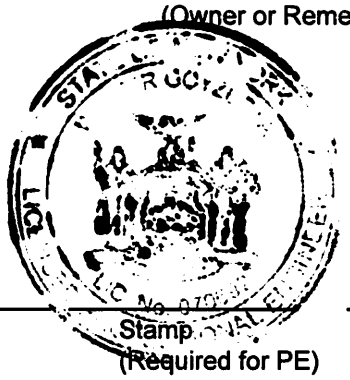
Box 7

Signature

I certify that all information in Boxes 4 and 5 are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law.

I Walter Goyzueta, PE (print name) at 96-05 Horace Harding Expressway, Corona, NY 11368 (print business address),

am certifying as a for the Remedial Party (Owner or Remedial Party)



Walter Goyzueta

Signature of , for the Owner or Remedial Party, Rendering Certification

Stamp (Required for PE)

3/29/2019

Date

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Office of Remediation & Materials Management, Deputy Commissioner
625 Broadway, 14th Floor, Albany, New York 12233-1010
P: (518) 402-9401 | F: (518) 402-9016
www.dec.ny.gov

December 13, 2017

Kathleen L. Martens
Acting General Counsel
NYS Office of Parks, Recreation and Historic Preservation
625 Broadway
Albany, NY 12238

Re: Change of Use Notification
Pennsylvania Avenue Landfill, Site No. 224002
Fountain Avenue Landfill, Site No. 224003

Dear Ms. Martens:

The New York State Department of Environmental Conservation (Department) has received New York State Parks, Recreation and Historic Preservation's (Parks) October 20, 2017 letter formally notifying the Department of Parks' intent to develop and operate a New York State park at the former Pennsylvania Avenue and Fountain Avenue Landfills. The letter transmitted the Change of Use form required by the Department's regulations (6 NYCRR 375-1.11(d)) and plans detailing proposed modifications to enable the passive recreational use, as described at 6 NYCRR 375-1.8(g)((2)(iii), of certain areas. Additional information regarding certain elements of the project was provided to the Department's project manager by e-mail dated November 6, 2017. The Department, in consultation with the New York State Department of Health (NYSDOH), supports Parks' transformation of these closed landfills into an area that enhances the quality of life of the greater community and approves the proposed modifications.

As noted in your letter, Parks' activities will not change or affect any legal obligations of New York City (City), the former owner and operator of the landfills, or the National Park Service, the property owner. As closed and monitored landfills, the City will continue to carry out operation and maintenance activities pursuant to Orders on Consent with the Department. The City's current Operation and Management Plan was approved by the Department by letter dated December 22, 2008. Parks will be responsible for operation of State park facilities pursuant to agreements with the City and the National Park Service.

The Department recognizes that Parks' plans will be consistent with the Department-approved Operation and Management Plan and any revisions thereto, that its use of the area will comply with the requirements and prohibitions of the May 16, 2012 Environmental Notice filed in the Office of the City Register on July 16, 2012, and that Parks will obtain any Department approvals or waivers required by the Environmental Notice, and provide the Department with prior notice and information regarding Parks' intended activities. Parks' passive recreational plans for the area will not prevent or interfere with the on-going remedial program being carried out by the City, and will be protective of public health and the environment.

Based on the above, the Department hereby provides the express written waiver described in paragraph "Fourth" of the Environmental Notice. The future use of the sites will be as a closed landfill with Department-approved passive recreational uses. This change of use applies to all future activities to develop and operate the park, subject to review and approval of plans submitted to the Department prior to any work being initiated.

As discussed at our September 25, 2017 meeting, some of Parks' proposed modifications will require coordination with the Department's Division of Environmental Remediation and Division of Environmental Permits. The Division of Environmental Remediation will also continue to coordinate with the NYSDOH. That coordination is ongoing, and we look forward to working closely with Parks to facilitate this project moving forward.

In closing, the Department is pleased to be part of the transition of these areas into a State park that benefits the community. If you have any questions or need additional information, please feel free to contact me.

Sincerely,

Martin Brand
Deputy Commissioner

Enclosure

ec: M. Ryan, S. Zahn, M. Cruden, M. Mason, D. Tuohy – NYSDEC
J. Deming – NYSDOH
Vincent Sapienza, P.E., Commissioner, NYC Department of Environmental Protection
Jennifer T. Nersesian, Superintendent, Gateway National Recreation Area:

NEW YORK
STATE OF
OPPORTUNITY.

Department
of Health

ANDREW M. CUOMO
Governor

HOWARD A. ZUCKER, M.D., J.D.
Commissioner

SALLY DRESLIN, M.S., R.N.
Executive Deputy Commissioner

December 13, 2017

Martin Brand, Deputy Commissioner
Office of Remediation & Materials Management
NYS Dept. of Environmental Conservation
625 Broadway
Albany NY 12233

Re: **Proposed Change of Use**
Pennsylvania Avenue Landfill (site #224002)
Fountain Avenue Landfill (site #224003)
Brooklyn, Kings County

Dear Mr. Brand:

At your Department's request, the New York State Department of Health (NYSDOH) has reviewed the October 2017 *Proposed Change of Use* for the above referenced sites. The NYSDOH understands that the New York State Office of Parks, Recreation and Historic preservation is proposing to develop and operate a New York State Park at the referenced sites. Current proposed enhancements include walking and biking paths, comfort facilities, and improvements to the piers. Additional plans may be proposed in the future.

The NYSDOH also recognizes that both landfill sites have been remediated and properly closed in accordance with 6 NYCRR Part 360, and that the potential for human exposure to remaining contamination is being addressed through institutional and engineering controls. Compliance with the approved Operation and Management Plan and certification by New York City to the New York State Department of Environmental Conservation (NYSDEC) will ensure that the institutional and engineering controls remain effective.

Based on this information, and with the understanding that the proposed development will be conducted in accordance with the approved Operation and Management Plan and coordinated with the NYSDEC and the NYSDOH, the proposed change of use is acceptable and will be protective of public health.

State parks, particularly urban parks, play an important role in improving quality of life and overall health in the communities they serve. As such, the NYSDOH looks forward to continued collaboration with all parties involved in this project to ensure the successful transition of these sites.

If you have any questions, please contact me at (518) 473-0771.

Sincerely,

Bradley Hutton
Deputy Commissioner
Office of Public Health

ec: K. Anders / e-file
C. Westerman – NYSDOH MARO
C. D'Andrea – NYCDHMH
M. Ryan, J. O'Connell – NYSDEC